Microsoft

Volumes and Networking

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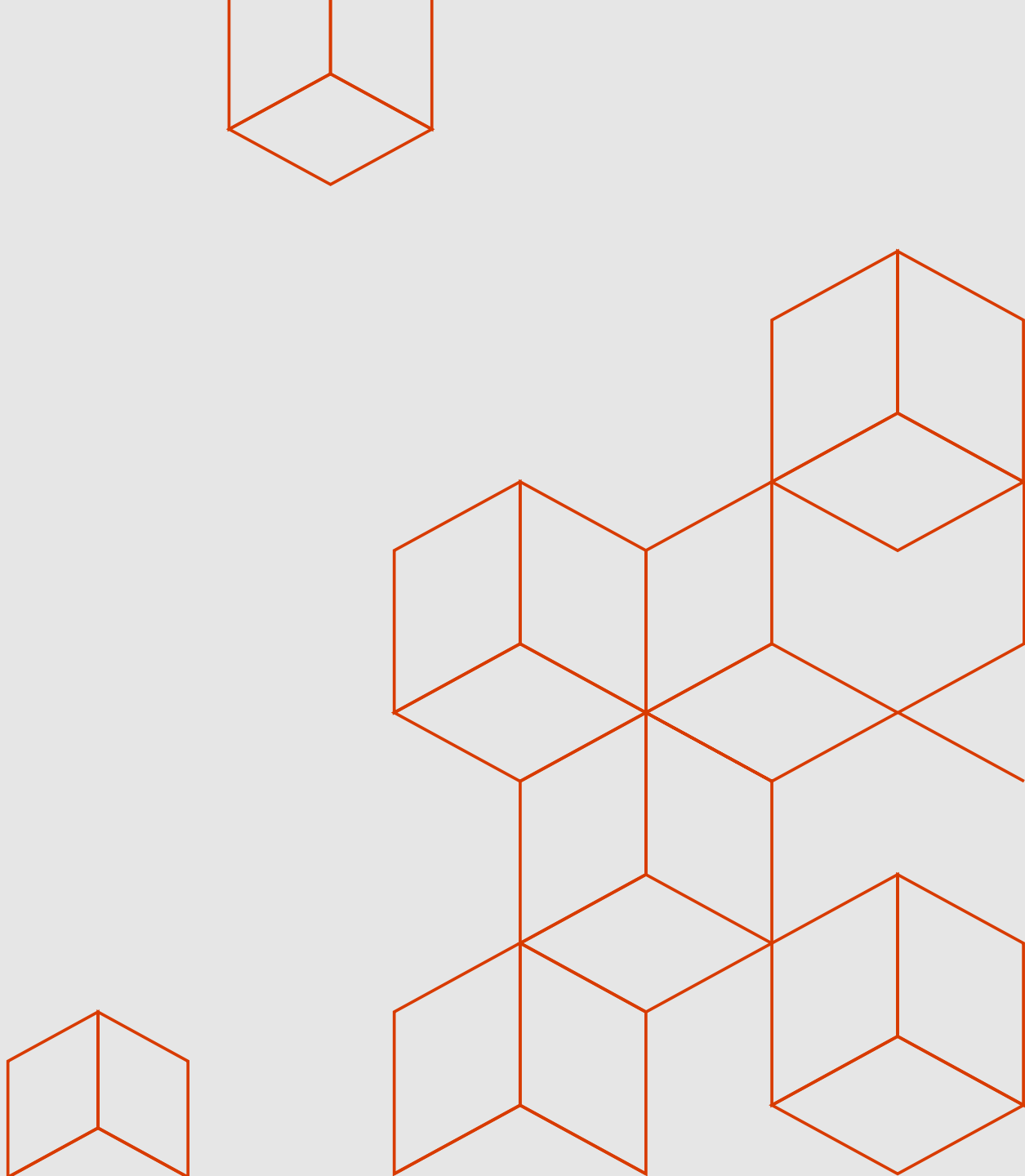
Apps

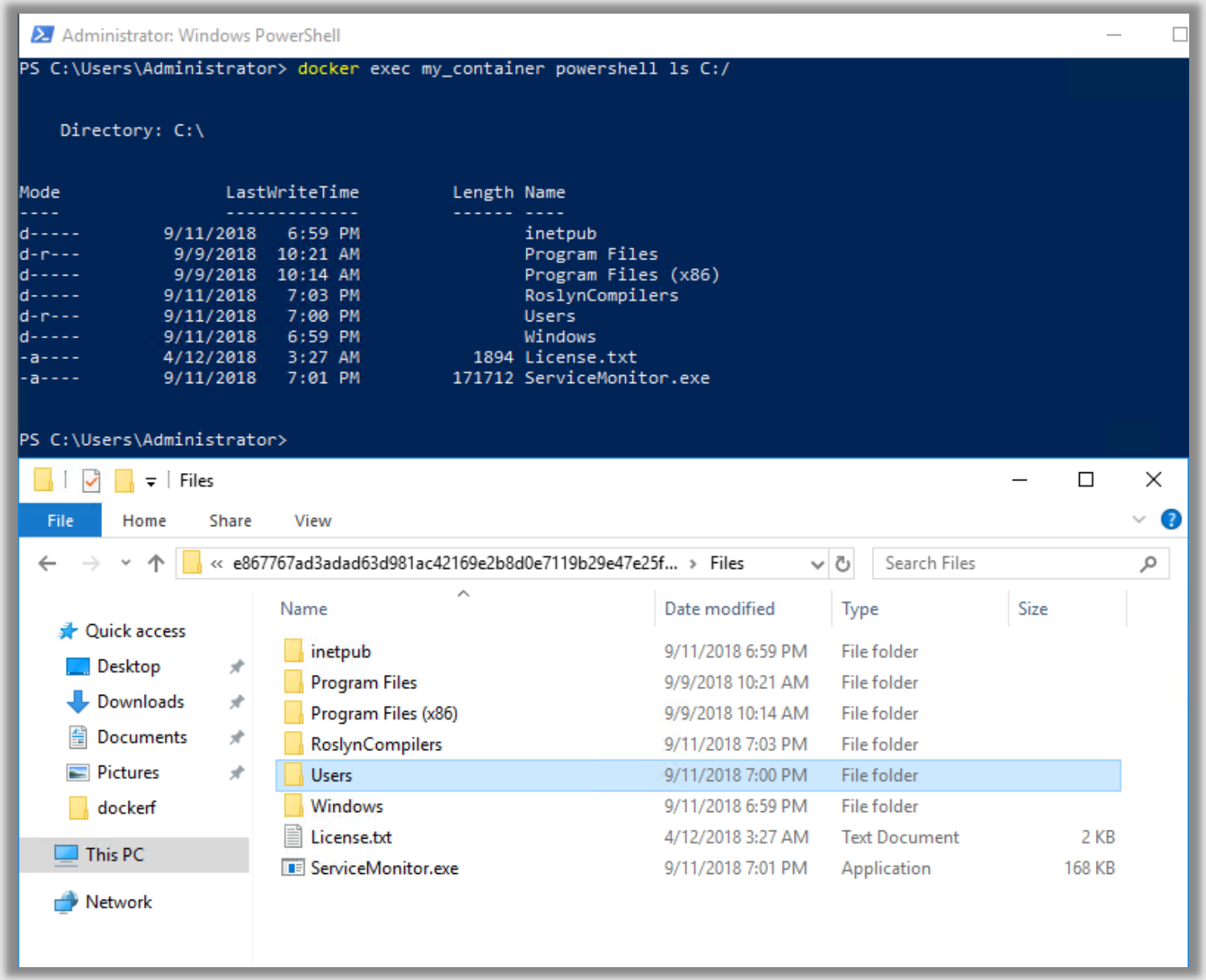
Overview

- Storage
- Volumes
- Networking
  - Linux
  - Windows

Storage and Networking



Filesystem in Containers



Filesystem in Containers

- Containers get temporary storage
- Throw away storage when container goes away

```
[sujit@labs ~]$ sudo docker exec -it 63 bash
root@63e6d68fe47c:/#
root@63e6d68fe47c:/# ls -l
total 8
drwxr-xr-x.   2 root root 4096 Feb  4 00:00 bin
drwxr-xr-x.   2 root root    6 Jan 22 13:47 boot
drwxr-xr-x.   5 root root  340 Feb 14 04:54 dev
drwxr-xr-x.   1 root root   66 Feb 14 04:54 etc
drwxr-xr-x.   2 root root    6 Jan 22 13:47 home
drwxr-xr-x.   1 root root   45 Feb  4 00:00 lib
drwxr-xr-x.   2 root root   34 Feb  4 00:00 lib64
drwxr-xr-x.   2 root root    6 Feb  4 00:00 media
drwxr-xr-x.   2 root root    6 Feb  4 00:00 mnt
drwxr-xr-x.   2 root root    6 Feb  4 00:00 opt
dr-xr-xr-x. 159 root root    0 Feb 14 04:54 proc
drwx------.   2 root root   37 Feb  4 00:00 root
drwxr-xr-x.   1 root root   38 Feb 14 04:54 run
drwxr-xr-x.   2 root root 4096 Feb  4 00:00 sbin
drwxr-xr-x.   2 root root    6 Feb  4 00:00 srv
dr-xr-xr-x.  13 root root    0 Feb 13 23:43 sys
drwxrwxrwt.   1 root root    6 Feb  6 08:11 tmp
drwxr-xr-x.   1 root root   66 Feb  4 00:00 usr
drwxr-xr-x.   1 root root   19 Feb  4 00:00 var
root@63e6d68fe47c:/#
```

Storage

Container Image
- Not designed for persistent data
- Not designed for secrets

Volumes
- Enables storage persistence
- Enables mapping of storage into containers
- Read-Only or Read/Write
- Multiple containers on the same host can access the same location
- Plug-In Architecture

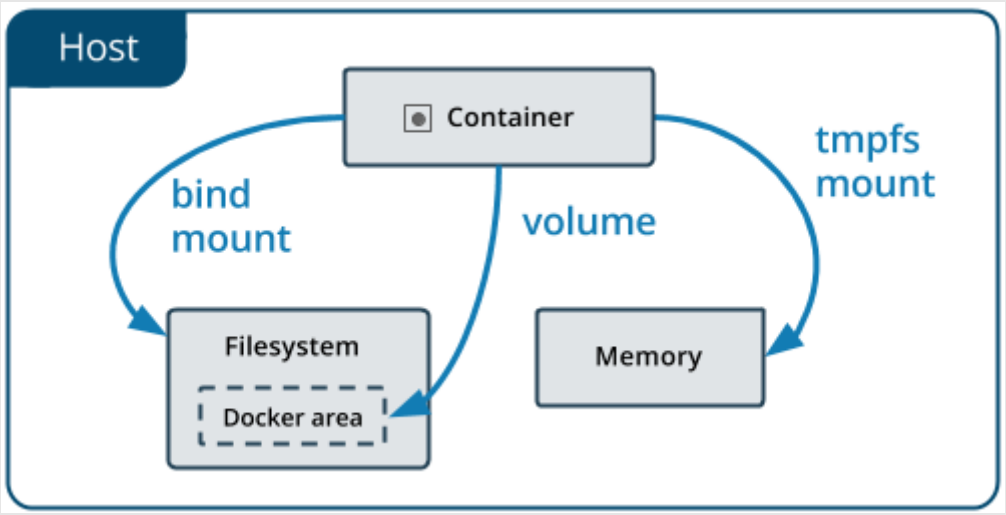
Network Storage
- Containers access SMB shares
- Accessed though the containers network

Storage Options

1. Volumes
   Stored in a part of the host filesystem which is managed by Docker

2. Bind Mounts
   anywhere on the host system

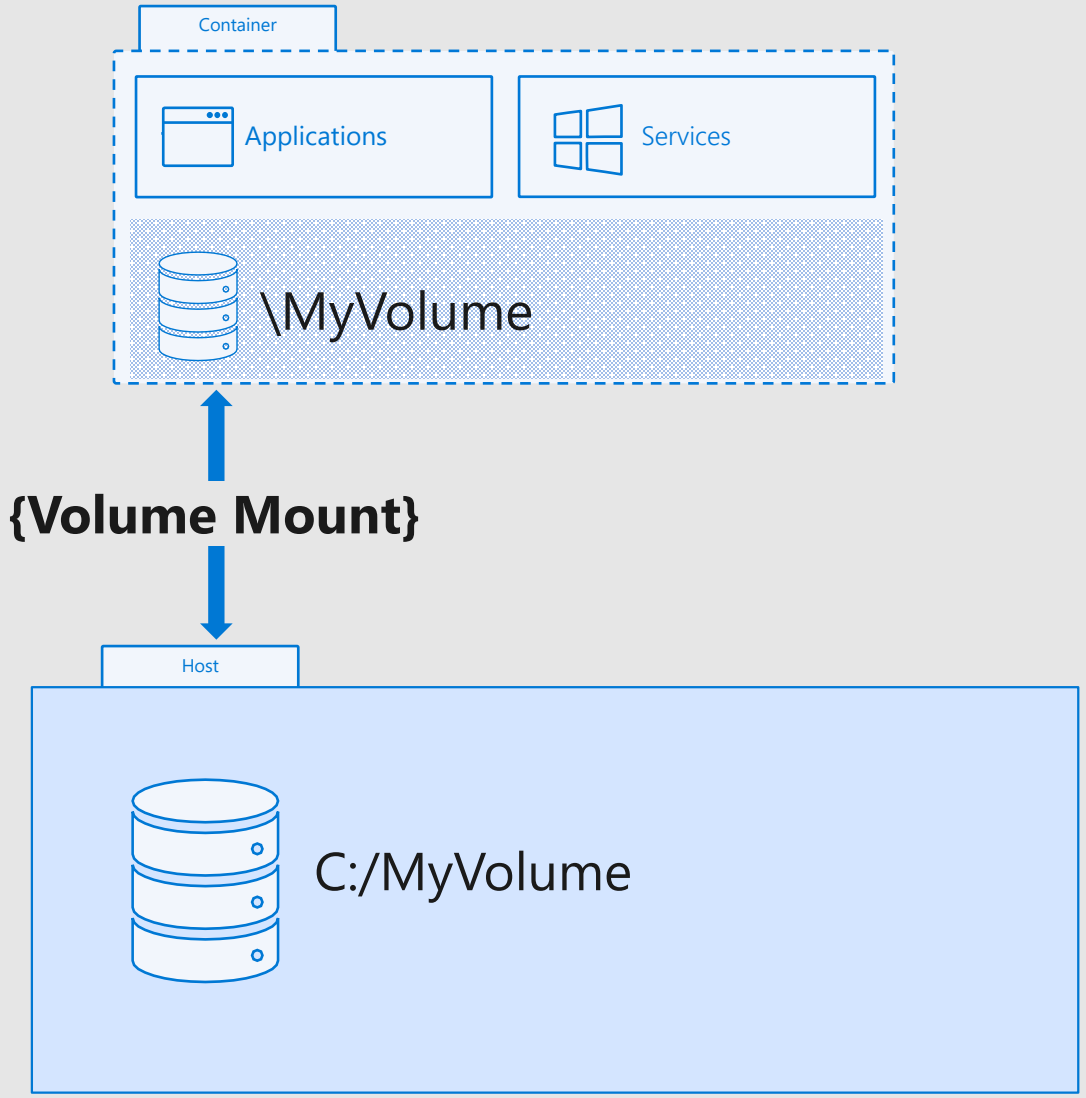
3. Tmpfs mounts
   stored in the host system’s memory only



https://docs.docker.com/storage/

Persistent Storage for containers

- You can **mount** folders or files from host to container.
- Changes preserved on host



Mount a host folder from a container

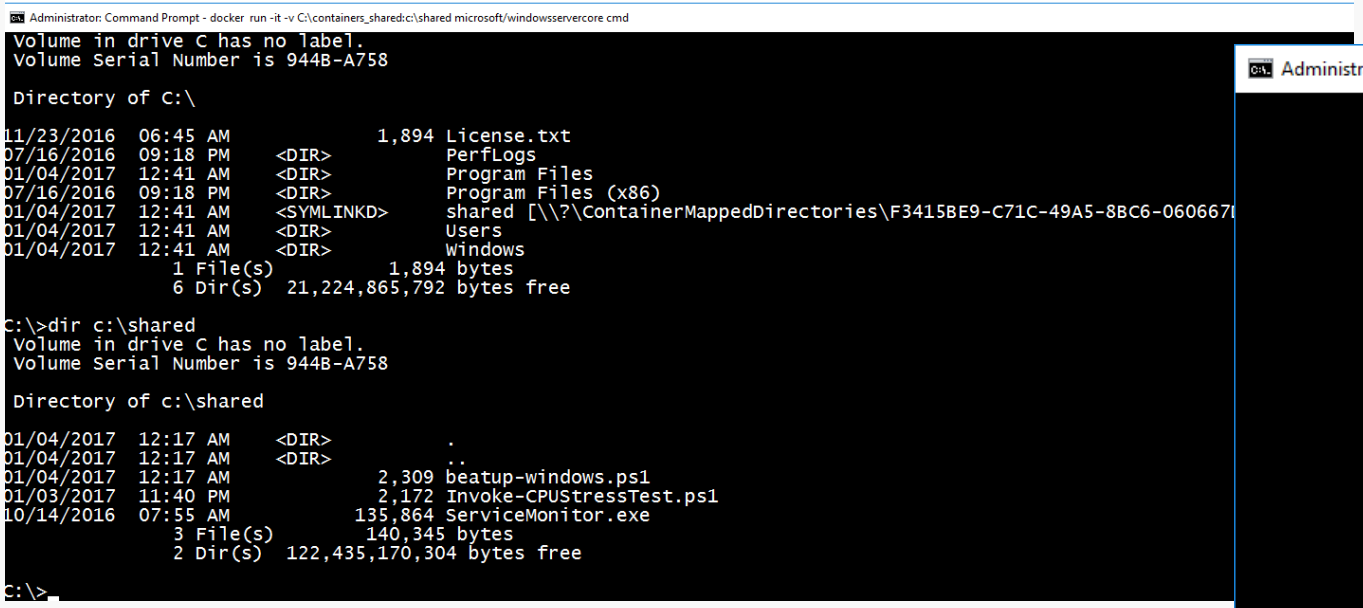
- To mount a container host folder to a container:
  - docker run –v [host folder path]:[container folder path]

  Example:

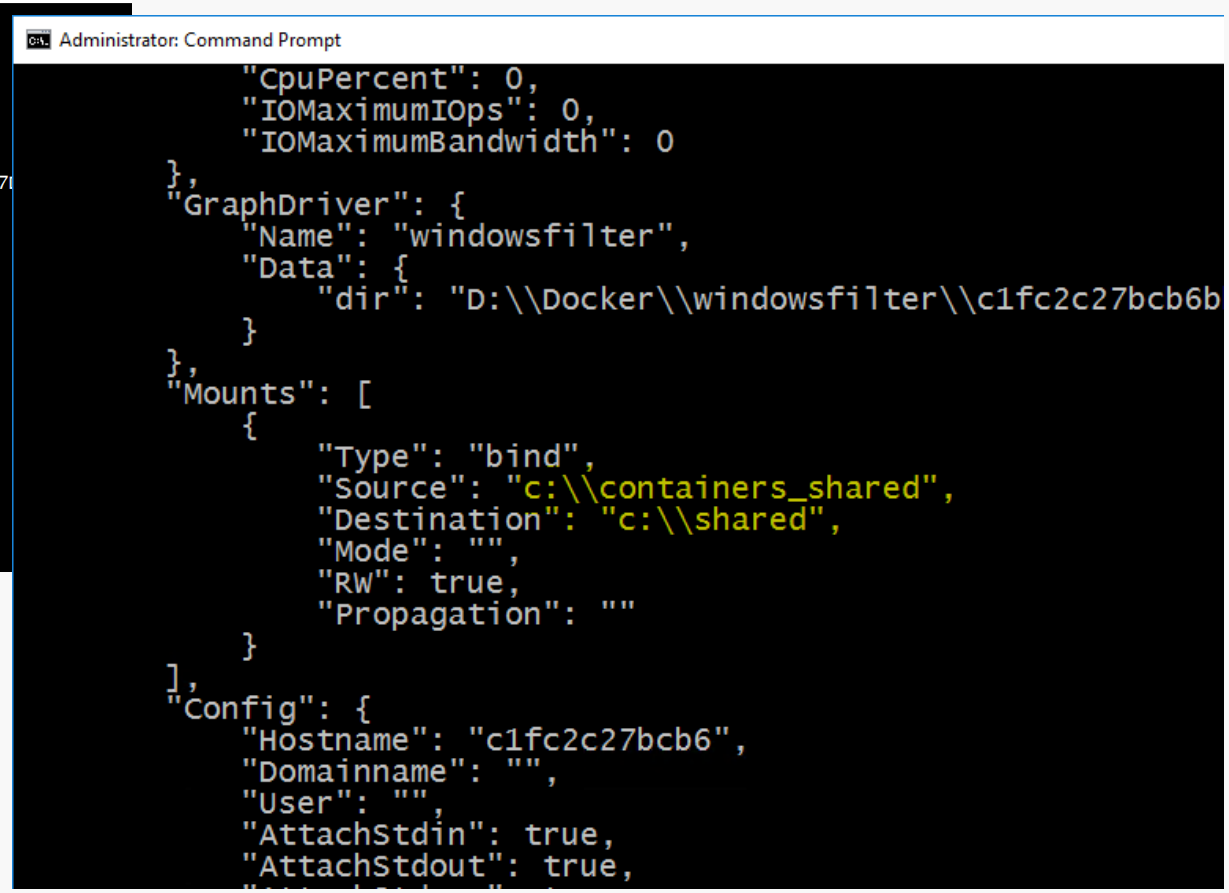
  docker run -it -v c:\containers_shared:c:\shared microsoft/windowsservercore cmd

Mount a host folder from a container

Docker inspect [container]



Inside the container



Volume

- Create a volume

```
docker volume create <volume name>
```

- Mount the volume

```
docker run -it --mount source=<volume name>,target=<container path>
        mcr.microsoft.com/windows/nanoserver:1909 cmd
```

Tmpfs

- Only for Docker on Linux
- can’t share tmpfs mounts between containers
- This is useful to temporarily store sensitive files that you don’t want to persist in either the host or the container writable layer.

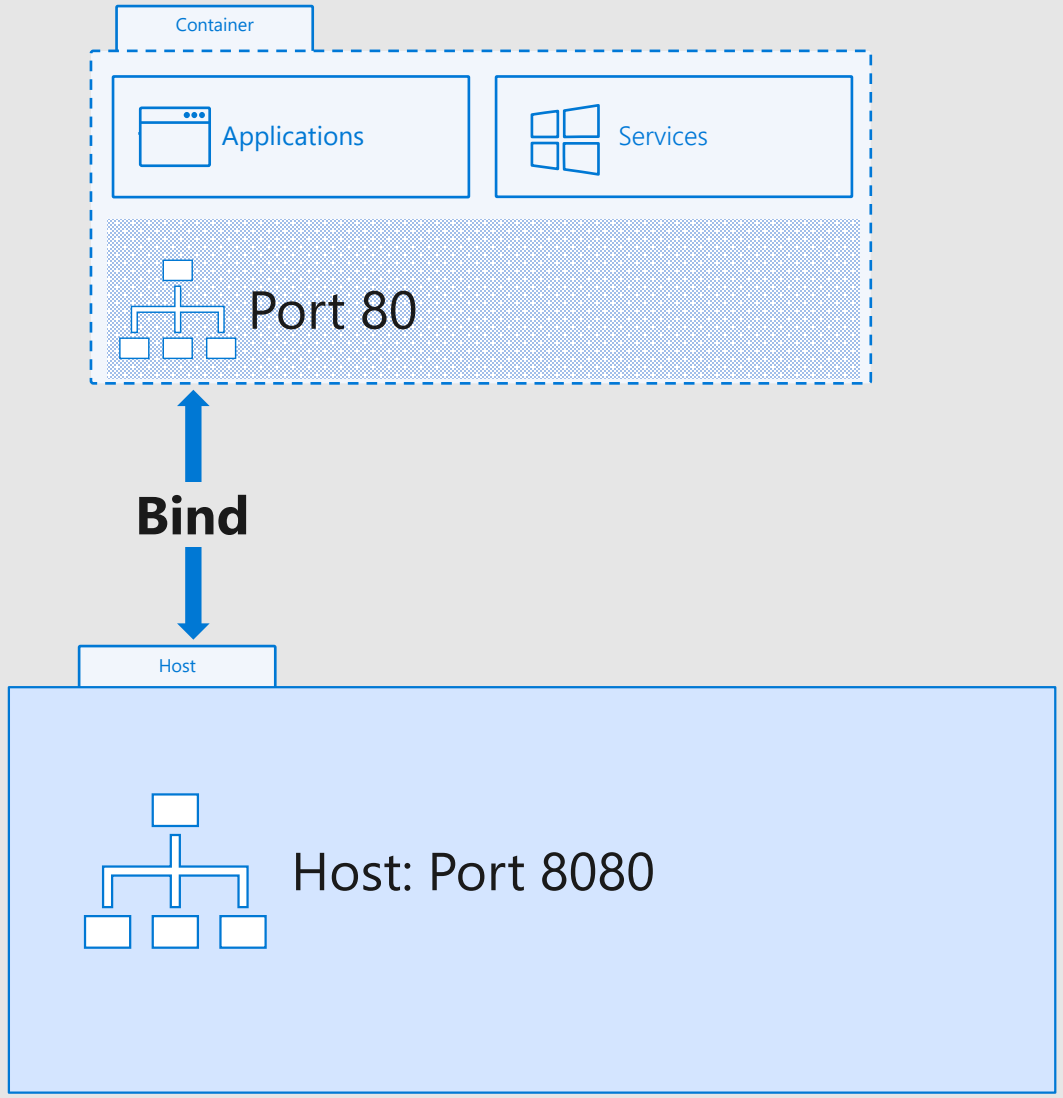
```
docker run -d -it --name container1 /
        --mount type=tmpfs, destination=/app nginx:latest
```

Demo

- Bind mount
- Volume

Container Networking

- Each container gets their own network isolation
- Bind container to host ports.



Linux Networking

- **User-defined bridge networks** are best when you need multiple containers to communicate on the same Docker host.
- **Host networks** are best when the network stack should not be isolated from the Docker host, but you want other aspects of the container to be isolated.
- **Overlay networks** are best when you need containers running on different Docker hosts to communicate, or when multiple applications work together using swarm services.
- **Macvlan networks** are best when you are migrating from a VM setup or need your containers to look like physical hosts on your network, each with a unique MAC address.
- **Third-party network plugins** allow you to integrate Docker with specialized network stacks.

Windows networking

- NAT (Default) Dynamic IP allocation and assignment by Host Networking Service (HNS) from internal NAT subnet prefix
- Transparent Static or dynamic (using external DHCP server) IP allocation and assignment from IP addresses within container host's network prefix
- Overlay Dynamic IP allocation from Docker Engine Swarm Mode managed prefixes and assignment through HNS
- L2Bridge Static IP allocation and assignment from IP addresses within container host's network prefix (could also be assigned through HNS)
- L2Tunnel Azure only - Dynamic IP allocation and assignment from plugin

User defined networks

- docker network create \
  --driver=nat \
  --subnet=172.28.0.0/16 \
  --ip-range=172.28.5.0/24 \
  --gateway=172.28.5.254 \
  mynetwork

Demo

- Networking

Knowledge Check

- Difference between bind mount and volume
- Parameters to mount folders in containers?
- What are default networks for Windows and Linux containers?

Microsoft

Thank you! Questions?