The Docker & Container Ecosystem 101

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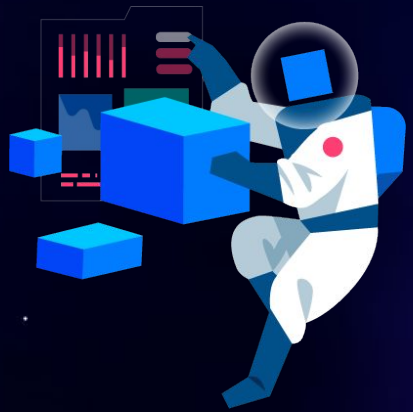
Agenda

- Introductions
- Why Containers?
- History Lesson
- The Docker Ecosystem
- Containers Explained
- What Now?



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JAVA CHAMPION
DOCKER CAPTAIN

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https://jfrog.com/shownotes

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SO MANY QUESTIONS!!!

- What is DOCKER?
- Is this something I have to install?
- How do I build this thing?
- What's a CONTAINER?
- What's an IMAGE?
- How do I launch this?

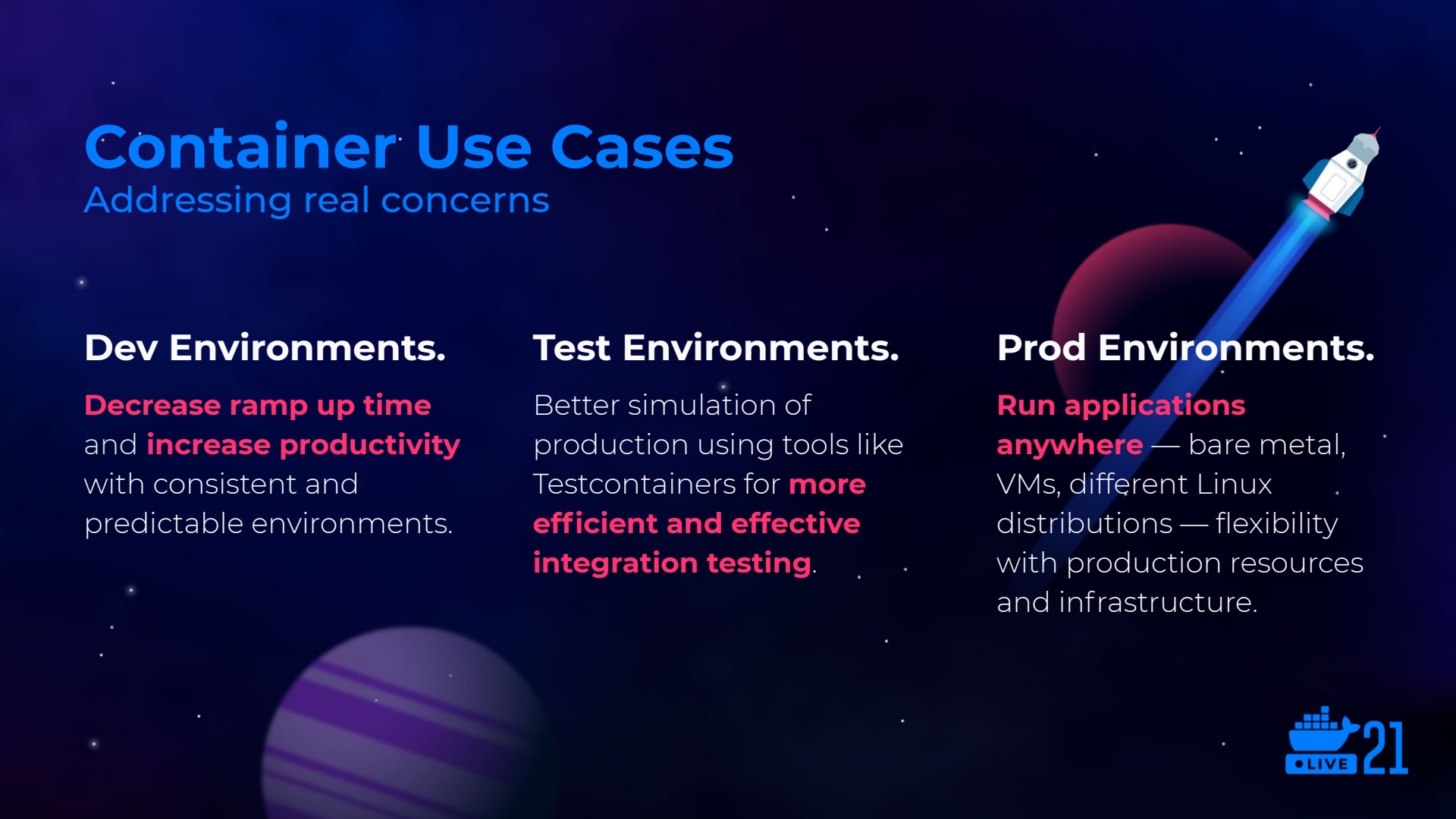
WHY Containers?

What Problem are You Trying to Solve?

1. Really? You're using Java 11?
2. My workstation is a Macbook Pro
3. There's a bug in production
4. It works on my machine... ONLY on my machine
5. We just hired three new developers
6. My service is super popular!

Container Use Cases

Addressing real concerns



Dev Environments.

Decrease ramp up time and **increase productivity** with consistent and predictable environments.

Test Environments.

Better simulation of production using tools like Testcontainers for **more efficient and effective integration testing**.

Prod Environments.

Run applications anywhere — bare metal, VMs, different Linux distributions — flexibility with production resources and infrastructure.

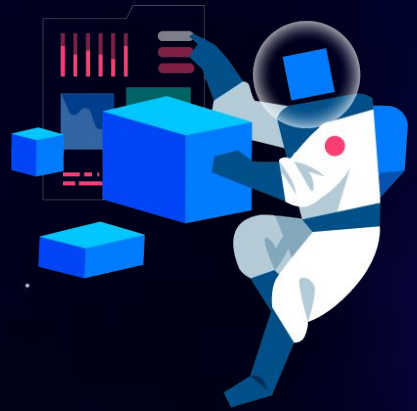
History Lesson

“Those who fail to learn from history are condemned to repeat it.”

- Winston Churchill (George Santayana paraphrased)

“We are not makers of history. We are made by history.”

- Martin Luther King, Jr.



Timing is Everything

- 1979/1982: chroot → 2000: FreeBSD jail
- 2004: Solaris Zones / snapshots
- 2006: Google Process Containers / cgroups
- 2008: IBM LinuX Containers (LXC)
- 2013: Docker / Google LMCTFY (open source!)
- 2014: Docker trades LXC for libcontainer
- .... more stuff

Open Container Initiative (OCI) Established June 22, 2015

"Participants include, basically, everyone from A to V in the tech industry. This is **20+ organizations** including Apcera, AWS, Cisco, CoreOS, Docker, EMC, Fujitsu Limited , Google, Goldman Sachs, HP, Huawei, IBM, Intel, Joyent, Pivotal, the Linux Foundation, Mesosphere, Microsoft, Rancher Labs, Red Hat, and VMware."[1]

1. Golub, Ben. "Docker and Broad Industry Coalition Unite to Create Open Container Project." docker blog, Jun 22. 2015, docker.com/blog/open-container-project-foundation/.

OCI Activities

opencontainers.org

- June 2015: OCI established
  - OCI **Runtime** Specification (runtime-spec)
  - OCI **Image** Specification (image-spec)
  - OCI **Distribution** Specification (distribution-spec)
- July 2017: **Runtime** and **Image** specs released (v1.0)
- May 4 2021: **Distribution** spec released (v1.0)

Cloud Native Computing Foundation (CNCF) Established July 21, 2015

"The Cloud Native Computing Foundation (CNCF) hosts critical components of the global technology infrastructure. CNCF brings together the world's top developers, end users, and vendors and runs the largest open source developer conferences. CNCF is part of the nonprofit Linux Foundation."[2]

2. "Who we are." Cloud Native Computing Foundation, Accessed May 20. 2021, https://www.cncf.io/about/who-we-are/.

CNCF Activities

cncf.io

- July 21, 2015: Kubernetes v1.0 released!
- Dec 13, 2016: Kubernetes v1.5 released!
  - Container **Runtime** Interface (CRI)
- Mar, 2017: Docker contributes

  CRI compatible **containerd** to CNCF

Docker Anatomy

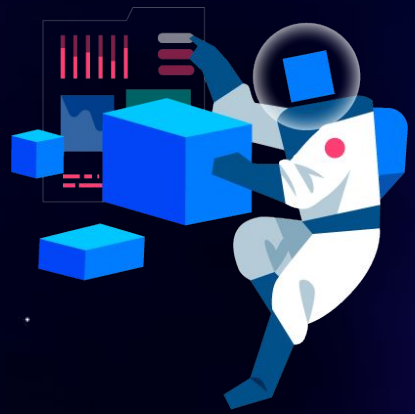
All the things....

- Define a container (**an image format**)
- Build an image of a container
- Manage container images
- Distribute/share container images
- Create a container environment
- Launch/run a container (**a container runtime**)
- Manage the lifecycle of container instances

Container Runtimes.

- **Low Level Runtimes**
  - runC (Go, *used to be libcontainer*, Docker)
  - crun (C, RedHat)
  - railcar (Rust, Oracle) <- archived
- **High Level Runtimes**

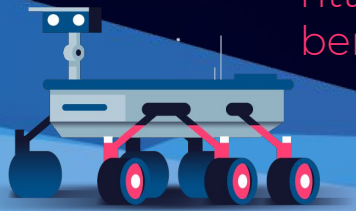
  (implementations of CRI to use OCI runtimes)
  - containerd
  - cri-o



Kubernetes Deprecates Docker Runtime (after v1.20)

Docker (the whole package) does not implement the CRI, but **containerd** does! Docker has used containerd as its runtime since v1.11

https://kubernetes.io/blog/2020/12/02/dont-panic-kubernetes-and-docker/



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Containers Explained

Terminology 101

CONTAINER: a running instance on your machine

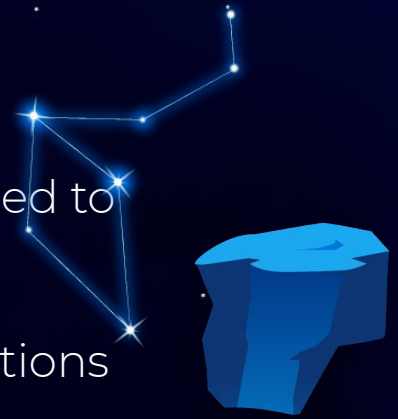
CONTAINER IMAGE: an immutable, executable binary used to create a container (a blueprint)

DOCKERFILE: the file containing the image build instructions

IMAGE TAG: indicates the version of the image

CONTAINER REGISTRY: a library of container repositories and images (e.g. Docker Hub)

IMAGE REPOSITORY: stores all versions/tags of an image

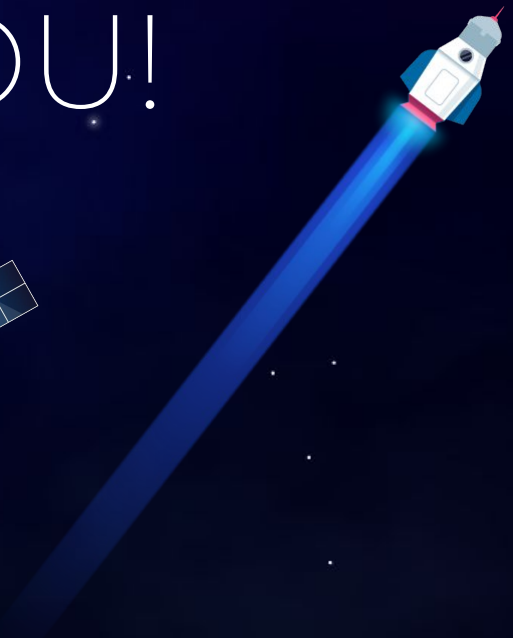


What Now?

HELPFUL LINKS

- Download Docker Desktop!
- docs.docker.com
- cncf.io
- opencontainers.org

THANK YOU!
Q&A



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