Docker Storage

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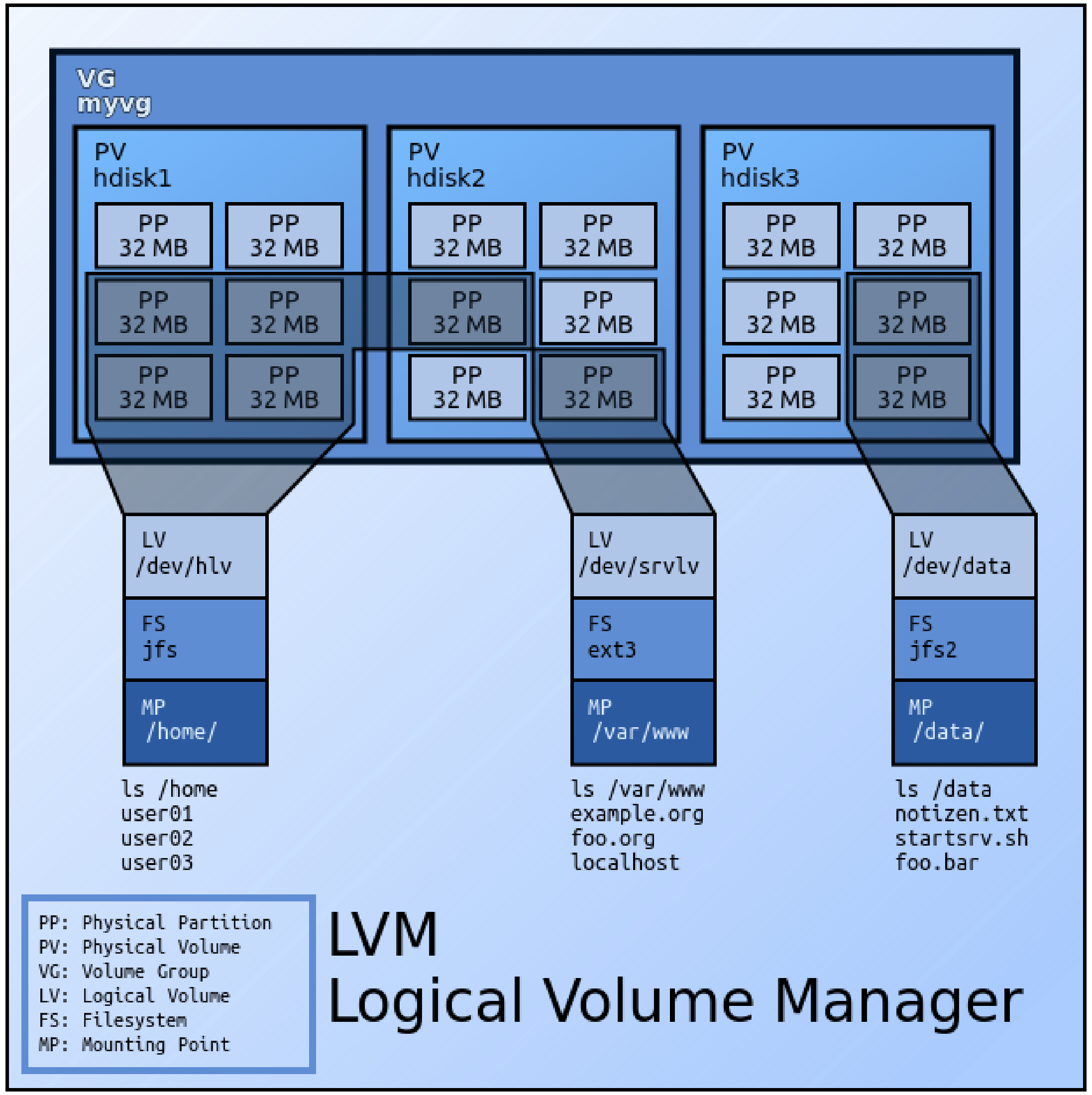
Agenda

- ***Brush-up on Docker basics***
- ***Linux Volumes***
- ***Overlay and Docker File System***
- ***Types of Docker mount***
  - ***Volumes***
  - ***Bind mounts***
  - ***Tempfs***
- ***Hands-on***

Brush-up on Docker basics

- docker run hello-world, docker pull and docker images
- docker run ubuntu bash
- docker run -idt ubuntu bash , install vi and docker commit
- docker exec –it «container_id»
- docker run --name web -d -p 3000:80 nginx
- docker run --name web1 -d -p 3100:80 --mount type=volume,source=nginx-vol,destination=/usr/share/nginx/html nginx
- docker run --name web2 -d -p 3200:80 -v /root/Public:/usr/share/nginx/html nginx
- docker rm -f $(docker ps -qa)

Linux Volumes



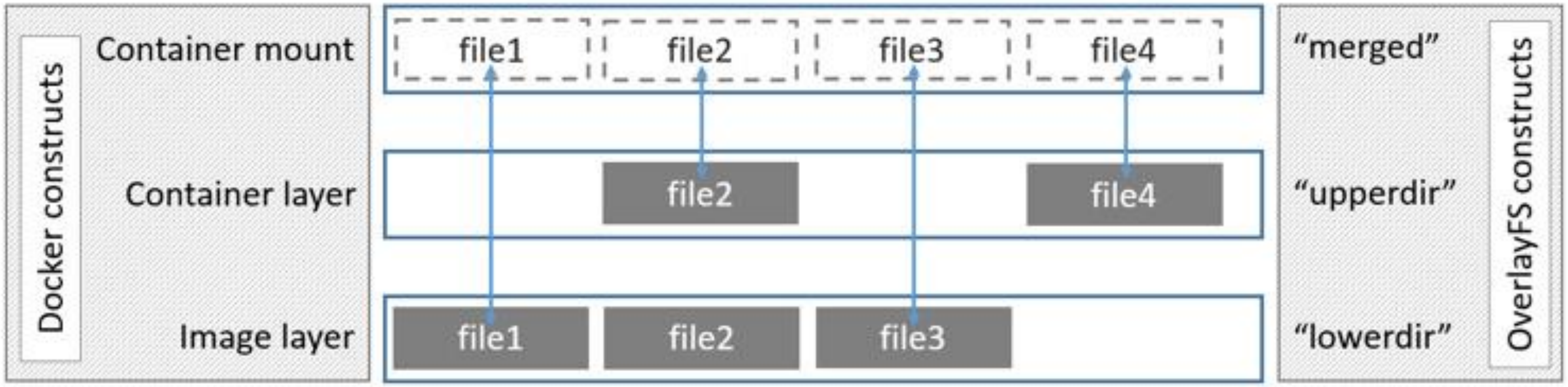
Storage Drivers (overlay, aufs etc)

1. Create a container: docker run --name web -d -p 3000:80 nginx
2. Connect to container and explore file system (/usr/share/nginx/html)
3. Check physical file system on host (/var/lib/docker/)
4. Create file on container
5. Find the file on the host
6. Check volume diff of the container
7. Kill and remove the container

What happens to the container’s file system?

Overlay FS in Docker

https://gdevillele.github.io/engine/userguide/storagedriver/overlayfs-driver/

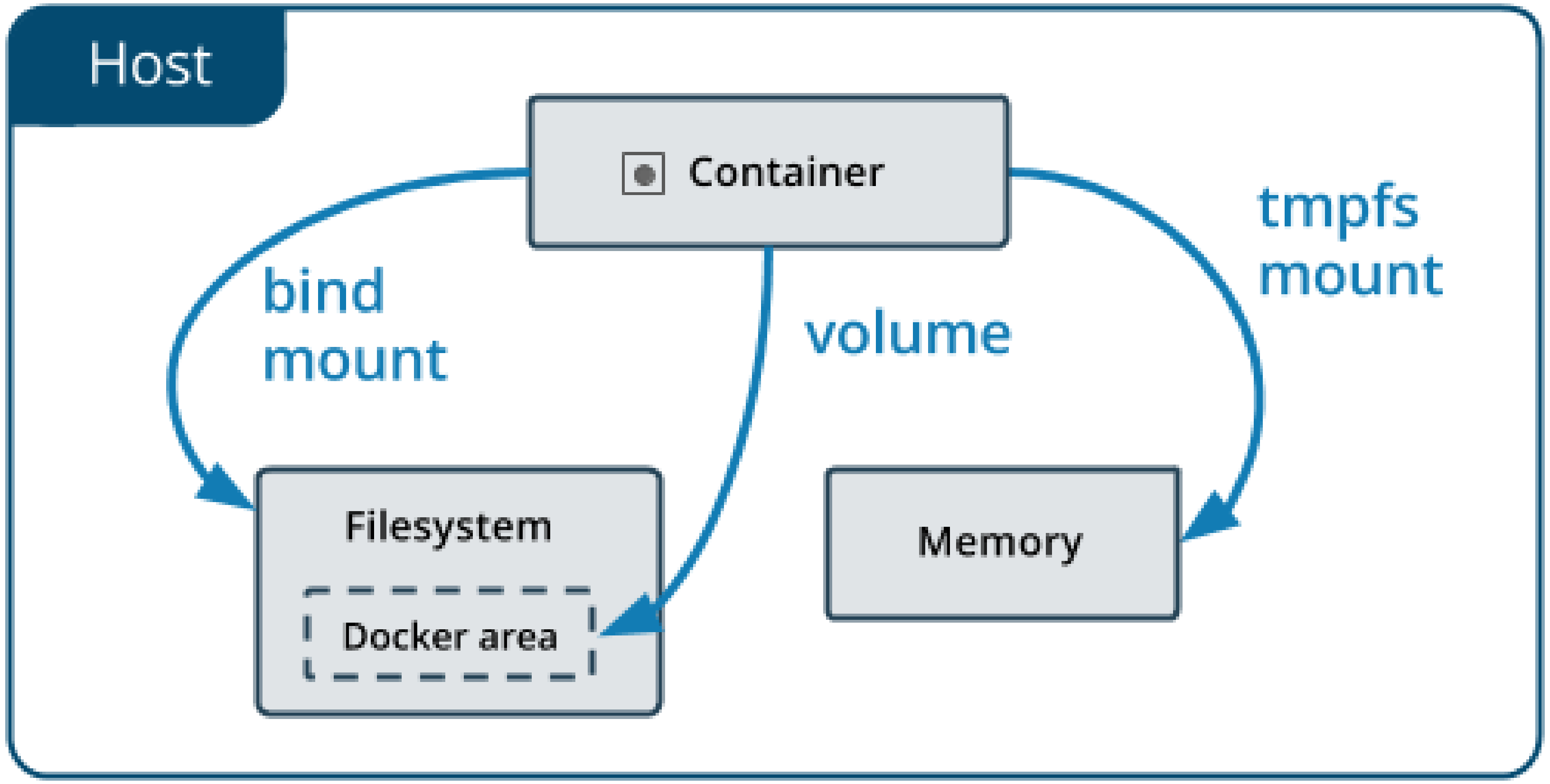


- Image layer and container layer can contain the same files.
- The files in the container layer ("upperdir") are dominant and obscure the existence of the same files in the image layer ("lowerdir").
- The container mount ("merged") presents the unified view.
- To create a container, the overlay driver combines the directory representing the image's top layer plus a new directory for the container. The image's top layer is the "lowerdir" in the overlay and read-only. The new directory for the container is the "upper

Default Docker file system

1. “Writable container layer”
2. No static path from outside the container
3. No container, no data
4. Tightly coupled with host machine
5. Union FS - slower performance

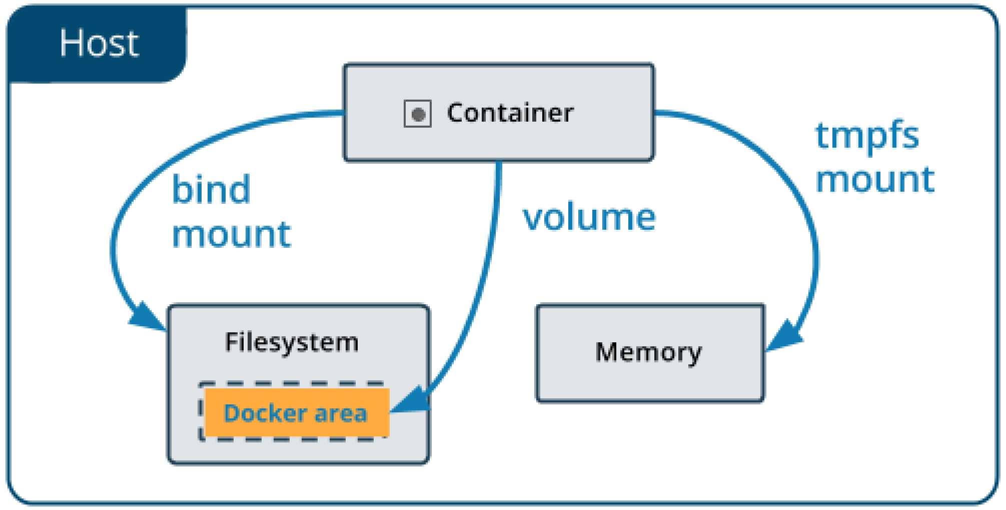
Types of Docker mount



Volumes

Describe the characteristics and use cases of volumes

- Created and managed by Docker
  - Explicitly (`docker volume create`)
  - Implicitly (during container creation)
- Can be Named or Anonymous
- Supports volume drivers
- Cleanup possible (`docker volume prune`)



Volumes – Use cases

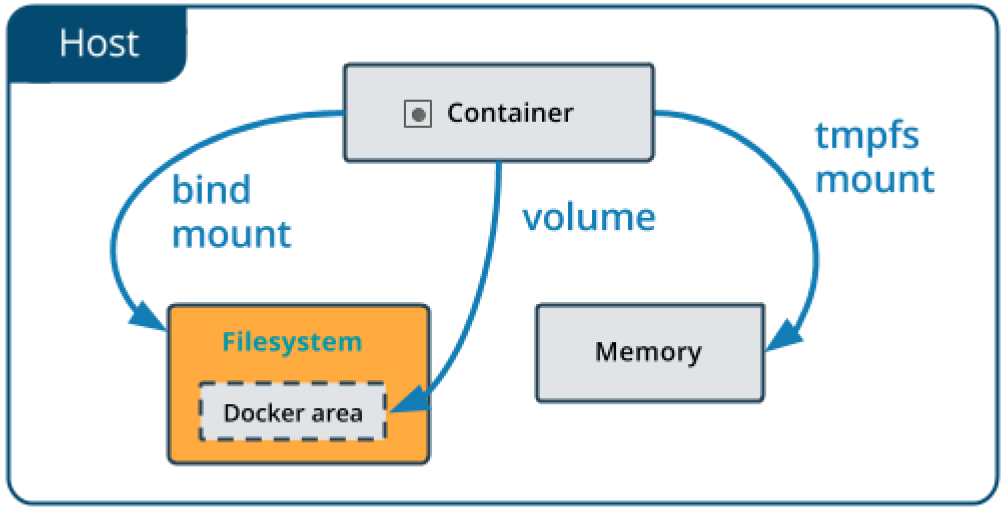
Describe the characteristics and use cases of volumes

- Persistency across container lifecycle
- Sharing data across containers (say across 2 nginx’s)
- Decoupled host-container file system architecture
- Storing data outside the host (central storage or cloud)
- Backup and restore

Bind mounts

Describe the characteristics and use cases of bind mounts

- Created by docker if needed
- Maintained by host
- Can have security implications
- Performant
- Needs specific dir structure on host



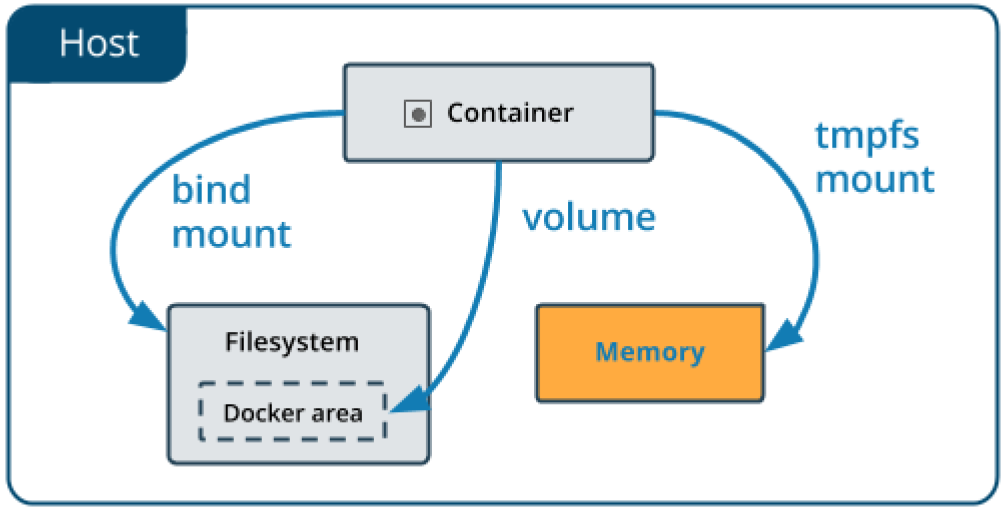
Bind mounts – Use cases

- Sharing config from host
- DevOps build lifecycle – *target* folder into container
- Persistency across container lifecycle
- Sharing data across containers (say across 2 nginx’s)

Tempfs

Describe the characteristics and use cases of Tempfs mounts

- Only in memory!
- Great for storing sensitive data
- Extremely fast
- No cleanup needed



Tempfs – Use cases

- I/O sensitive projects
- Standalone containers with need to store runtime info

Reference material

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

Thank You.