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empowering ideas


codit


bbv
MAKING VISIONS WORK.


sonar


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Azure Zurich
User Group


ZÜRICH DEV .NET
ZÜRICH .NET DEVELOPERS UG


SWISS
ANGULAR


Kubernetes in Azure for .NET Developers - Zero to Hero

Who am I?

@AnnieTalvasto

Sr. Product Marketing Mgr at Camunda

- CNCF Ambassador
- Azure MVP

- Kubernetes & CNCF meetup co-organizer
- Startup-coach
- Co-host of Cloudgossip podcast - cloudgossip.net

What value do you get by attending this talk?

- Learn Kubernetes in the cloud

Impact of cloud native

- Kubernetes has crossed the adoption chasm to become a mainstream global technology.
- According to CNCF's respondents, **96% of organizations are either using or evaluating Kubernetes** – a record high since the surveys began in 2016.

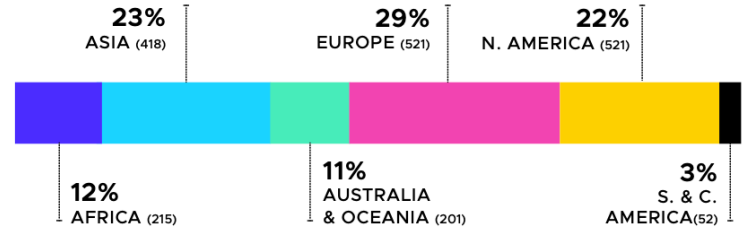
  - CNCF 2021 Survey

KUBERNETES IS STARTING TO GO "UNDER THE HOOD" 1 / 3

CNCF saw this trend reflected in part one of our survey results: 79% of respondents use Certified Kubernetes Hosted platforms. Of those, the most popular are Amazon Elastic Container Service for Kubernetes (39%), Azure Kubernetes Service (23%), and Azure (AKS) Engine (17%).

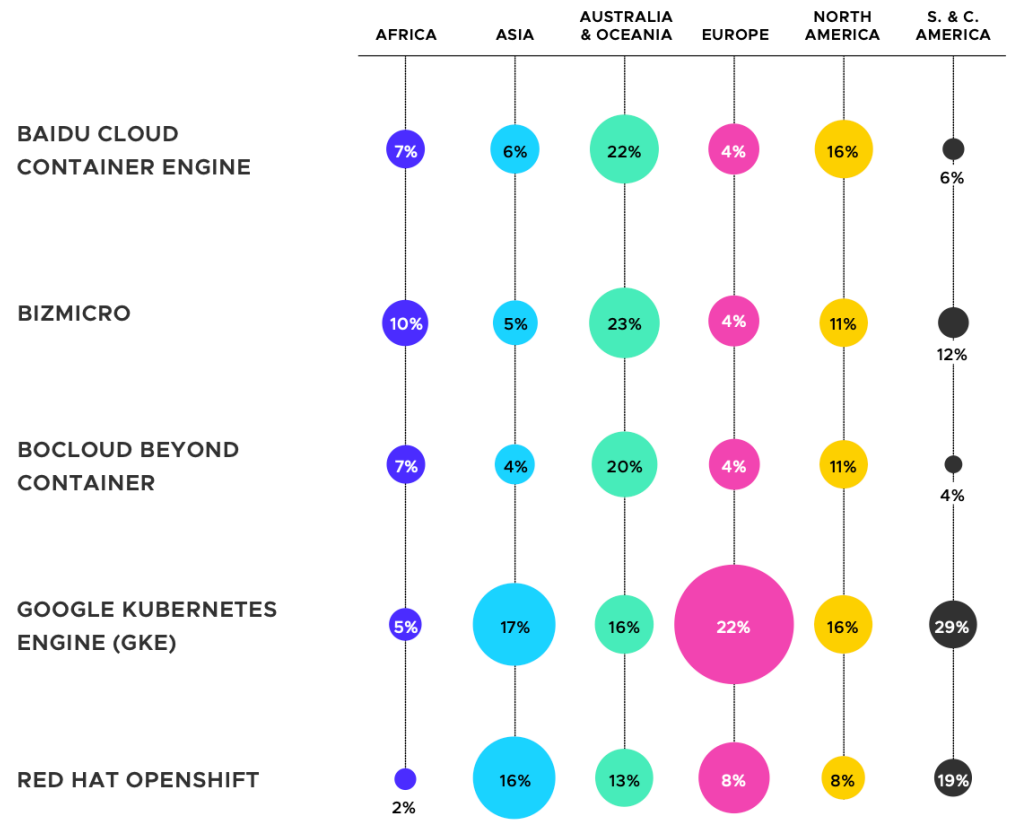
1809
RESPONDENTS

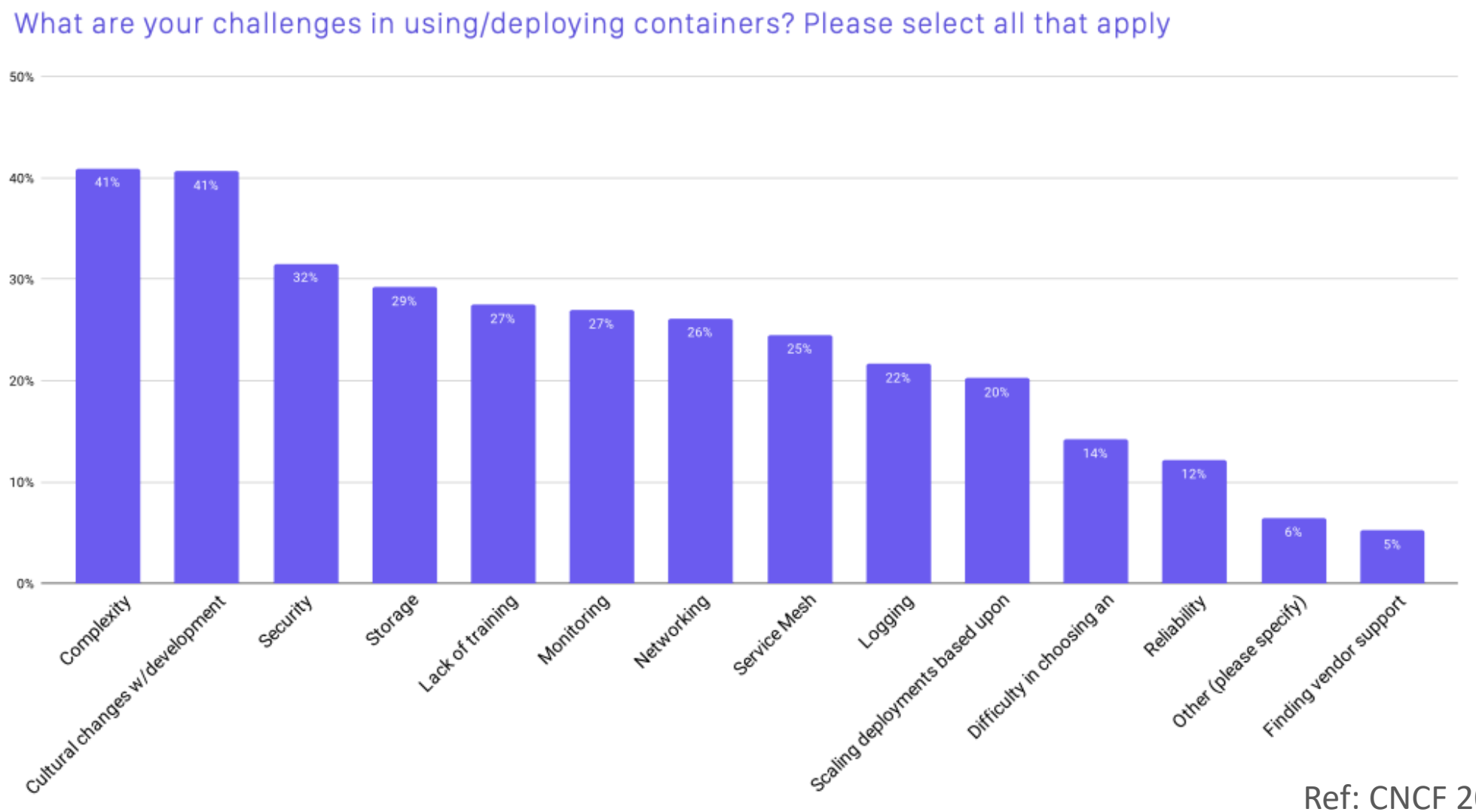
respondents could select more than one platform



DOES YOUR ORGANIZATION USE ANY CERTIFIED KUBERNETES INSTALLERS?

Scale of circle denotes volume of respondents and platform combined



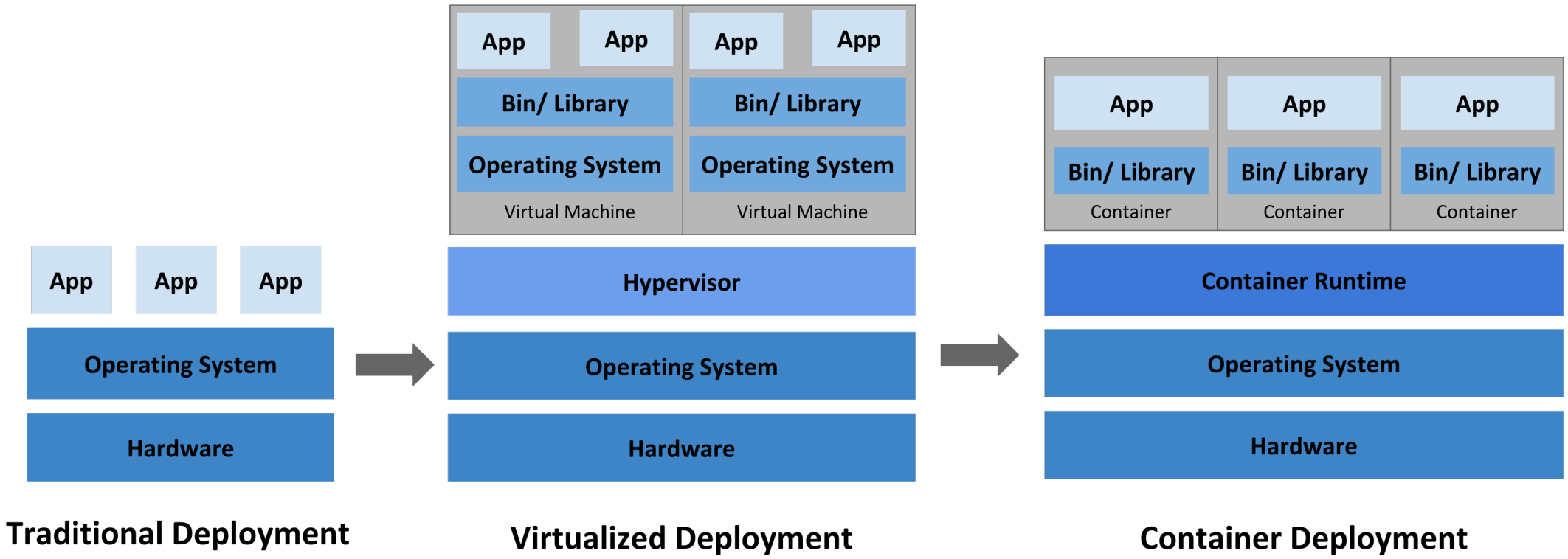


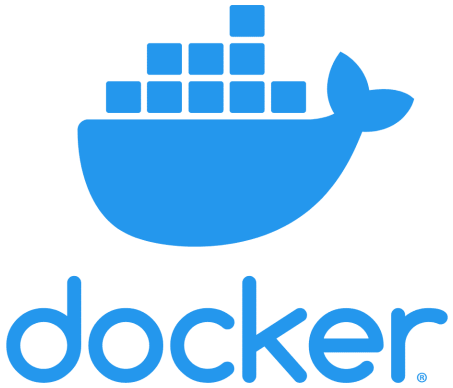
Ref: CNCF 2020 Survey

Agenda:

- Containers & Kubernetes
- Kubernetes services in Azure
- How to use AKS
- Deploying a .NET app to Kubernetes
- Next steps in Kubernetes
  - Helm
  - Linkerd
  - Keda
- Resources

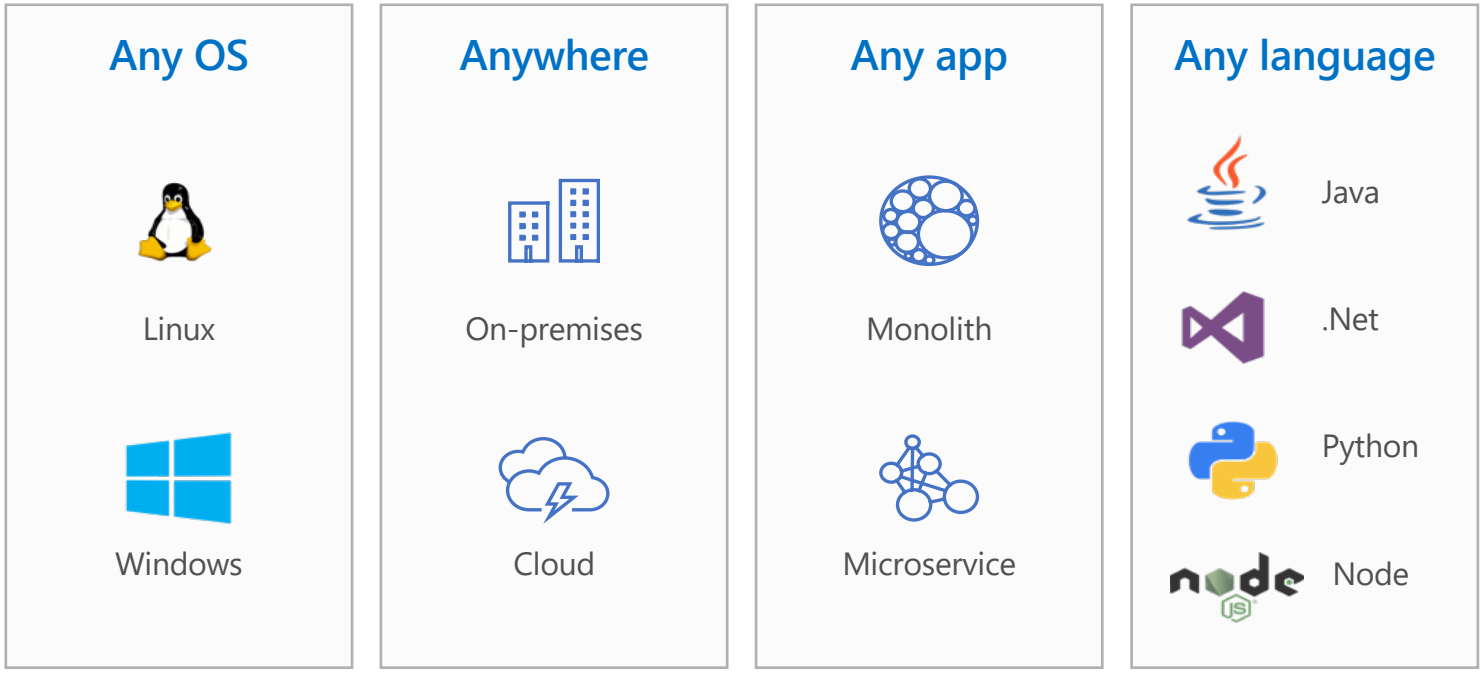
Containers & Kubernetes


App
App
App
Operating System
Hardware
Traditional Deployment
App
App
App
App
Bin/ Library
Bin/ Library
Operating System
Operating System
Virtual Machine
Virtual Machine
Hypervisor
Operating System
Hardware
Virtualized Deployment
App
App
App
Bin/ Library
Bin/ Library
Bin/ Library
Container
Container
Container
Container Runtime
Operating System
Hardware
Container Deployment



- Docker is an open platform for developing, shipping, and running applications. Docker enables you to separate your applications from your infrastructure so you can deliver software quickly.

The benefits of using containers



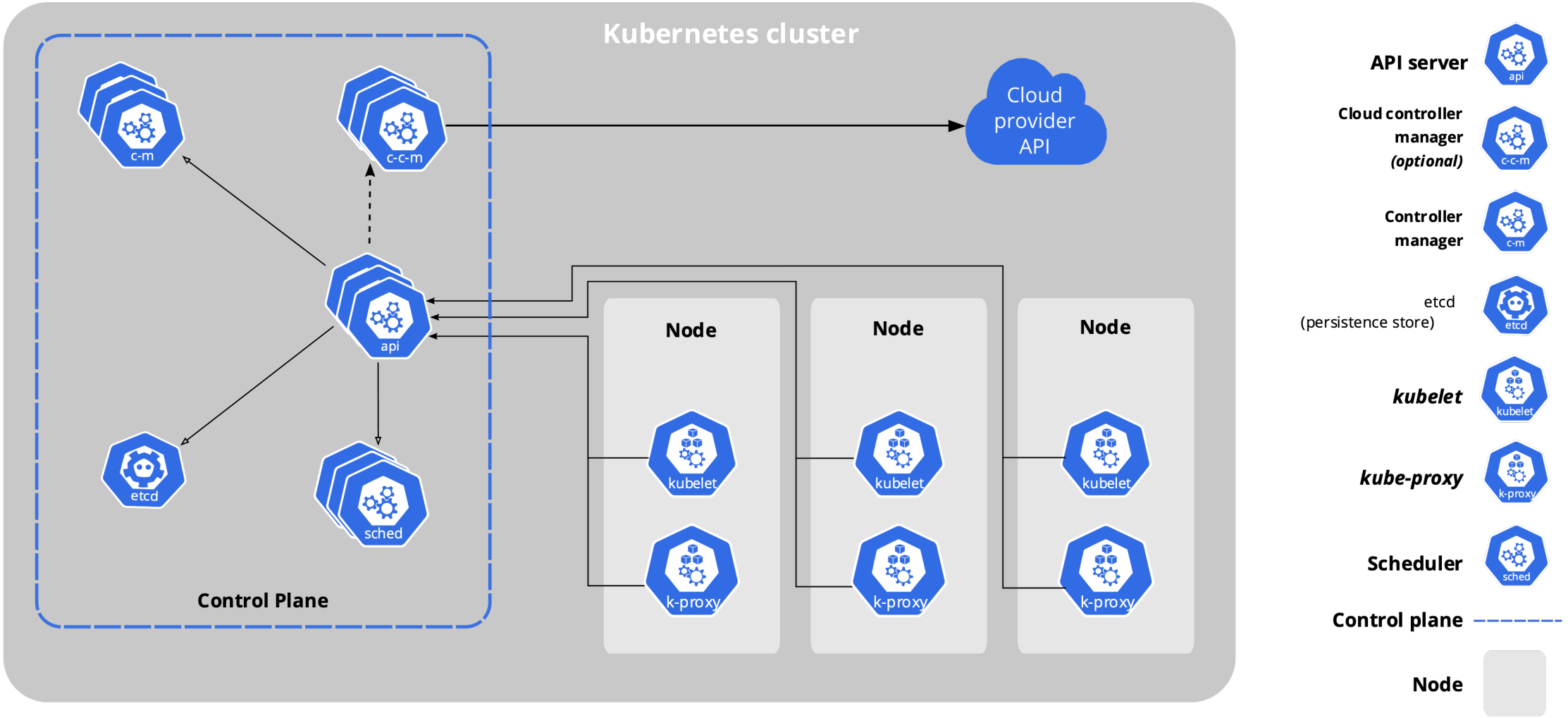
kubernetes

- Kubernetes, also known as K8s, is an open-source system for automating deployment, scaling, and management of containerized applications.

Cattle

vs

Pet


Kubernetes cluster
c-m
c-c-m
Cloud provider API
api
etcd
sched
Control Plane
Node
kubelet
k-proxy
Node
kubelet
k-proxy
Node
kubelet
k-proxy
API server
api
Cloud controller manager (optional)
c-c-m
Controller manager
c-m
etcd (persistence store)
etcd
kubelet
kubelet
kube-proxy
k-proxy
Scheduler
sched
Control plane
Node

Kubernetes Services in Azure

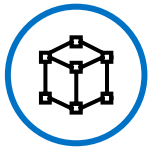
Azure Kubernetes Service (AKS)

Simplify the deployment, management, and operations of Kubernetes

Deploy and manage Kubernetes with ease

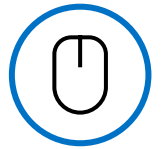
Scale and run applications with confidence

Secure your Kubernetes environment



Accelerate containerized application development

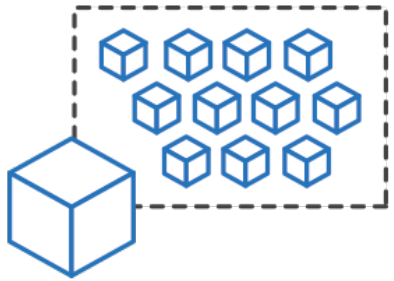
Work how you want with open-source tools & APIs



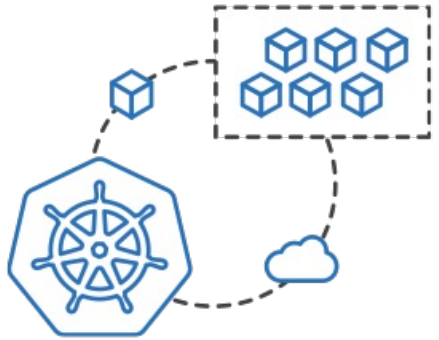
Set up CI/CD in a few clicks

Azure Container Instances (ACI)

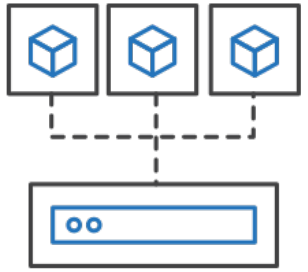
Easily run containers on Azure without managing servers



Run containers without managing servers



Increase agility with containers on demand



Secure applications with hypervisor isolation

Azure Container Apps

Select any container image using any language or framework

Choose vCPU cores, memory, and scale settings based on events or HTTP requests

Enable service-to-service communication, configure ingress, and event sources

Create and deploy your application

Using AKS

Azure Kubernetes Service (AKS)

Deploy a Kubernetes cluster in Azure:

Create a resource group:

az group create

Create AKS cluster :

az aks create

Connect to cluster

az aks get-credentials

Run the application!

Azure Kubernetes Service (AKS)

How to scale a cluster?

To see the number and state of pods:
kubectl get pods

To manually change:
kubectl scale --replicas=5 deployment/azure-vote-front

Verify with:
kubectl get pods

Automation: use cluster autoscaler!

Azure Kubernetes Service (AKS)

How to upgrade a cluster? Part 1

Find out:

az aks get-upgrades

Example: az aks get-upgrades --resource-group myResourceGroup --name myAKSCluster --output table

When you can upgrade:

Name	ResourceGroup	MasterVersion	Upgrades
default	myResourceGroup	1.18.10	1.19.1, 1.19.3

If not:

ERROR: Table output unavailable. Use the --query option to specify an appropriate query. Use --debug for more info.

Azure Kubernetes Service (AKS)

How to upgrade a cluster? Part 2

To upgrade:

```
az aks upgrade \
    --resource-group myResourceGroup \
    --name myAKSCluster \
    --kubernetes-version KUBERNETES_VERSION
```

Check with az aks show command:

```
az aks show --resource-group myResourceGroup --name myAKSCluster --
output table
```

Deploying a .NET application to Kubernetes

Takes a few steps

Andrew Lock blog series:

- Part 1 - An Introduction to Kubernetes
- Part 2 - Configuring resources with YAML manifests
- Part 3 - An introduction to deploying applications with Helm
- Part 4 - Creating a Helm chart for an ASP.NET Core app
- Part 5 - Setting environment variables for ASP.NET Core apps in a Helm chart
- Part 6 - Adding health checks with Liveness, Readiness, and Startup probes
- Part 7 - Running database migrations when deploying to Kubernetes
- Part 8 - Running database migrations using jobs and init containers
- Part 9 - Monitoring Helm releases that use jobs and init containers
- Part 10 - Creating an 'exec-host' deployment for running one-off commands
- Part 11 - Avoiding downtime in rolling deployments by blocking SIGTERM
- Part 12 - Tips, tricks, and edge cases

Introducing Project Tye

Amiee Lo

May 21st, 2020 | 12 | 1

Project Tye

Project Tye is an experimental developer tool that makes developing, testing, and deploying microservices and distributed applications easier.

When building an app made up of multiple projects, you often want to run more than one at a time, such as a website that communicates with a backend API or several services all communicating with each other. Today, this can be difficult to setup and not as smooth as it could be, and it's only the very first step in trying to get started with something like building out a distributed application. Once you have an inner-loop experience there is then a, sometimes steep, learning curve to get your distributed app onto a platform such as Kubernetes.

The project has two main goals:

1. Making development of microservices easier by:
   - Running many services with one command
   - Using dependencies in containers
   - Discovering addresses of other services using simple conventions
2. Automating deployment of .NET applications to Kubernetes by:
   - Automatically containerizing .NET applications
   - Generating Kubernetes manifests with minimal knowledge or configuration
   - Using a single configuration file

If you have an app that talks to a database, or an app that is made up of a couple of different processes that communicate with each other, then we think Tye will help ease some of the common pain points you've experienced.

We have recently demonstrated Tye in a few Build sessions that we encourage you to watch, Cloud Native Apps with .NET and AKS and Journey to one .NET

Tour of Tye

Installation

To get started with Tye, you will first need to have .NET Core 3.1 installed on your machine.

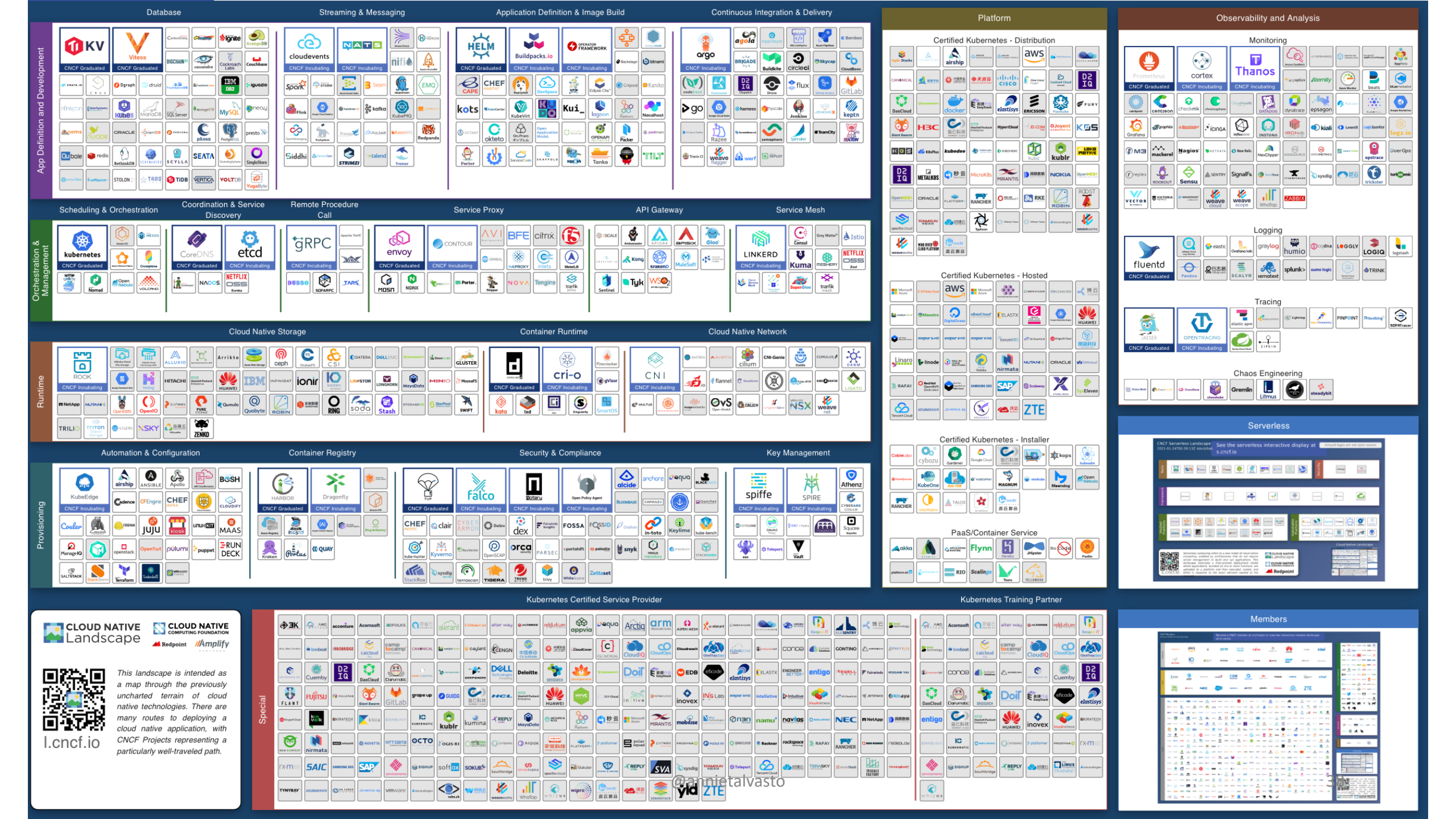
Tye can then be installed as a global tool using the following command:

Become the Hero

CLOUD NATIVE
COMPUTING FOUNDATION

Building sustainable ecosystems for cloud native software

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.


App Definition and Development
Database
Streaming & Messaging
Application Definition & Image Build
Continuous Integration & Delivery
Orchestration & Management
Scheduling & Orchestration
Coordination & Service Discovery
Remote Procedure Call
Service Proxy
API Gateway
Service Mesh
Runtime
Cloud Native Storage
Container Runtime
Cloud Native Network
Provisioning
Automation & Configuration
Container Registry
Security & Compliance
Key Management
Platform
Certified Kubernetes - Distribution
Certified Kubernetes - Hosted
Certified Kubernetes - Installer
PaaS/Container Service
Observability and Analysis
Monitoring
Logging
Tracing
Chaos Engineering
Serverless
Kubernetes Certified Service Provider
Kubernetes Training Partner
Special
Members
CLOUD NATIVE Landscape
CLOUD NATIVE COMPUTING FOUNDATION
Redpoint
Amplify
l.cncf.io
This landscape is intended as a map through the previously uncharted terrain of cloud native technologies. There are many routes to deploying a cloud native application, with CNCF Projects representing a particularly well-traveled path.
@annietalvasto
38

Home Docs Charts Blog Community English Get Started

The package manager for Kubernetes

Helm is the best way to find, share, and use software built for Kubernetes.

What is Helm?

- Package manager for Kubernetes
- Homebrew, snap or chololatey for kubernetes

- Helm maintainer:
- Package management: Tooling that enables someone who has knowledge of an application and a platform to package up an application so that **someone else who has neither** extensive knowledge of the aplication or the way it needs to be run on the platform **can use it.**

What are the benefits of Helm?

- Manage Complexity
- Easy Updates
- Simple Sharing
- Rollbacks

How is Helm used?

- Charts

- What are the prerequisites?
  - A Kubernetes cluster
  - Deciding what security configurations to apply to your installation, if any
  - Installing and configuring Helm.

Helm Demo:

Easily deploy complex application (WordPress) to Kubernetes using a helm chart

A different kind of service mesh

Ultra light, ultra simple, ultra powerful. Linkerd adds security, observability, and reliability to Kubernetes, *without* the complexity. CNCF-hosted and 100% open source.

Get Started | Get Involved

Star 7,784 | Watch 190 | Fork 906

Instant platform health metrics

Instantly track success rates, latencies, and request volumes for every meshed workload, without changes or config.

Simpler than any other mesh

Minimalist, Kubernetes-native design. No hidden m... as little YAML and as few CRDs as possible.

Zero-config mutual TLS

Transparently add mutual TLS to any on-cluster TCP communication with no configuration.

Designed by engineers, for engineers

Self-contained control plane, incrementally deployabl... and lots of diagnostics and debugging tools.

Linkerd

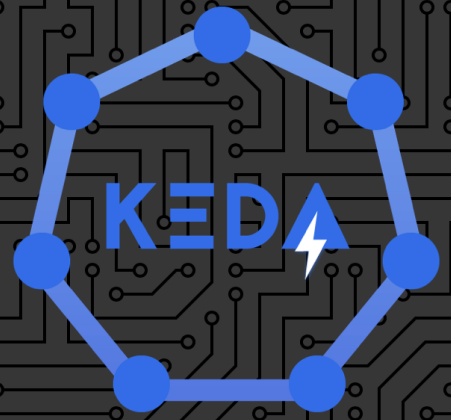
- Service mesh
- Ultralight, ultrafast, security-first service mesh for Kubernetes.
- The overall goal is to reduce mental overhead of having service mesh
- What does it do?
  - Observability
  - Realiability
  - Security

What are the benefits of Linkerd?

- Thriving open source community
- Simple, minimalist design
- Deep Runtime Diagnostics
- Ultralight and ultra fast
- Installs in seconds with zero config
- Actionable service metrics

What is needed to use Linkerd:

cat deployment.yml | linkerd inject - | kubectl apply -f -



Kubernetes Event-driven Autoscaling

Application autoscaling made simple

Concepts | Deploying KEDA | Architecture | Scalers | Blog

What is KEDA?

KEDA is a Kubernetes-based Event Driven Autoscaler. With KEDA, you can drive the scaling of any container in Kubernetes based on the number of events needing to be processed.

KEDA is a single-purpose and lightweight component that can be added into any Kubernetes cluster. KEDA works alongside standard Kubernetes components like the Horizontal Pod Autoscaler and can extend functionality without overwriting or duplication. With KEDA you can explicitly map the apps you

What is Keda?

- Default Kubernetes Scaling is not well suited for event driven applications, kubernetes is more for resource based scaling (CPU and memory).

- Keda: Event driven scale controlling that can run inside any kubernetes cluster.

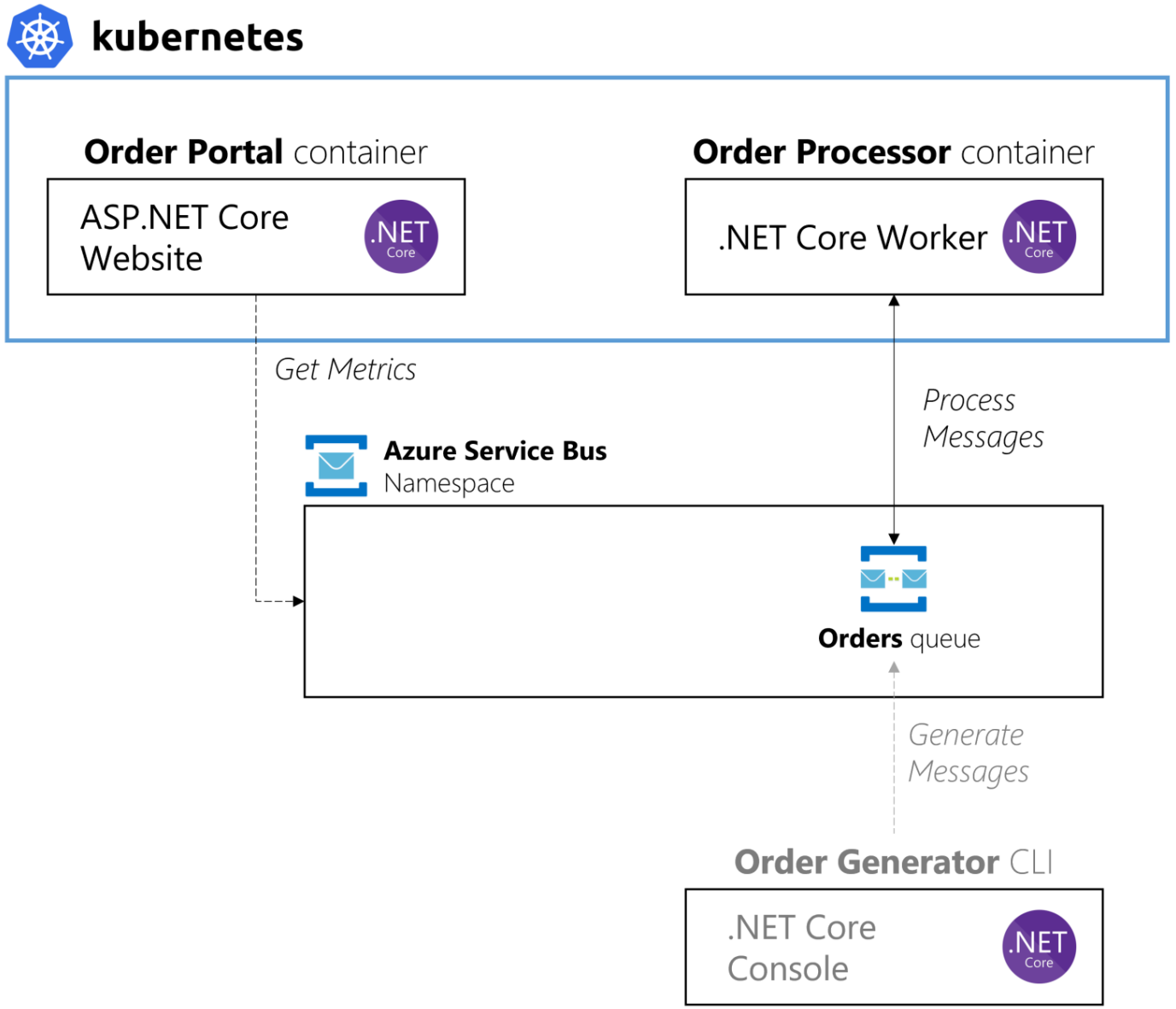
- You can install it into new or existing clusters.

What are the Keda principles?

- Not rebuilding anything that Kubernetes offers out of the box.
- Single purpose, simple, non-intrusive.
- Works with any container and any workload

Demo

KEDA: Scaling .NET Core worker with Azure Service Bus



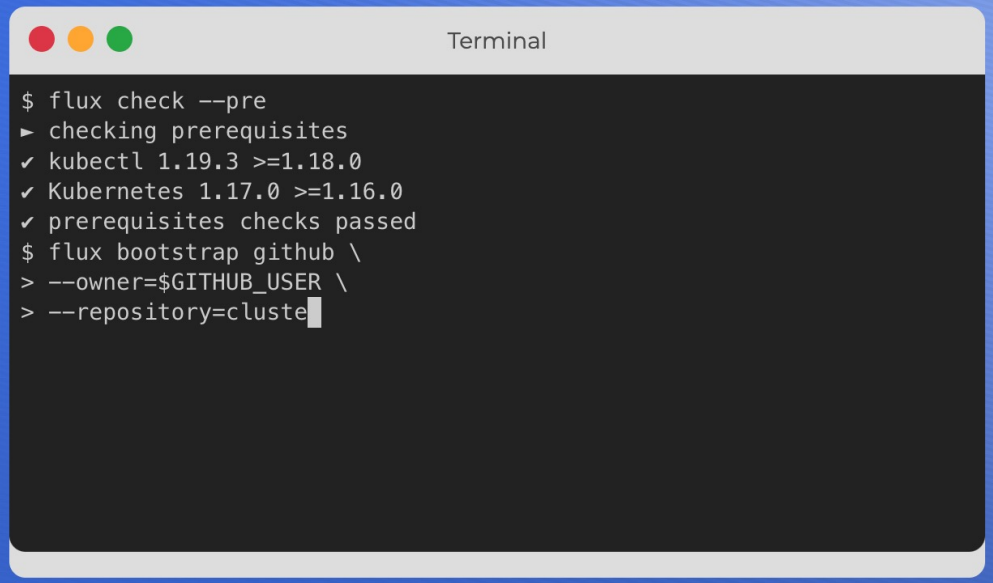
Flux - the GitOps family of projects

Flux is a set of continuous and progressive delivery solutions for Kubernetes that are open and extensible.

The latest version of Flux brings many new features, making it more flexible and versatile.

Flux is a CNCF Incubating project.

Get started →



Flux in short

What is Flux?

- What is GitOps?
  - Kubectl apply
  - Kubectl set image
  - Helm upgrade
  - Kubectl upgrade
  - -> git push

GitOps provides one model for making infrastructure, apps and Kubernetes add-on changes, you have consistent end-to-end workflow across your entire organization

- Why is Flux great for GitOps?

Flux practices & benefits

Defined GitOps practices:

- 1) Describe your system declaratively
- 2) Keep configuration under source control
- 3) Use software agents to reconcile and ensure correctness and alert for drfit

Benefits

- Collaboration on infra
- Access Control
- Auditable History
- Drift Correction
- Clear boundaries between dev-team and kubernetes

CNCF helps you along the way

CLOUD NATIVE COMPUTING FOUNDATION

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 leveraging open source, 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/kcsp

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

v20200501

@annietalvas

Learn more

- Azure Docs Resourcews
  - https://docs.microsoft.com/en-us/azure/aks/kubernetes-walkthrough
  - https://docs.microsoft.com/en-us/azure/aks/tutorial-kubernetes-scale?tabs=azure-cli
  - https://docs.microsoft.com/en-us/azure/aks/cluster-autoscaler
  - https://docs.microsoft.com/en-us/azure/aks/upgrade-cluster
- Kubernetes for .NET Developers - Hossam Barakat
  - https://www.youtube.com/watch?v=uh4V2IjSrlI
- Deploying ASP.NET Core applications to Kubernetes - Part 1
  - https://andrewlock.net/deploying-asp-net-core-applications-to-kubernetes-part-1-an-introduction-to-kubernetes/
- Project Tye
  - https://github.com/dotnet/tye
- Workshop:
- https://docs.microsoft.com/en-us/learn/modules/aks-workshop/
- Cncf yYoutube - https://www.youtube.com/channel/UCvqbFHwN-nwalWPjPUKpvTA
- Techworld with Nana - https://www.youtube.com/channel/UCdngmbVKX1Tgre699-XLlUA
- Links and slides: github.com/annietalvasto

Cloud Gossip

Cloud Gossip is a cloud technology podcast. The first season of Cloud Gossip explains and helps people to understand the underlying terms, technologies & concepts that might be foreign in the cloud world. The second season delves deeper into the technology and features interviews with top industry experts. Hosted by Annie Talvasto & Karl Ots.

Listen on Apple Podcasts

LISTEN & SUBSCRIBE

Recent Episodes

Evolution of DevOps with Martyn Coupland

Today's guest on Cloud Gossip is Martyn Coupland! Martyn works as Principal Solution Architect at Ensono, and he's an Azure MVP and DevOps Ambassador at DevOps Institute. Martyn is going to talk about his role at Ensono and wha...

MARCH 8TH, 2021 | 57:34 | S2:E6

Thank you!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