CSCS
Centro Svizzero di Calcolo Scientifico
Swiss National Supercomputing Centre

ETH zürich

# Introduction to Containers and Docker

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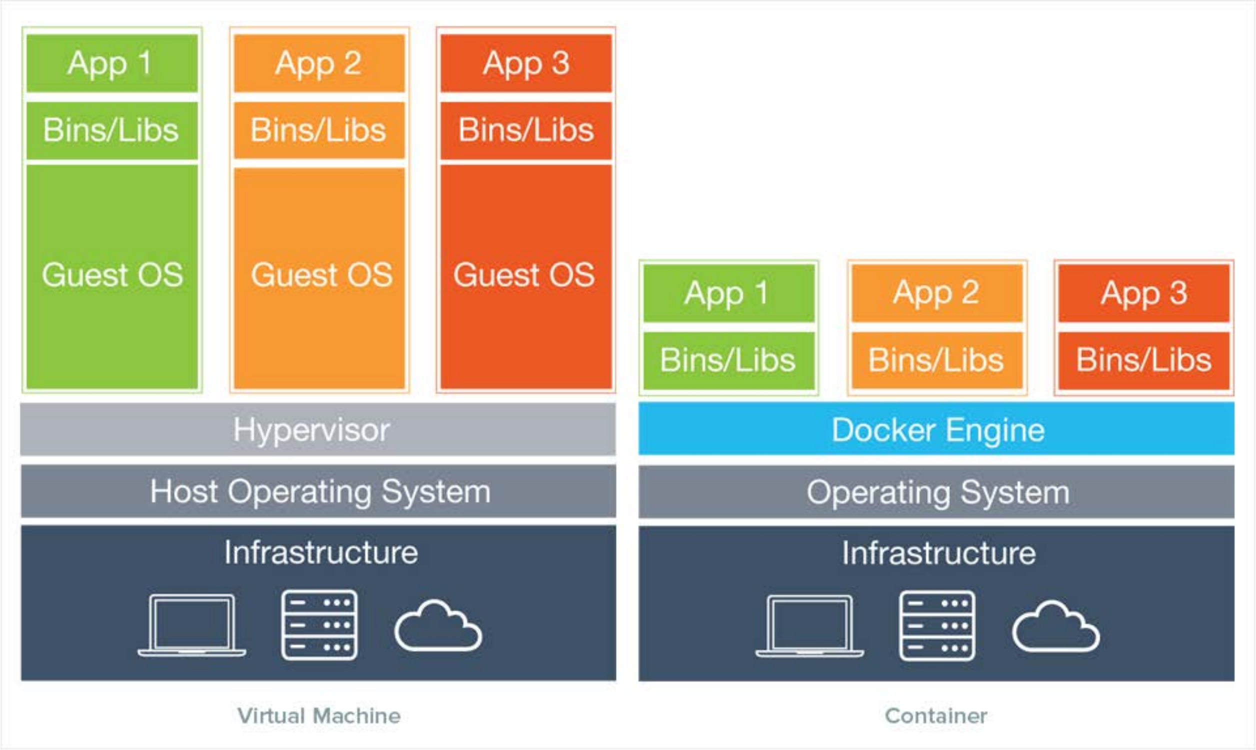
# Table of Contents

1. Introduction to containers and Docker (15 min)
2. Live demo (30 min)
3. Hands-on (90+ min)

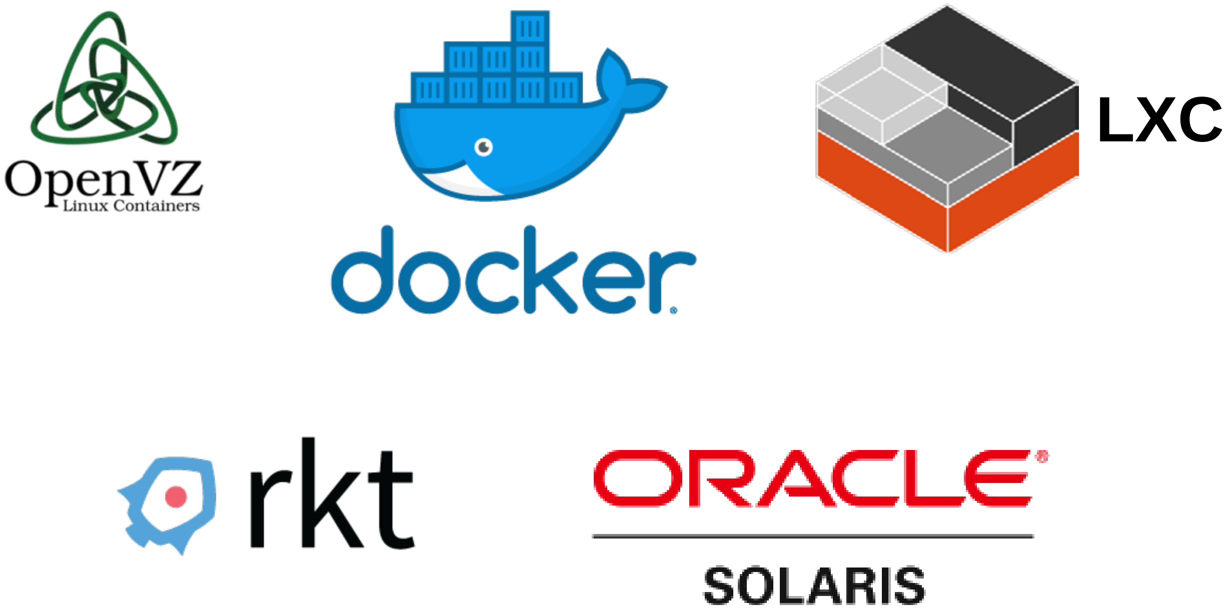
- Slides and code available at https://github.com/eth-cscs/container-hands-on

# Containers

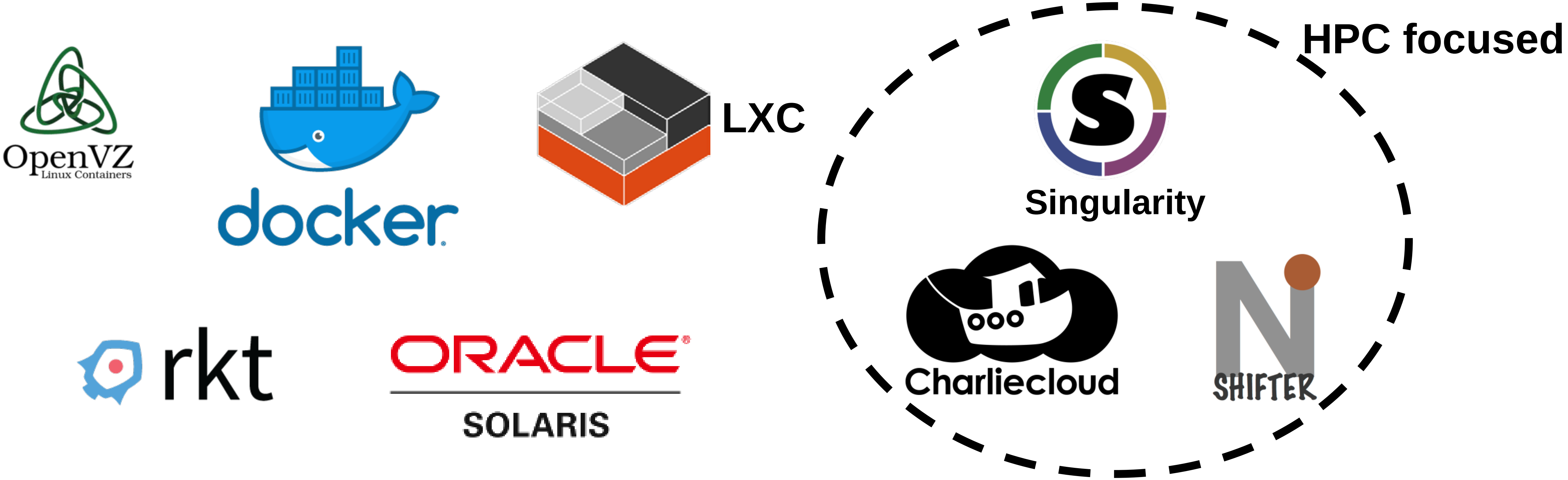
- Lightweight, isolated environments to run applications/services
- Already include all software dependencies
- Interest from HPC: a way to provide user-defined software stacks



# Container implementations



# Container implementations



# Docker

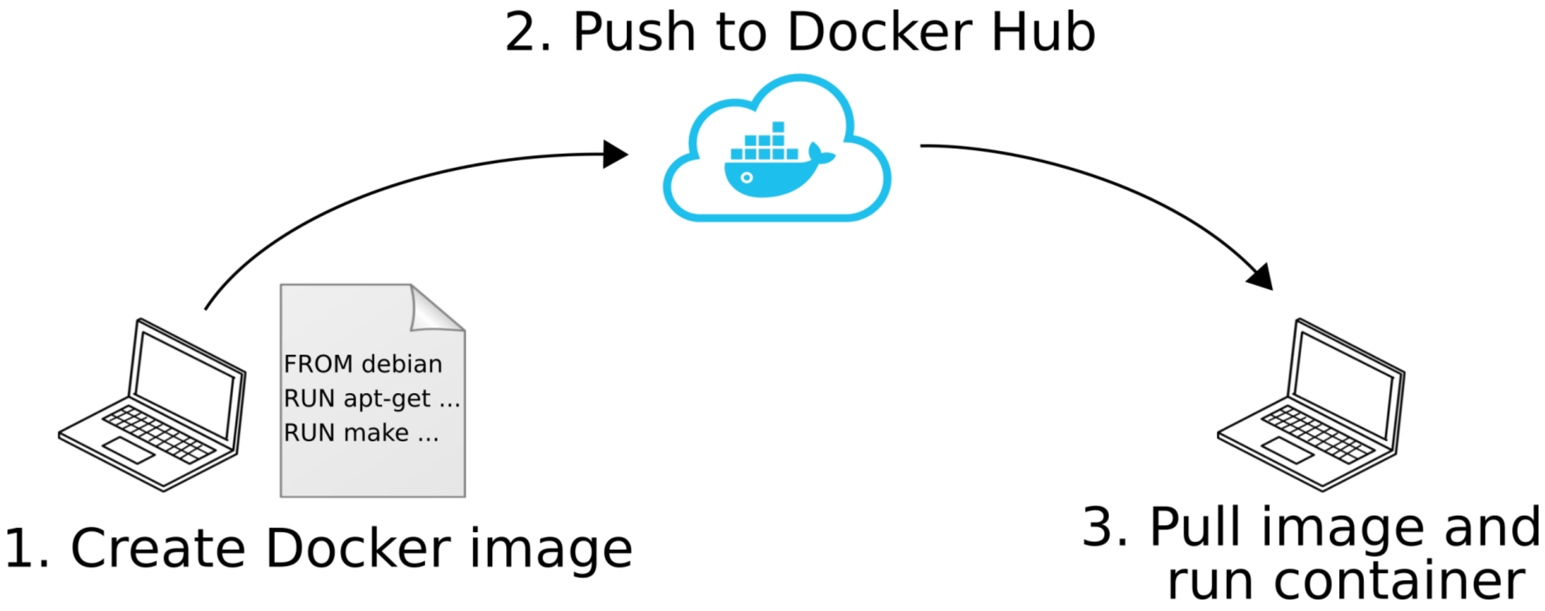
- Extremely popular container implementation

- Easy to use authoring tools
  - Container images are created from recipe-like files
  - Images can be named, tagged and built on top of other images

- Cloud-based image distribution strategy
  - Several remote registries available (e.g. Docker Hub)
  - Client includes facilities to authenticate, push and pull images

# Docker workflow

1. An image is created locally from a Dockerfile
2. Push (i.e. upload) the image to a remote registry
   DockerHub is the public registry maintained from the Docker company
3. Pull (i.e. download) the image on a target machine and run the container



# Key terms

- **Image**: standalone, executable package that includes everything needed to run a piece of software (code, runtime libraries, environment variables, configuration files).

- **Container**: runtime *instance* of an image what the image becomes in memory when actually executed. It runs completely isolated from the host environment by default, only accessing host resources if configured to do so.

# So… how are containers useful?

- Containers give the possibility to create (scientific) applications that are:

1. Portable
2. Reproducible
3. Easy to deploy
4. Easy to test

# Live demo!

# Cheatsheet

Step-by-step guides: https://github.com/eth-cscs/container-hands-on

```
docker pull <repo/image:tag>
docker run <image:tag> <command>
docker run –it <image:tag> bash
docker run <image:tag> mpiexec –n 2
docker images
docker build –t <repo/image:tag> .
docker login
docker push <repo/image:tag>
```

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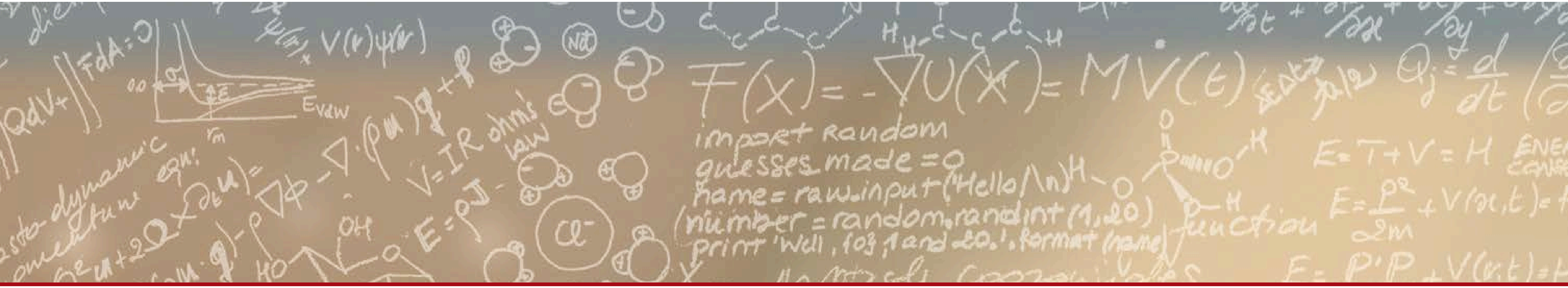

# Thank you for your attention.