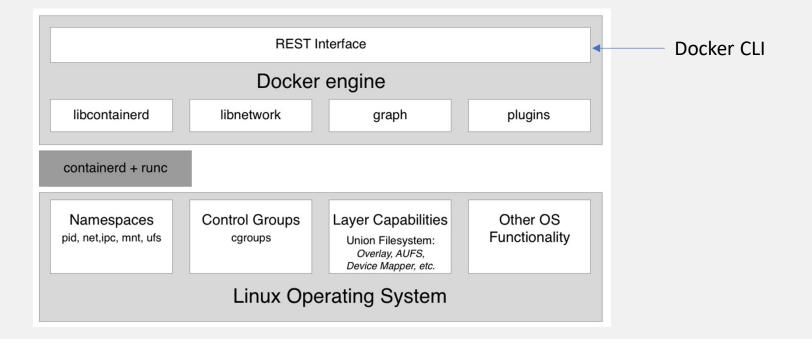


CLOUD COMPUTING APPLICATIONS

Containers: Docker Architecture

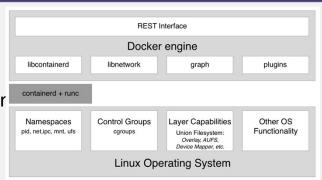
Prof. Reza Farivar

Docker Architecture



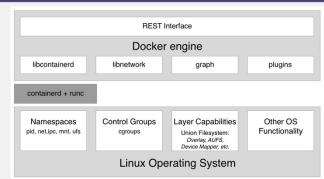
Container Runtime

- · Docker was originally monolithic
 - · Later the runtime was separated
- Responsible for the whole life cycle of a container
- pulls a container image (which is the template for a container from a registry
- Creates a container from that image
- Initializes and runs the container
- Eventually stops and removes the container from the system
- The container runtime on a Docker host consists of containerd and runc
- Both are open source and have been donated by Docker to the CNCF
 - CNCF: Cloud Native Computing Foundation, a Linux Foundation project



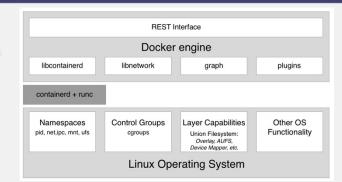
Container Runtime: containerd

- containerd is based on runc, provides higher-level functionality
 - Image push and pull
 - Managing of storage
 - executing of Containers by calling runc with the right parameters to run containers
 - Managing of network primitives for interfaces
 - Management of network namespaces for containers to join existing namespaces
- reference implementation of the OCI specifications
 - OCI: Open Container Initiative, a Linux Foundation Project
- containerd was donated to and accepted by the CNCF in 2017



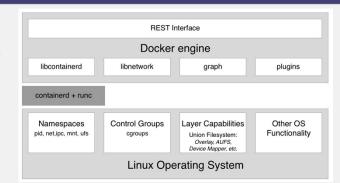
Container Runtime: runc

- runc is the low-level functionality of the container runtime
 - full support for Linux namespaces
 - native support for all security features available on Linux
 - SELinux
 - AppArmor
 - Seccomp
 - cgroups
- Spawns and runs containers according to the Open Container Initiative (OCI) specification
 - · Containers are configured using bundles
 - A bundle for a container is a directory that includes a specification file named "config.json" and a root filesystem
 - The root filesystem contains the contents of the container



Docker Engine

- Docker engine provides additional functionality on top of the container runtime
 - E.g. network libraries or support for plugins.
- Provides a REST interface over which all container operations can be automated
 - The Docker command-line interface is one of the consumers of this REST interface



Docker Overview

 Container **Docker Compose Docker Client** Docker Swarm **Docker Registry** Platform Orchestration Independent **REST Interface** Docker Engine **Platform** libnetwork libcontainerd graph plugins Specific containerd & runC Compute Services Windows Other OS Namespaces Layer Control Groups Functionality **Containers** Object Namespace, Registry, Union like Job Objects Process Table, filesystem extentions Windows Networking Layer Other OS Control Groups Namespaces Union Filesystem: AUFS,

cgroups

Linux

pid, net, pic, mnt, uts

brtfs,vfs, zfs, DeviceMapper Functionality

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