

CNCF Overview

Manikandan, GCP Architect, @manikandank276





Manikandan

Loves question, people, cloud & dart

Twitter / LinkedIn **@manikandank276**

- 03+ years as GCP architect
- 11+ years as solution analyst
- 03+ years of community volunteer

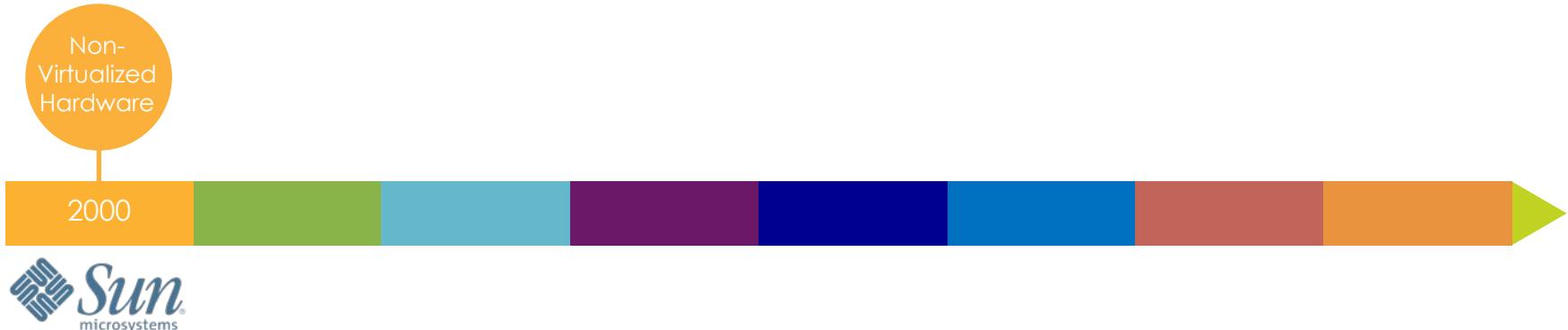


A Brief History of the Cloud

Non-Virtualized Servers: Sun (2000)



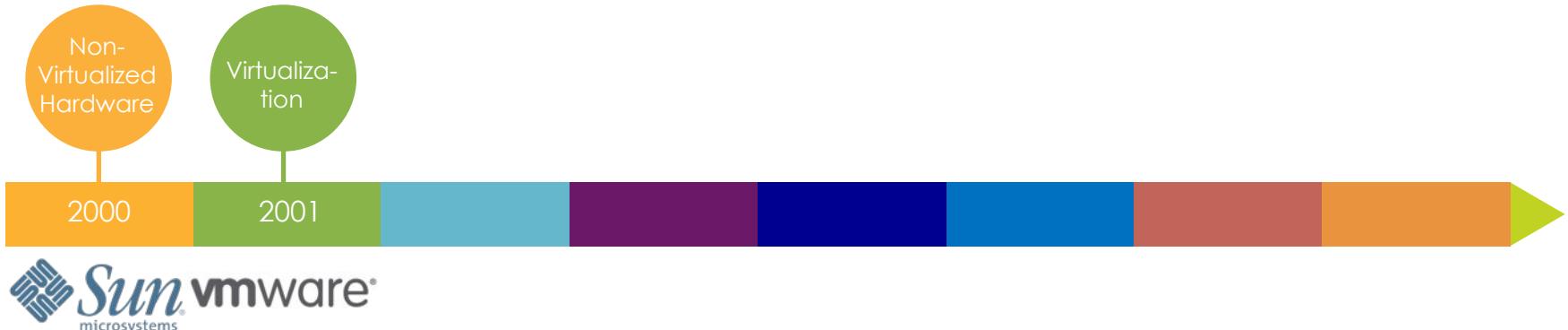
- Launching a new application? Buy a new server; or a rack of them!
- Building block of your application is physical servers



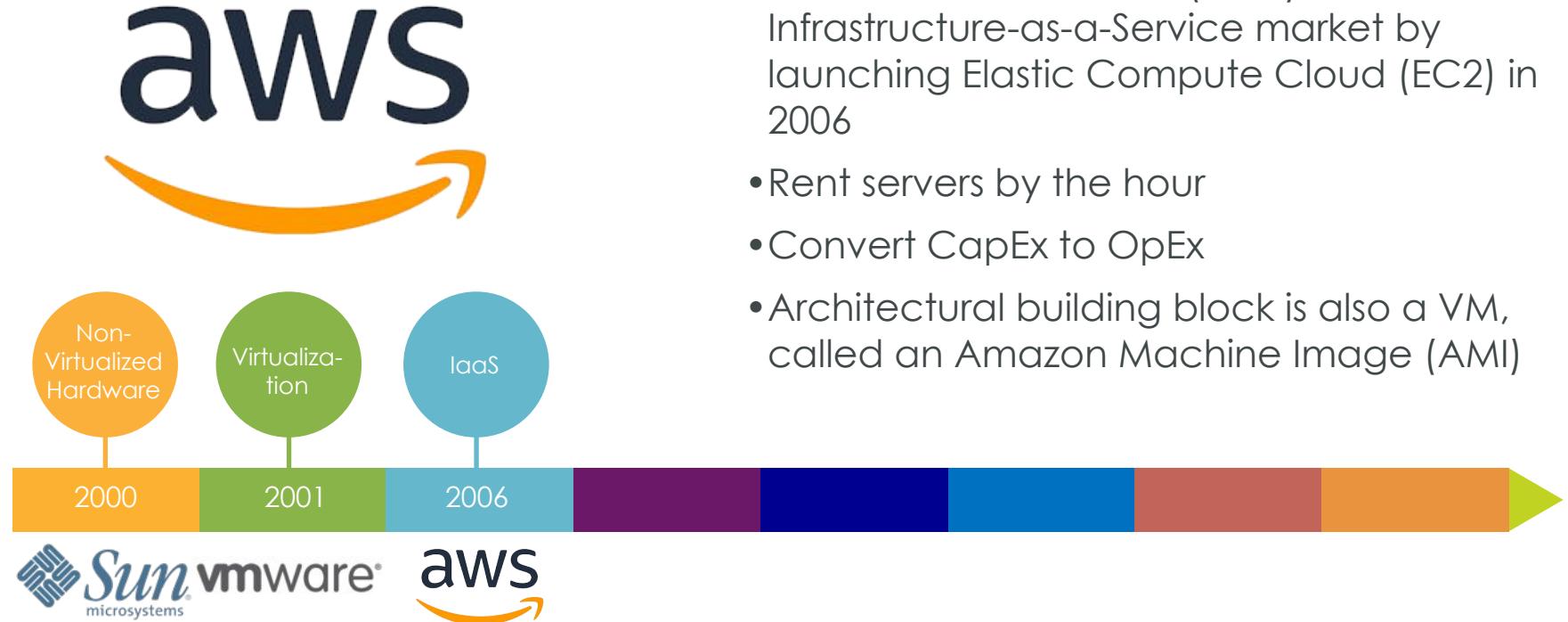
Virtualization: VMWare (2001)

vmware®

- Releases for server market in 2001
- Popularizes virtual machines (VMs)
- Run many VMs on one physical machine, meaning you can buy fewer servers!
- Architectural building block becomes a VM



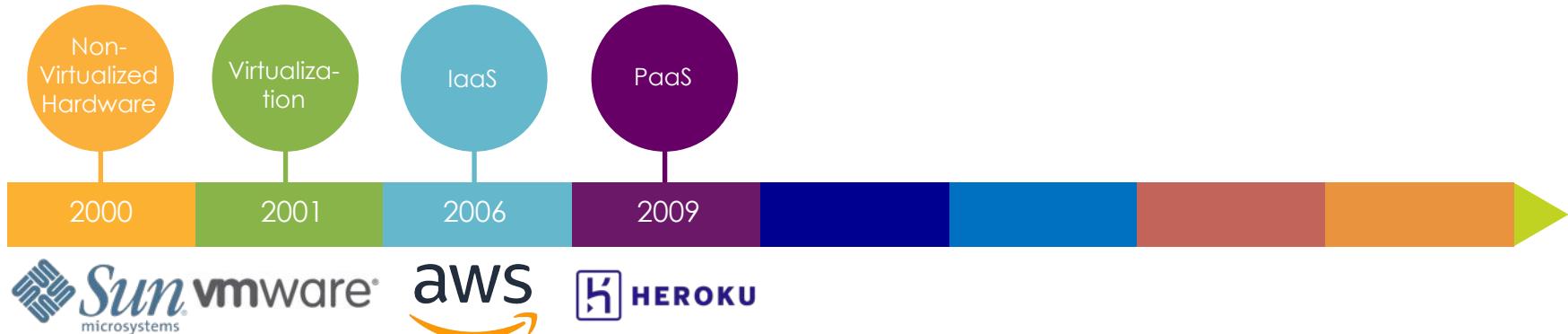
IaaS: AWS (2006)



PaaS: Heroku (2009)



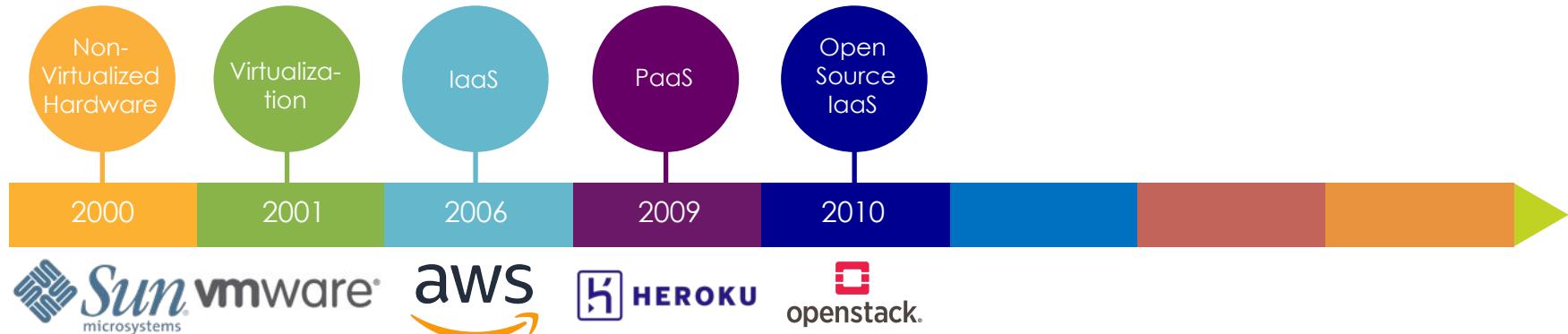
- Heroku popularizes Platform-as-a-Service (PaaS) with their launch in 2009
- Building block is a buildpack, which enables containerized 12-factor applications
 - The process for building the container is opaque, but:
 - Deploying new version of an app is just: git push heroku



Open Source IaaS: OpenStack (2010)



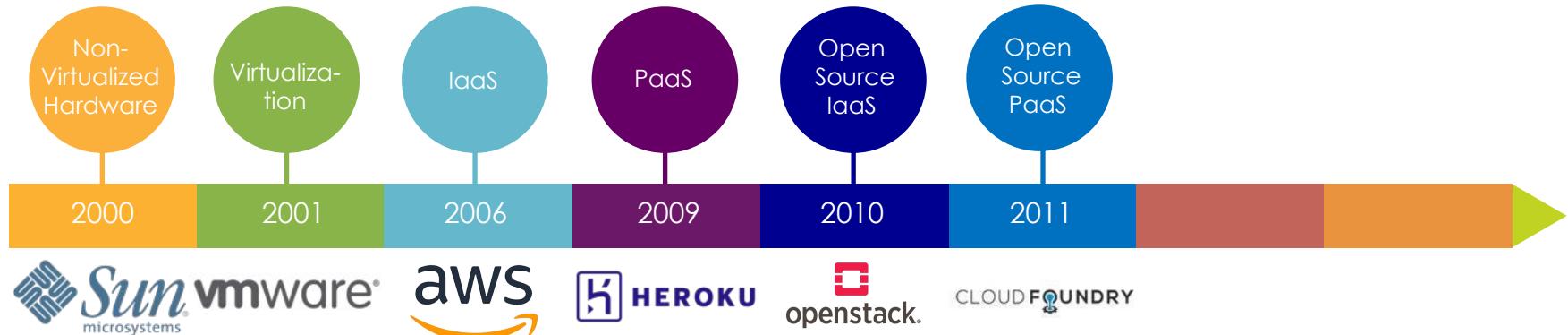
- OpenStack brings together an extraordinarily diverse group of vendors to create an open source Infrastructure-as-a-Service (IaaS)
- Competes with AWS and VMWare
- Building block remains a VM



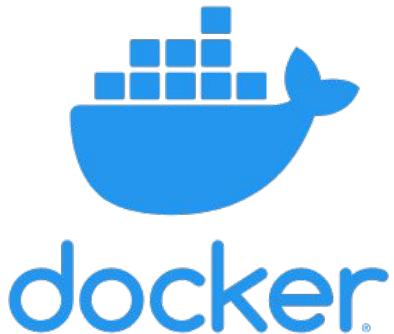
Open Source PaaS: Cloud Foundry (2011)



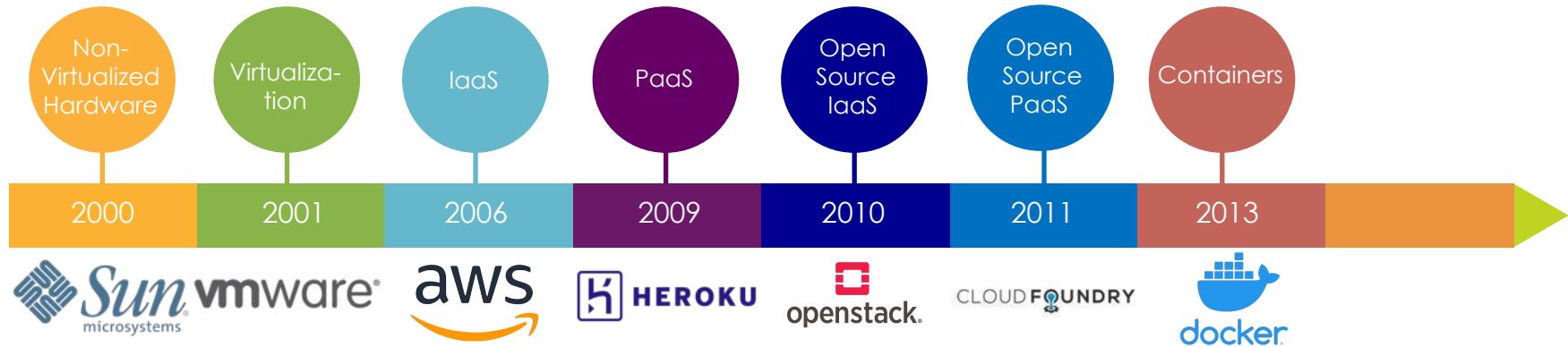
- Pivotal builds an open source alternative to Heroku's PaaS and launches the Cloud Foundry Foundation in late 2014
- Building block is Garden containers, which can hold Heroku buildpacks, Docker containers and even non-Linux OSes



Containers: Docker (2013)



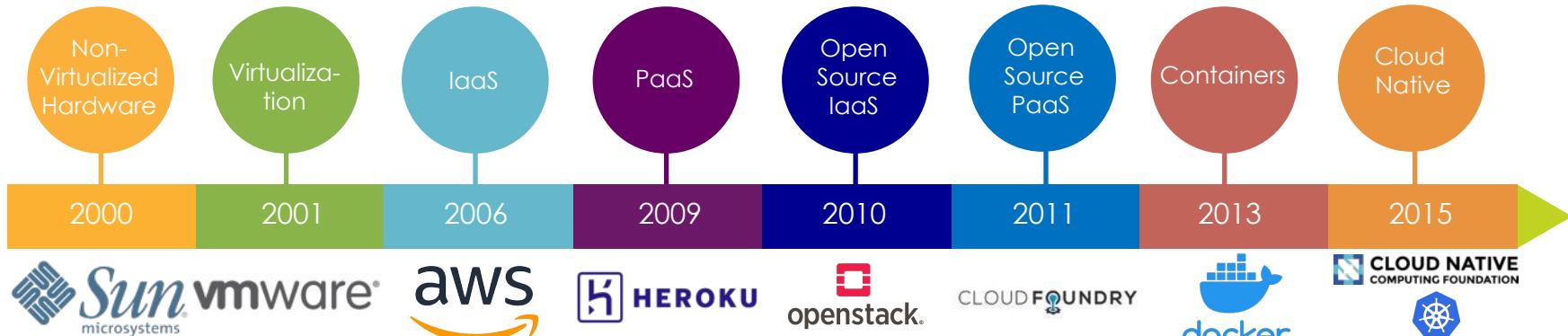
- Docker combines LXC, Union File System and cgroups to create a containerization standard adopted by millions of developers around the world
- Fastest uptake of a developer technology ever
- Enables isolation, reuse and immutability



Cloud Native: CNCF (2015)



- Cloud native computing uses an open source software stack to:
 - segment applications into *microservices*,
 - package each part into its own *container*
 - and dynamically *orchestrate* those containers to optimize resource utilization



What Have We Learned?

- Core Building Block:
 - Servers → Virtual Machines → Buildpacks → Containers
- Isolation Units
 - From heavier to lighter weight, in spin-up time and size
- Immutability
 - From pets to cattle
- Provider
 - From closed source, single vendor to open source, cross-vendor



What About PaaS?

- OpenShift, Huawei CCE, and Flynn are examples of PaaS's built on top of cloud native platforms
- Many new applications start out as 12-factor apps deployable on a PaaS
 - In time they sometimes outgrow PaaS
 - And some apps never fit a PaaS model
- PaaS on top of Kubernetes supports both



Cloud Native Value Propositions

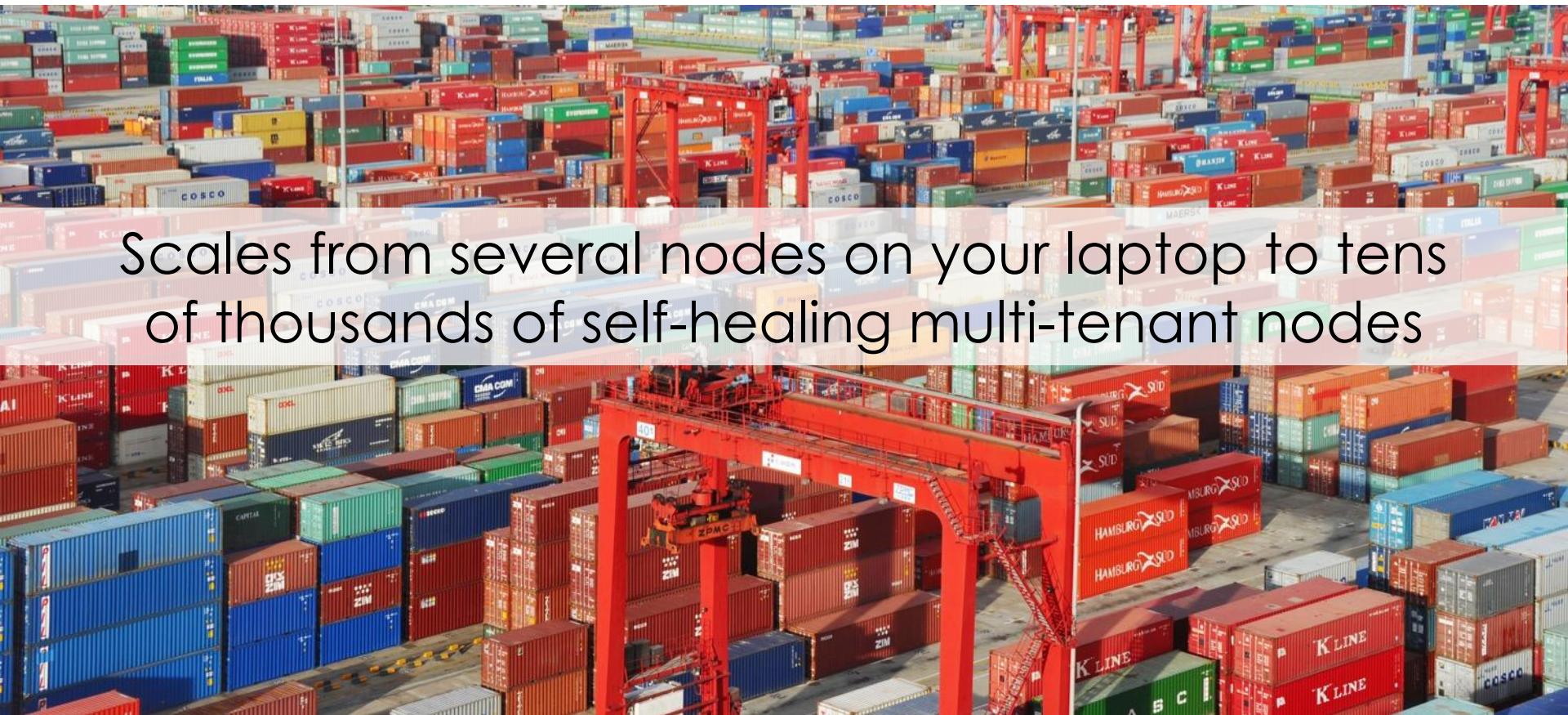
Avoid Vendor Lock-in



Open source software stack enables deployment on any public, private cloud or hybrid cloud



Enable Unlimited Scalability

A wide-angle photograph of a busy port terminal. The foreground and middle ground are filled with stacks of shipping containers in various colors, including red, blue, green, and white. Several large red gantry cranes are positioned between the stacks, some with their booms extended. The background shows more containers and what appears to be a ship docked at a pier. The overall scene conveys a sense of industrial activity and logistics.

Scales from several nodes on your laptop to tens
of thousands of self-healing multi-tenant nodes

Increase Agility and Maintainability



By splitting applications into microservices
with explicitly described dependencies

Achieve Resiliency



To failures of individual containers, machines, and even data centers and to varying levels of demand

Improve Efficiency and Resource Utilization

A photograph of a woman conductor with blonde hair, wearing a white sleeveless dress, leading an orchestra. She is holding a baton and gesturing with her right hand. The orchestra members are visible in the foreground and background, playing various instruments like violins and cellos. The audience is seated in the dark auditorium seating behind them.

Via a central orchestrating process that dynamically manages and schedules microservices

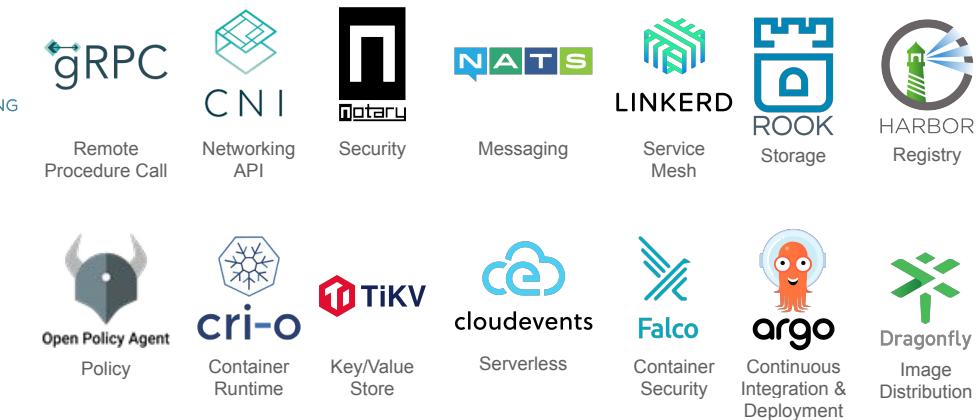
Cloud Native Computing Foundation

- Nonprofit, part of the Linux Foundation; founded Dec 2015

Graduated



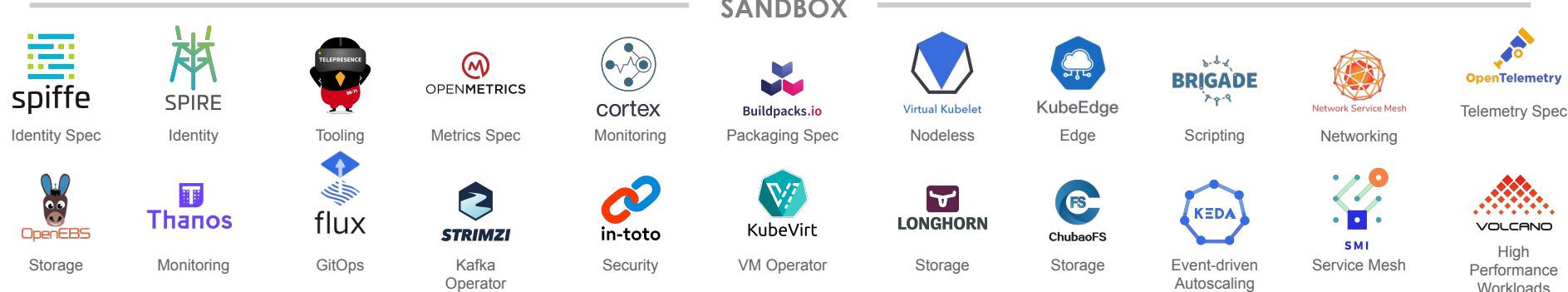
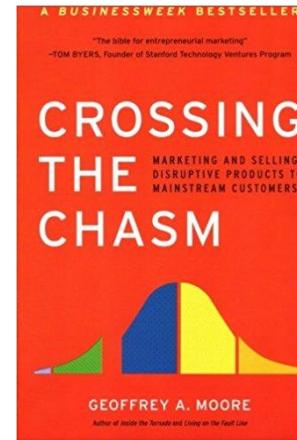
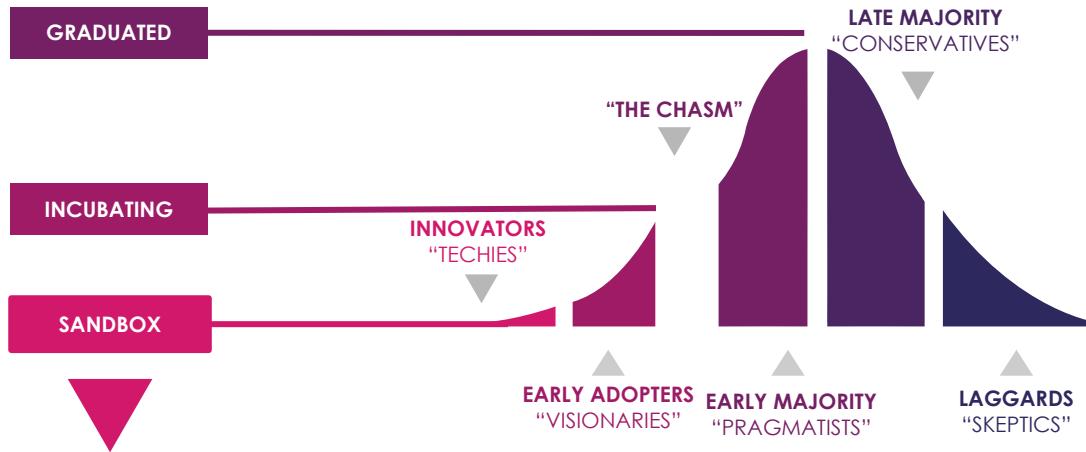
Incubating



- Platinum members:



CNCF Project Maturities



Today the Linux Foundation is much more than Linux



Security

We are helping global privacy and security through a program to encrypt the entire internet.



Networking

We are creating ecosystems around networking to improve agility in the evolving software-defined datacenter.



Cloud

We are creating a portability layer for the cloud, driving de facto standards and developing the orchestration layer for all clouds.



Automotive

We are creating the platform for infotainment in the auto industry that can be expanded into instrument clusters and telematics systems.



Blockchain

We are creating a permanent, secure distributed ledger that makes it easier to create cost-efficient, decentralized business networks.



Web

Node.js and other projects are the application development framework for next generation web, mobile, serverless, and IoT applications.



We are regularly adding projects; for the most up-to-date listing of all projects visit tlfprojects.org



Why You Should Host Your Project at CNCF

- A neutral home increases contributions
- Endorsement by CNCF's Technical Oversight Committee
- Engagement with End User and Service Provider Communities
- Full-time press and analyst relations teams
- Tens of thousands of dollars per year in documentation, security audits, case studies, and other support services
- Maintain your committers and define your own governance, as long as it's neutral
- Full-time staff eager to assist
- World-class events team, track at KubeCon + CloudNativeCon around the world, and custom events for your project
- Worldwide meetup groups
- Cloud resources for CI and scale testing



Cloud Native Trail Map

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Trail Map: l.cncf.io

CLOUD NATIVE TRAIL MAP

The Cloud Native Landscape (l.cncf.io) has a large number of options. This Cloud Native Trail Map is a recommended process for learning about cloud native technologies. At each step you can choose a vendor-supported offering or do it yourself, and everything after step #3 is optional based on your circumstances.

HELP ALONG THE WAY

A. Training and Certification

Consider training offerings from CNCF and then take the exam to become a Certified Kubernetes Administrator or a Certified Kubernetes Application Developer cncf.io/training

B. Consulting Help

If you want assistance with Kubernetes and the surrounding ecosystem, consider leveraging a Kubernetes Certified Service Provider cncf.io/kscsp

C. Join CNCF's End User Community

For companies that don't offer cloud native services externally cncf.io/enduser

WHAT IS CLOUD NATIVE?

Cloud native technologies empower organizations to build and run scalable applications in modern, dynamic environments such as public, private, and hybrid clouds. Containers, service meshes, microservices, immutable infrastructure, and declarative APIs exemplify this approach.

These techniques enable loosely coupled systems that are resilient, manageable, and observable. Combined with robust automation, they allow engineers to make high-impact changes frequently and predictably with minimal toil.

The Cloud Native Computing Foundation seeks to drive adoption of this paradigm by fostering and sustaining an ecosystem of open source, vendor-neutral projects. We democratize state-of-the-art patterns to make these innovations accessible for everyone.



l.cncf.io
v20191107

1. CONTAINERIZATION

- Commonly done with Docker containers
- Any size application and dependencies (even PDP-11 code running on an emulator) can be containerized
- Over time, you should aspire towards splitting suitable applications and writing future functionality as microservices



3. ORCHESTRATION & APPLICATION DEFINITION

- Kubernetes is the market-leading orchestration solution
- You should select a Certified Kubernetes Distribution, Hosted Platform, or Installer: cncf.io/cck
- Helm Charts help you define, install, and upgrade even the most complex Kubernetes application



5. SERVICE PROXY, DISCOVERY, & MESH

- CoreDNS is a fast and flexible tool that is useful for service discovery
- Envoy and Linkerd each enable service mesh architectures
- They offer health checking, routing, and load balancing



7. DISTRIBUTED DATABASE & STORAGE

When you need more resiliency and scalability than you can get from a single database, Vitess is a good option for running MySQL at scale through sharding. Rock is a storage orchestrator that integrates a diverse set of storage solutions into Kubernetes. Since it runs on top of Kubernetes, it provides a reliable way to store data across a cluster of machines. TiKV is a high performance distributed transactional key-value store written in Rust.



9. CONTAINER REGISTRY & RUNTIME

Harbor is a registry that stores, signs, and scans content. You can use alternative container runtimes. The most common, both of which are OCI-compliant, are containerd and gRPC.



2. CI/CD

- Setup Continuous Integration/Continuous Delivery (CI/CD) so that changes to your source code automatically result in a new container being built, tested, and deployed to staging and eventually, perhaps, to production
- Set up automated rollouts, roll backs and testing

4. OBSERVABILITY & ANALYSIS

- Pick solutions for monitoring, logging and tracing
- Consider CNCF projects Prometheus for monitoring, Fluentd for logging and Jaeger for Tracing
- For tracing, look for an OpenTracing-compatible implementation like Jaeger



6. NETWORKING & POLICY

To enable more flexible networking, use a CNCF-compliant network project like Calico, Flannel, or Weave Net. Open Policy Agent (OPA) is a general-purpose policy engine with rules ranging from authorization and admission control to data filtering.



8. STREAMING & MESSAGING

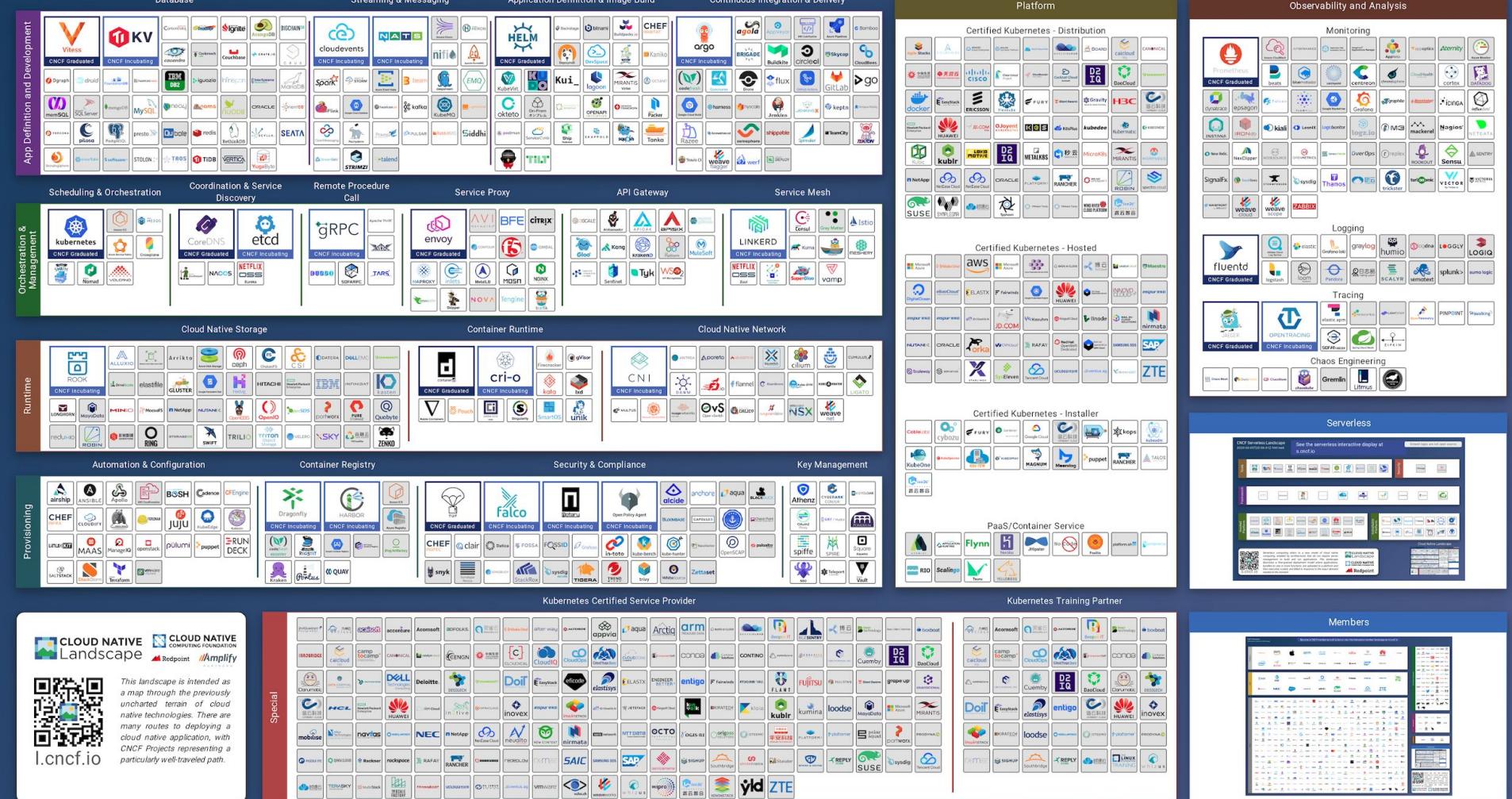
When you need higher performance than JSON+REST, consider using gRPC or NATS. gRPC is a universal RPC framework. NATS is a multi-modal messaging system that includes request/reply, pub/sub and load balanced queues. CloudEvents is a specification for describing event data in common ways.



10. SOFTWARE DISTRIBUTION

If you need to do secure software distribution, evaluate Notary, an implementation of The Update Framework.





CNCF Cloud Native Interactive Landscape

[Reset Filters](#)

Grouping

No Grouping

Sort By

Stars (high to low)

Category

Any

CNCF Relation

Any

License

Any

Organization

Any

Headquarters Location

Any

Example filters:[Cards by age](#)[Open source landscape](#)[Member cards](#)**Cards by stars**[Cards from China](#)[Certified K8s/KCSP/KTP](#)[Cards by MCap/Funding](#)[Download as CSV](#)

The Cloud Native Trail Map ([png](#), [pdf](#)) is CNCF's recommended path through the cloud native landscape. The cloud native landscape ([png](#), [pdf](#)), serverless landscape ([png](#), [pdf](#)), and member landscape ([png](#), [pdf](#)) are dynamically generated below. Please open a pull request to correct any issues. Greyed logos are not open source. Last Updated: 2019-07-12 2:17:13Z

You are viewing 1,158 cards with a total of 1,725,127 stars, market cap of \$10.38T and funding of \$57.6B.

Try it now at
<https://l.cncf.io>



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Landscape

Card Mode

Serverless

Members

No Grouping (1158)



Kubernetes

Cloud Native Computing Foundation (CNCF)
★ 55,292

Elastic

MCap: \$7.09B
★ 42,628

Netdata

Netdata
★ 39,579

Ansible

Red Hat
MCap: \$33.43B
★ 38,340

Redis

Redis Labs
Funding: \$146.6M
★ 37,543

serverless

Serverless
Serverless
★ 30,993
Funding: \$13M

Grafana

Grafana Labs
Funding: \$1.23M
★ 29,826

No Code

No Code
★ 29,736

Dubbo

Apache Software Foundation
★ 27,880

etcd

Cloud Native Computing Foundation (CNCF)
★ 26,033

Prometheus

Cloud Native Computing Foundation (CNCF)
★ 25,134

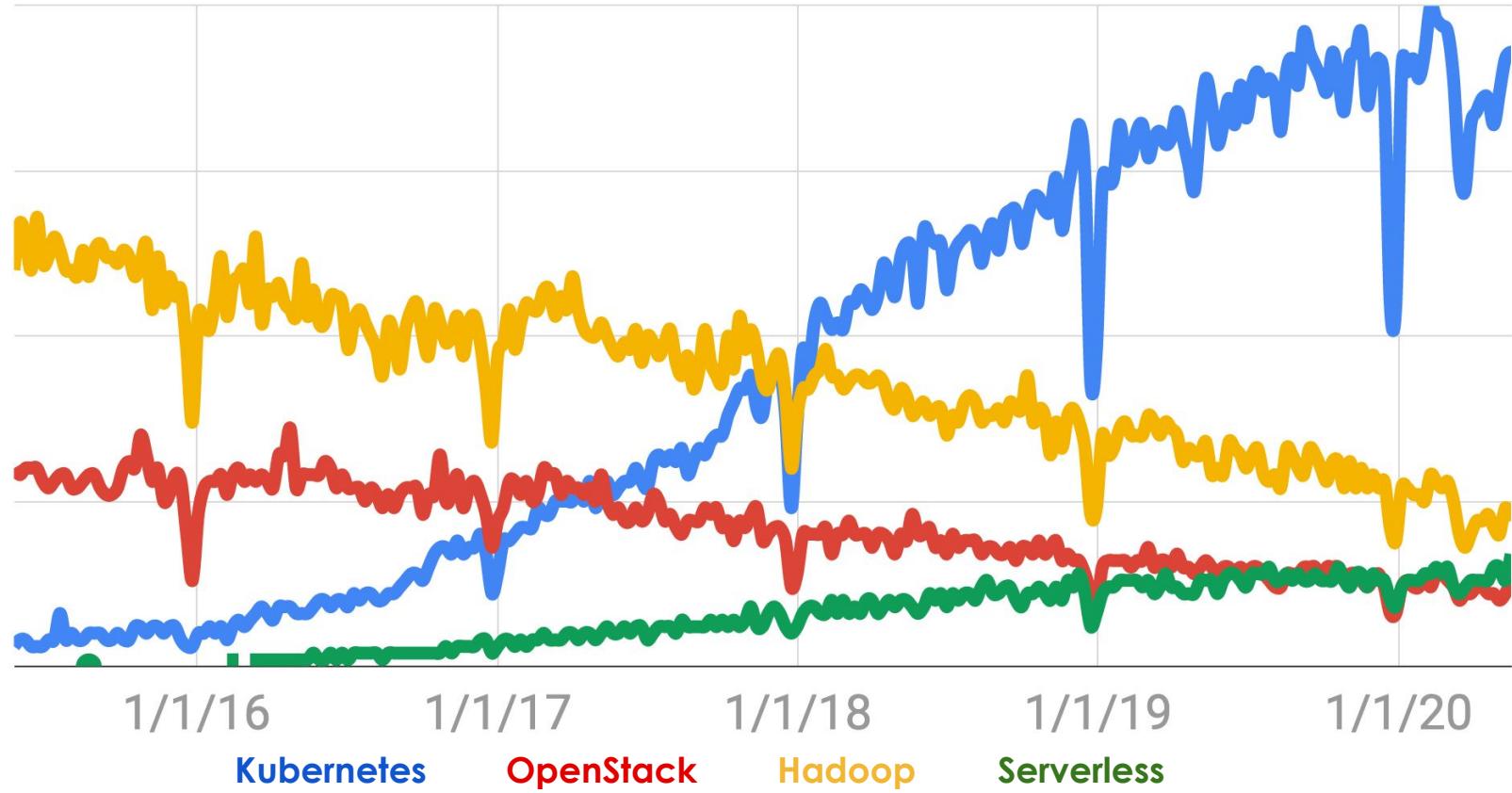
Traefik

Containous
Funding: \$1.06M
★ 23,355Apache Spark
Apache Software Foundation
★ 22,617Kong
Kong
Funding: \$69.1M
★ 22,580RethinkDB
Linux Foundation
★ 22,388gRPC
Cloud Native Computing Foundation (CNCF)
★ 22,130GitLab
GitLab
Funding: \$168.2M
★ 21,901Sentry
Sentry
Funding: \$26.5M
★ 21,457

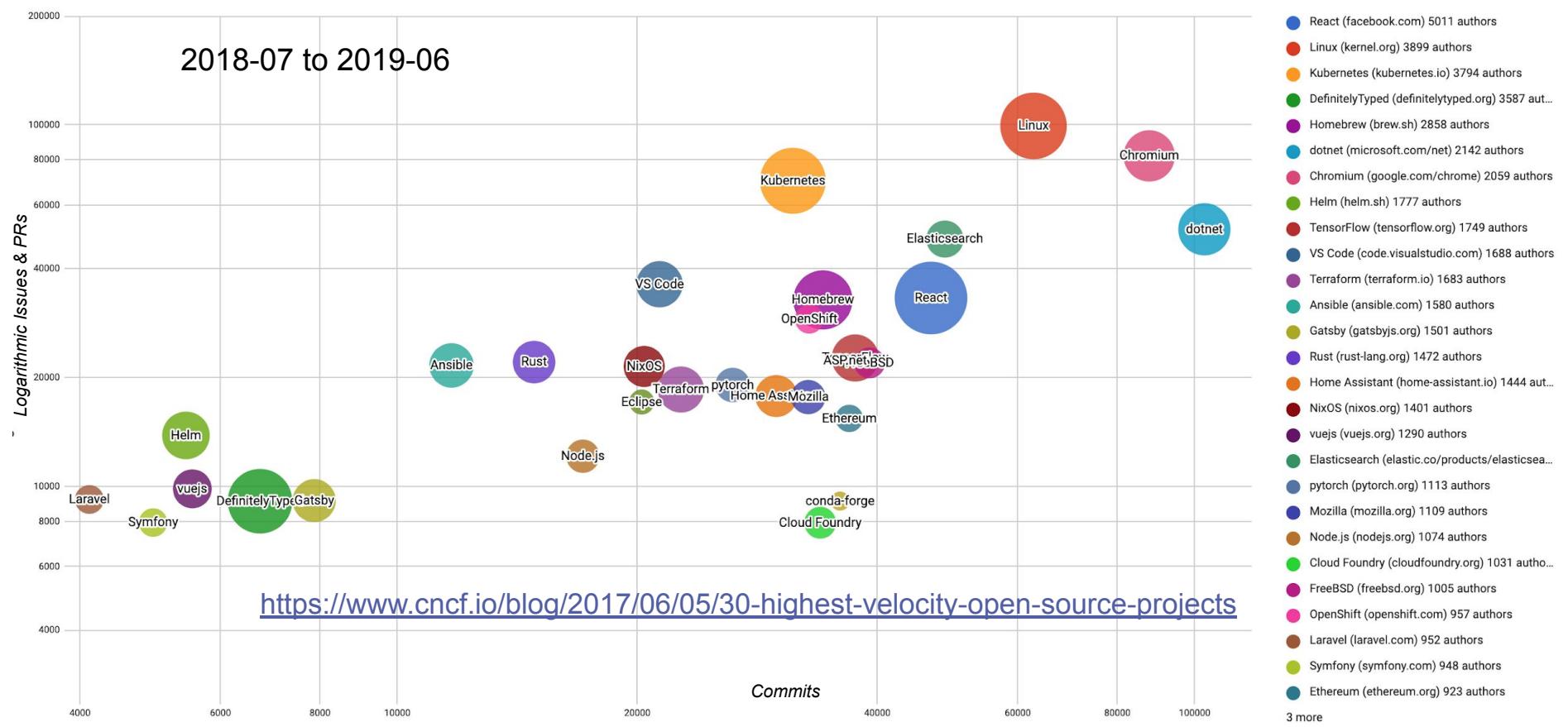
140+ Companies in the End User Community



Kubernetes in Search Trends



30 Highest Velocity Open Source Projects



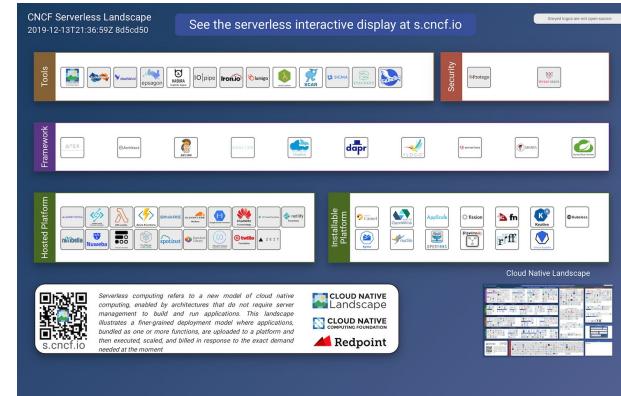
Serverless in CNCF

Decomposing Serverless

- Serverless [Working Group](#) published an influential [whitepaper](#)
- Attributes that developers love about closed serverless platforms (which already run on containers):
 - Infinite scalability
 - Microbilling
 - Easy app updates
 - Event-driven architectures
 - Zero server ops
- Several projects are decomposing these into features to be available on top of Kubernetes

Serverless Landscape & CloudEvents

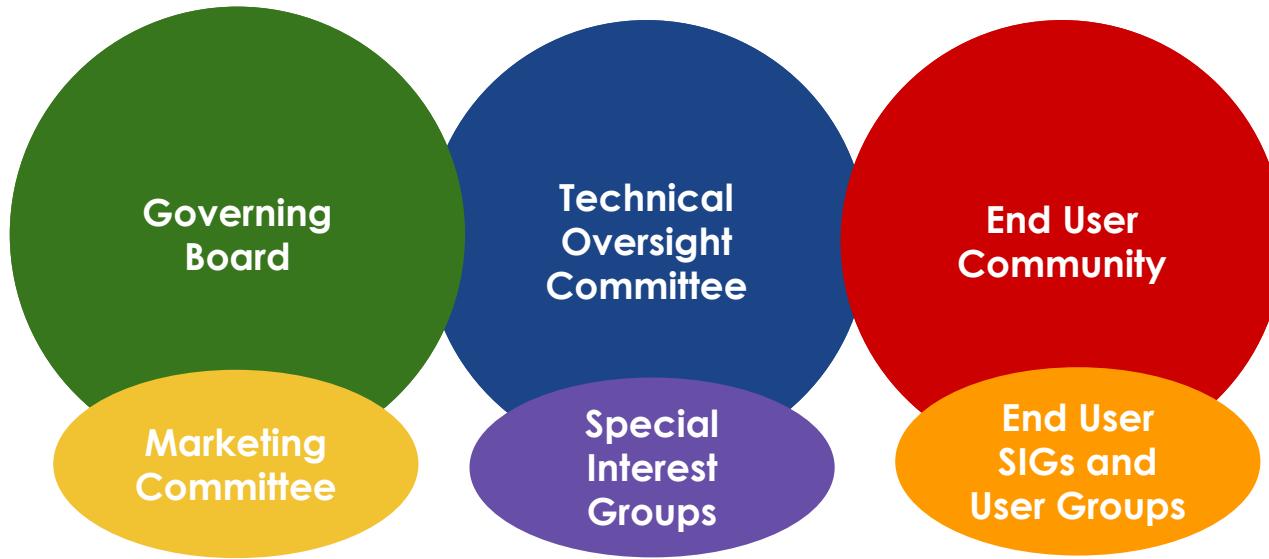
- The Serverless Landscape s.cncf.io tracks all projects and products in the space



- [CloudEvents](#), a new CNCF project, is a common model for event data to ease cross-provider event delivery



CNCF Structure



- Mainly vendors
 - Fund the organization
 - Marketing and strategic direction
- 11 top technical architects
 - Admit new projects
 - Acts as a resource to projects
- Real end users of these technologies
 - Communicate back requirements
 - and good and bad experiences



CNCF Cloud Native Definition v1.0

Cloud native technologies empower organizations to build and run scalable applications in modern, dynamic environments such as public, private, and hybrid clouds. Containers, service meshes, microservices, immutable infrastructure, and declarative APIs exemplify this approach.

These techniques enable loosely coupled systems that are resilient, manageable, and observable. Combined with robust automation, they allow engineers to make high-impact changes frequently and predictably with minimal toil.

The Cloud Native Computing Foundation seeks to drive adoption of this paradigm by fostering and sustaining an ecosystem of open source, vendor-neutral projects. We democratize state-of-the-art patterns to make these innovations accessible for everyone.



Why Organizations Are Adopting Cloud Native

1. Better resource efficiency lets you to run the same number of services on less servers
2. Improved resiliency and availability: despite failures of individual applications, machines, and even data centers
3. Cloud native allows multi-cloud (switching between public clouds or running on multiple ones) and hybrid cloud (moving workloads between your data center and the public cloud)
4. Cloud native infrastructure enables higher development velocity – improving your services faster – with lower risk



500+ Members and Growing

Platinum Members

Alibaba Cloud



DELL Technologies



ORACLE



vmware

Gold Members



BAIDU AI CLOUD



HCL

inspur 浪潮



Kingsoft Cloud

NEC



splunk®



T Mobile



ZTE

Academic/Nonprofit Members

CableLabs

CAMBIA

Canada Health Infoway
Inforoute Santé du Canada

CENGN

CLOUD FOUNDRY

ECLIPSE
FOUNDATION

GOLDEN GATE
UNIVERSITY

INTERNET®

KETI
Korea Electronics
Technology Institute

NAIC
National Association
of Insurance
Commissioners

NIPR
NATIONAL INSTITUTE
OF POLICE RESEARCH

SEL
Software Engineering Lab,
Zhejiang University

TTA
Telecommunications Technology Association

M
ADVANCED
RESEARCH COMPUTING
TECHNOLOGY SERVICES
UNIVERSITY OF TORONTO

WIKIMEDIA
FOUNDATION

500+ Members and Growing (Silver 1)



500+ Members and Growing (Silver 2)



500+ Members and Growing (Silver 3)



Certified Kubernetes Conformance

- CNCF runs a software conformance program for Kubernetes
 - Implementations run conformance tests and upload results
 - Mark and more flexible use of Kubernetes trademark for conformant implementations
 - cncf.io/ck



101 Certified Kubernetes Partners



Training and Certification

Training

- Over 125,000 people have registered for the free Introduction to Kubernetes [course](#) on edX
- Over 17,000 people have registered for the \$299 Kubernetes Fundamentals [course](#)



Certification

- Over 24,000 people have registered for the Certified Kubernetes Administrator (CKA) online [test](#)
- Over 12,000 people have registered for the Certified Kubernetes Application Developer (CKAD) online [test](#)



Kubernetes Certified Service Provider

A pre-qualified tier of vetted service providers who have deep experience helping enterprises successfully adopt Kubernetes through support, consulting, professional services and/or training.

Benefits

- Placement on the first tab of <https://kubernetes.io/partners/>
- Recognized in the community as a leader and expert in helping businesses adopt Kubernetes.
- Increase awareness of your brand when end users are searching for consulting partners
- KCSPs are featured on <https://kubernetes.io/partners/#kcsp>, and <https://www.cncf.io/certification/kcsp/>, and <https://landscape.cncf.io> which in aggregate receive more than 25,000 page views per month on their listings of KCSPs.

Requirements

- Three or more engineers who pass the [CKA exam](#)
- A business model to support enterprise end users
- Be a CNCF member

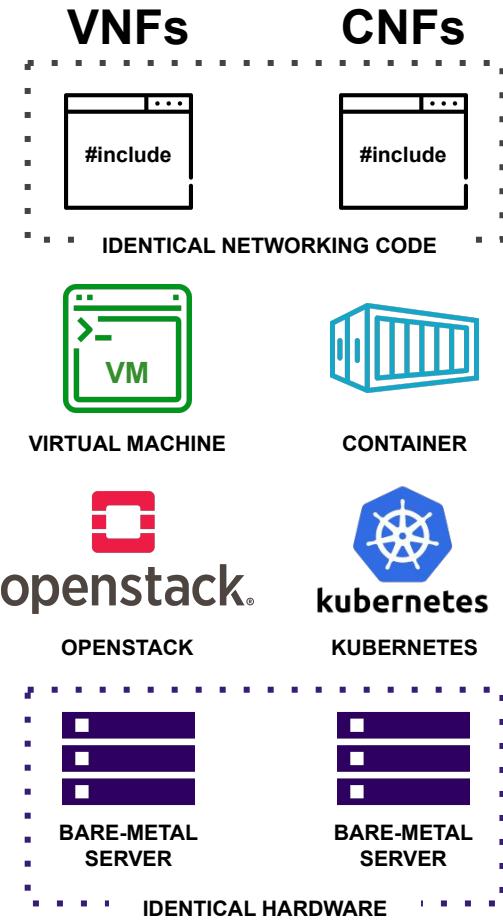


149 Kubernetes Certified Service Providers



CNF Testbed

- Open source [initiative](#) from CNCF
- Compare performance of:
 - Virtual Network Functions (VNFs) on OpenStack, and
 - Cloud native Network Functions (CNFs) on Kubernetes
- Identical networking code packaged as:
 - containers, or
 - virtual machines (VMs)
- Running on top of identical on-demand hardware from the bare metal hosting company [Packet](#)
- See [presentation](#) for more information



CNCF events



[August 17-20 Virtual](#)
[Sponsor](#)
[Register](#)



[July 30 - August 1](#)
[Sponsor](#)



[November 17-20](#)
[Sponsor](#)
[CFP open until June 28](#)



[June 24-25 Virtual](#)
[Sponsor](#)
[Register](#)



[August 17 Virtual](#)
[Register](#)



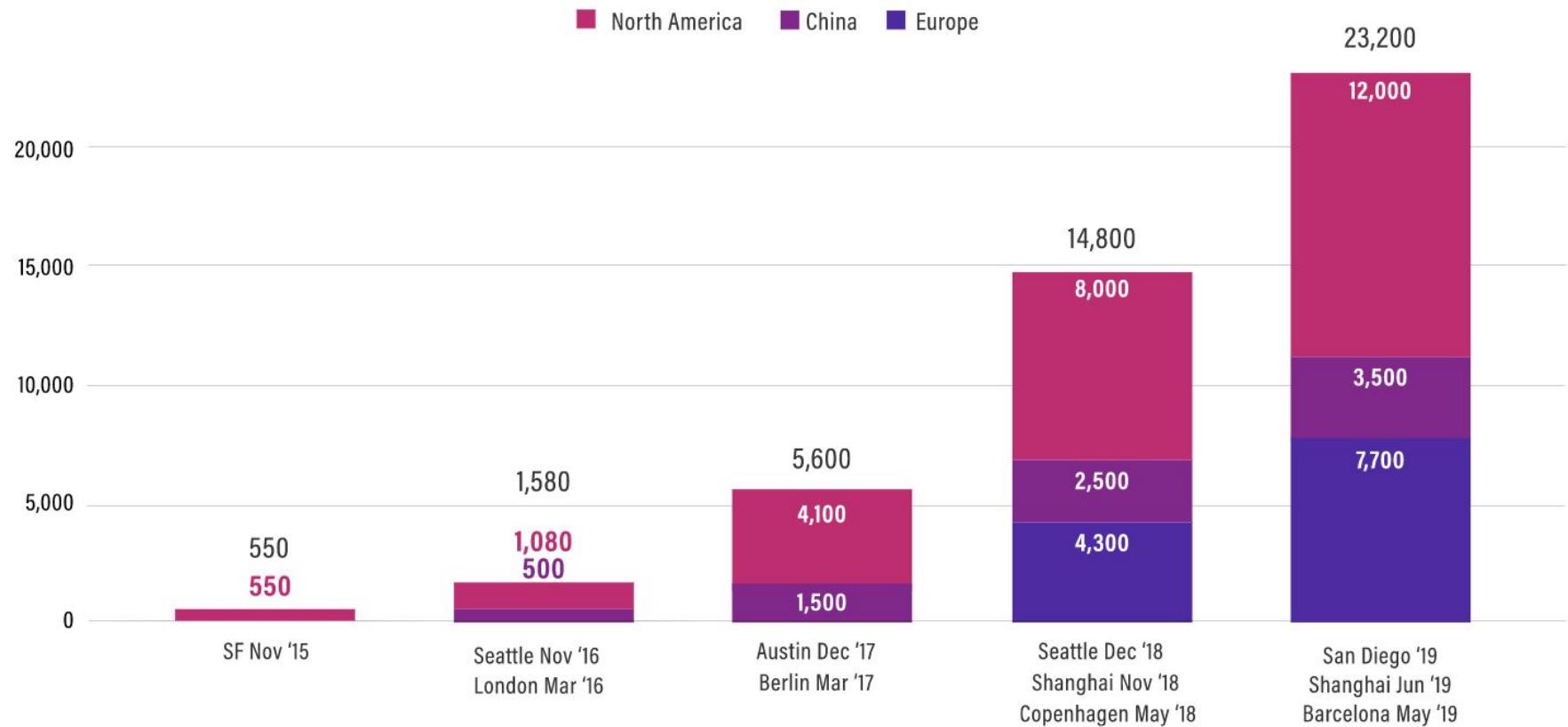
[August 17 Virtual](#)
[Register](#)



[August 17 Virtual](#)
[Register](#)



KubeCon + CloudNativeCon Attendance



Thank you



CLOUD NATIVE
COMPUTING FOUNDATION

Sincere thank to Dan Kohn for this presentation.

Dan Kohn, Executive Director, [@dankohn1](https://twitter.com/dankohn1)

This presentation is available at:
<https://github.com/cncf/presentations>