

# Containers: from the Ground Up

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# Background: What are Containers?

- Containerization on the Linux Operating System
- Containers vs Virtual Machines
- The advantage of containers over virtual machines

# Control Groups (cgroups)

Grouping processes based on the resources they use

- Organized in a hierarchical structure to allow OS to distribute resources systematically.
- This abstract functionality perspective is build directly in the Linux architecture.
- The functionality cgroups provide include, but are not limited to, resource allocation and limiting, prioritization, accounting, and control.

# Namespaces

## Limiting Visibility and Providing Isolation

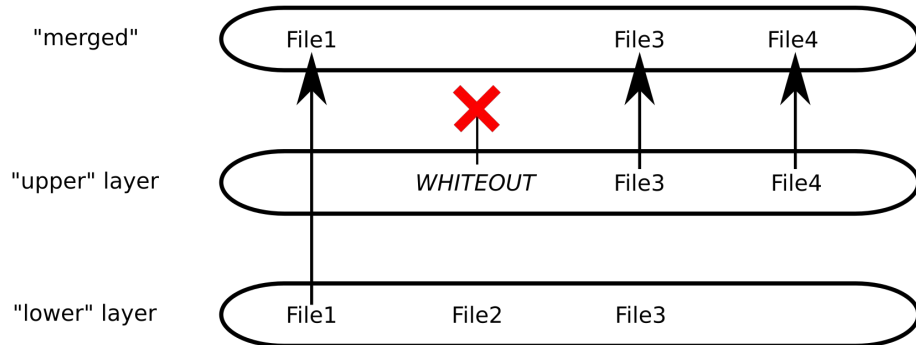
- Isolate processes from the host system.
- Limit visibility of host filesystem and resources.
- Create the illusion that a process is running on its own self-contained system.

# Filesystems

## Isolating storage resources and supporting fast, efficient containers

- Allow for isolation and management of containers' storage resources.
- Copy-on-Write strategies support near-instant copies and deduplication.
- Union filesystems allow for read-only "images" and efficient distribution.

### OverlayFS Concept



### Docker Concept

Container Filesystem  
(Perspective from within container)

"container" layer  
(writable)

"image" layer  
(read only)



# Demonstration



# Containers: from the Ground Up

Thank you!

