
AWS
re:Invent
NOV. 28 – DEC. 2, 2022 | LAS VEGAS, NV

COM207-R

Competition of the modern workloads: Serverless vs. Kubernetes on AWS

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Melio

Shimon Tolts

CEO & Co-Founder
Datree

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The battle of the modern infrastructures

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In the right corner



```yaml
apiVersion: 33
kind: CEO
metadata:
    name: "Shimon Tolts"
    labels:
     company: datree
     role: co-founder
spec:
    replicas: 1
    containers:
    - name: company-ceo
      image: datree
      command: ["/bin/bash" ]
      args: ["datree", "test"]

    - name: aws-community-hero
      image: aws/community/heroes

    - name: cncf-tel-aviv
      image: cncf/community/ambassador
      role: co-organizer
```

aws HEROES

@shimontolts

kubernetes

CLOUD NATIVE COMPUTING FOUNDATION

Tel Aviv

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In the left corner

Niv Yungelson

Tech enthusiast since the 8th grade

AWS Israel community leader

AWS Community Hero since 2022

DevOps Leader at Melio

Has the nerdiest tattoo



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AWS Israel Community

Over 8,000 Members

Monthly meetups

Different subjects and levels

No marketing – from the community for the community



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How is it going to work

6 categories – head to head

You get to ask questions after each round

You vote for the best argument by standing up

At the end we announce the winner you chose!

(The loser buys the winner an all-you-can-eat buffet meal)

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Introduction



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Why us?

Starred 6k

https://github.com/datreeio/datree

README.md



Prevent Kubernetes Misconfigurations

build-staging passing | build-main passing | views (today / total) 81 / 123479 | downloads 52k | go report A

Slack

Explore the docs »

What is Datree?

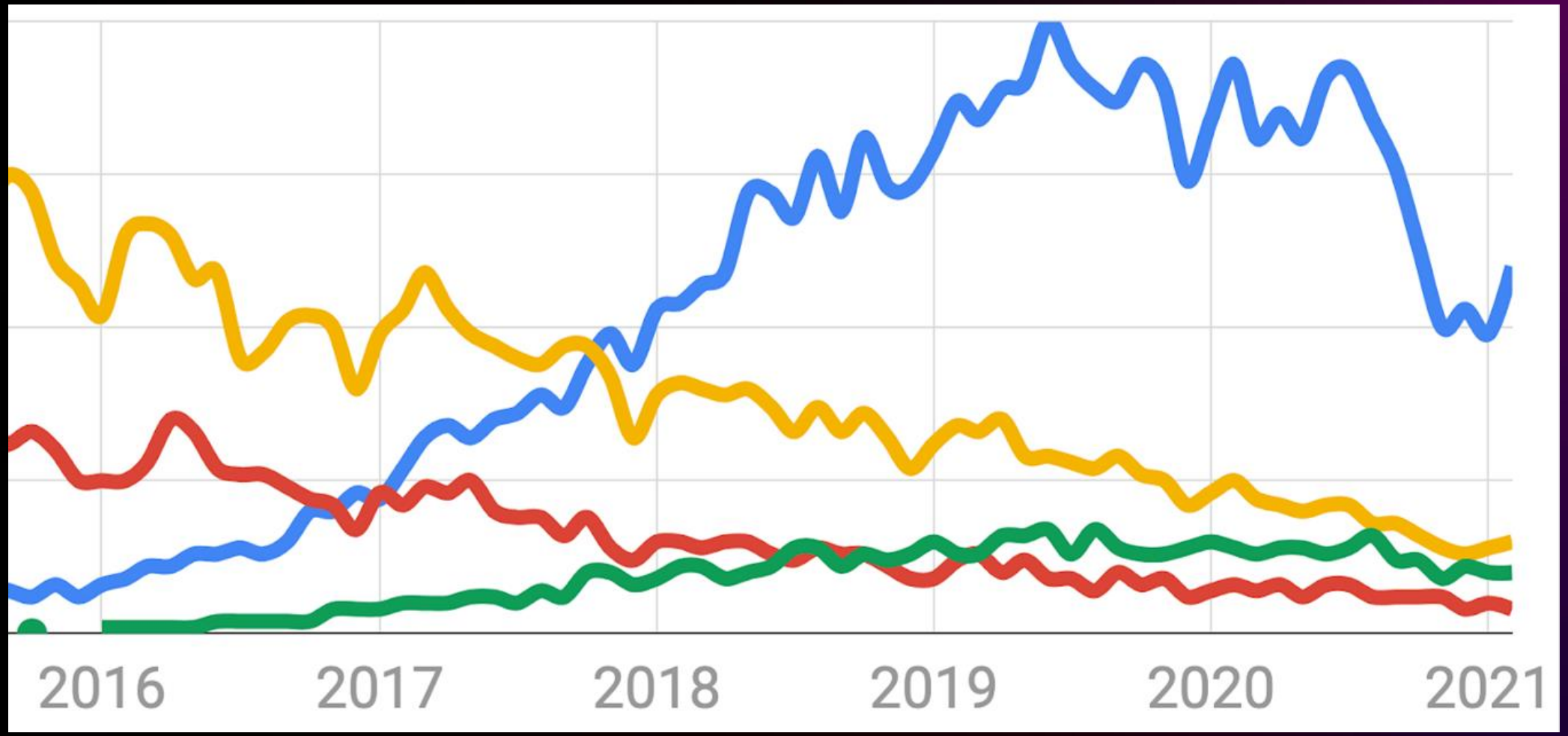
Datree automatically validates Kubernetes objects for rule violations, ensuring no misconfigurations reach production. It's an E2E policy enforcement solution that can be used on the command line, admission webhook, or even as a kubectl plugin.

It's far more effective than manual processes, such as sending an email to a slew of developers, begging them to set various limits, which likely falls on deaf ears because developers are already overwhelmed.

Quick-start in two steps

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Kubernetes in search trends



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Cloud Native Computing Foundation

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Graduated projects



Key/Value store



Logging



Registry



Package management



Orchestration



Distributed tracing



Service mesh



Policy



Monitoring



Container Runtime



Service discovery



Identity spec



Network Proxy



Key/value Store



Identity



Storage



Storage



Software update spec

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Incubating projects



Continuous integration & deployment



Services Management



Storage



Packaging spec



Networking & security



Metrics



Continuous integration & deployment



Serverless



Storage



Networking API



Ingress controller



Monitoring



Container runtime



Chaos engineering platform



Scheduling



Image distribution



Api Gateway



Container security



Security



Remote procedure call



Monitoring



GitOps



Supply chain



Autoscaling



Control Plane



Policy management



Serverless



Edge



Chaos engineering



Virtualization



Messaging



Observability framework



Operator lifecycle management



Batch system

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Kubernetes - 93,000 ☆ on GitHub

You could run a vanilla Kubernetes cluster on Amazon Elastic Compute Cloud (Amazon EC2), and you would have to do the following:

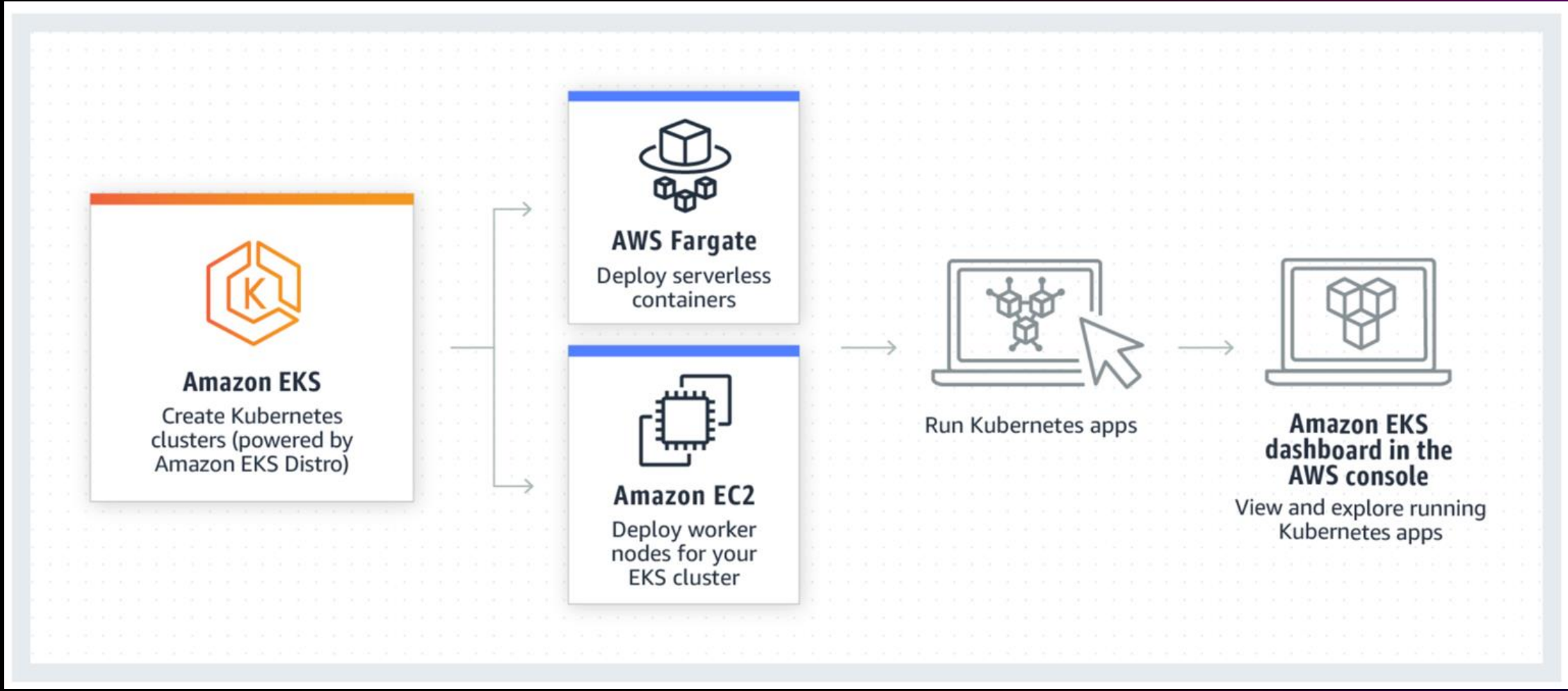
- Install, manage, upgrade a Kubernetes master
- Monitor, scale, etc.



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Amazon EKS deployment options



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EKS deployment options

Aws Fargate

Managed node group

Self-managed Amazon EC2

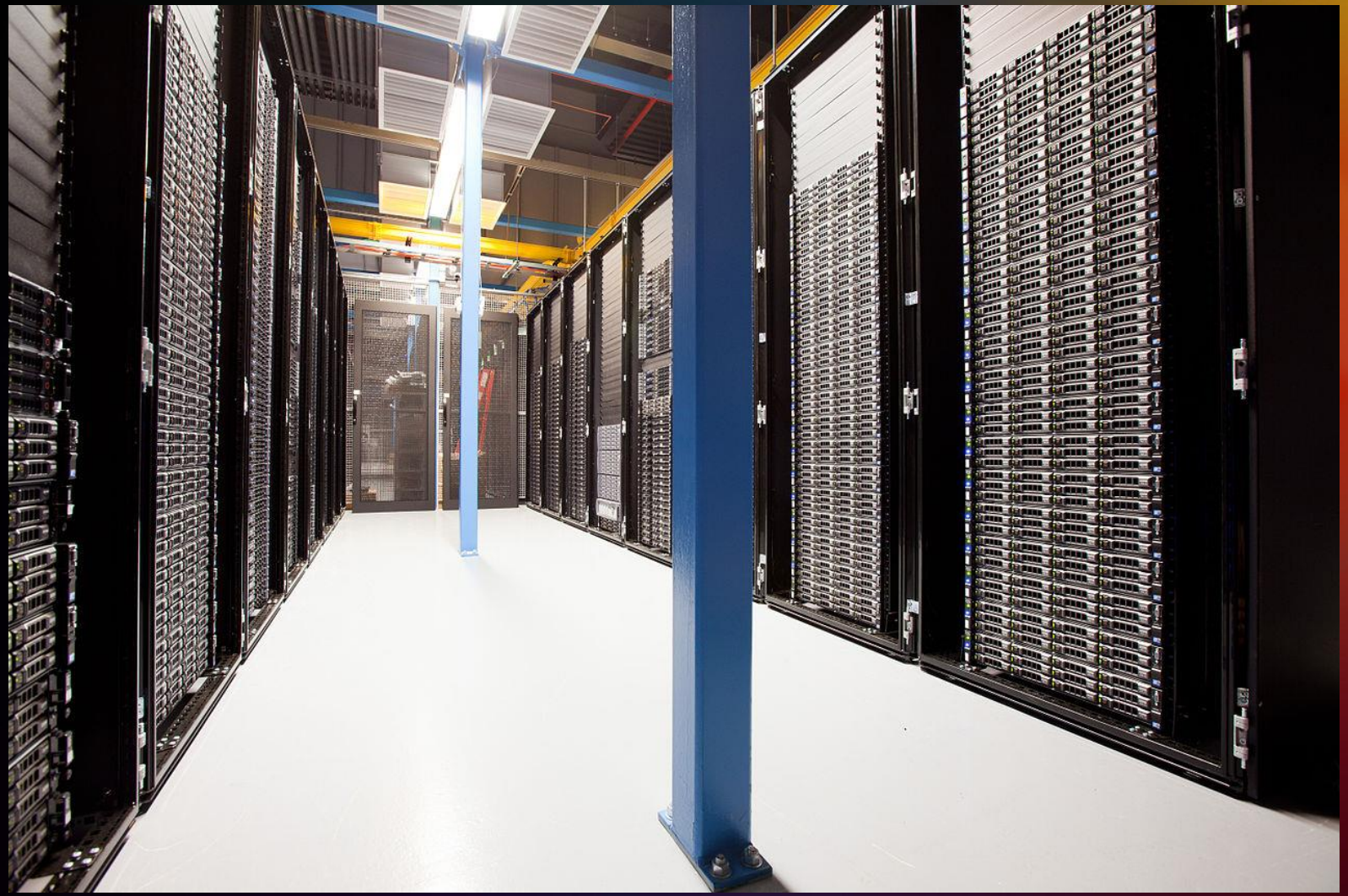
Feature	Amazon EKS	Amazon EKS on AWS Outposts	Amazon EKS Anywhere	Amazon EKS Distro
Hardware	AWS-supplied	AWS-supplied	Supplied by you	Supplied by you
Deployment location	AWS cloud	Your data center	Your data center	Your datacenter
Kubernetes control plane location	AWS cloud	AWS cloud	Your data center	Your datacenter
Kubernetes data plane location	AWS cloud	Your data center	Your data center	Your datacenter
Support	AWS support	AWS support	AWS support	OSS community support

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Serverless

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At the beginning there were server rooms…



Wikimedia Servers-0051 19

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Then there was cloud



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Then there were servers in the cloud



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How do we choose the right infrastructure for our needs

Evaluate actual needs of project and infrastructure

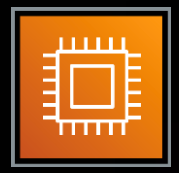
Kubernetes



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What do I mean by serverless





Compute

AWS Lambda



Application Integration

Amazon Simple Queue Service (Amazon SQS)

Amazon Simple Notification Service (Amazon SNS)



Storage

Amazon Simple Storage Service (Amazon S3)



Database

Amazon Relational Database Service (Amazon RDS)

Amazon DynamoDB

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Maintainability

Keeping the infrastructure updated



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Kubernetes

- Amazon Elastic Kubernetes Service (Amazon EKS) offers auto version upgrades within the service
- If used with AWS Fargate no servers are to be patched
- For node groups, you have to patch the instances by yourself

EKS Kubernetes release calendar

Kubernetes version	Upstream release	Amazon EKS release	Amazon EKS end of support
1.24	May 3, 2022	November 2022	January 2024
1.23	December 7, 2021	August 11, 2022	October 2023
1.22	August 4, 2021	April 4, 2022	May 2023
1.21	April 8, 2021	July 19, 2021	February 2023
1.20	December 8, 2020	May 18, 2021	November 1, 2022
1.19	August 26, 2020	February 16, 2021	August 1, 2022

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Serverless



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Maintainability – Pros and cons

Serverless

⛔ Serverless still mean servers (for someone) to manage

✅ You no longer have to provision and maintain servers to run your applications, databases, and storage systems

✅ No hardware to patch, AWS is taking care of it for you

Kubernetes

⛔ You have to keep up with a short release cycle of 4 month

⛔ Some updates require configuration files changes

✅ You have to be up to date with latest versions that are more secure

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Cost

How expensive is it?

What do we pay for?



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Serverless

- Pay for scale
- You don’t pay for what you’re not using
- Other aspects of cost

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Kubernetes

- In Amazon EKS you pay per Amazon EC2/minute /AWS Fargate vCPU hour
- You are free to optimize according to instance type/size
- Amazon EKS offers Spot instances



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Cost – Pros and cons

Serverless

⛔ Pay as you go – you pay for each new function and each run

✅ Pay as you go – you don’t pay when the service is not running

✅ Save money in the form of personnel time

⛔ Harder to predict the cost

Kubernetes

✅ Predictable

✅ Pay-per-use

✅ Spot instance supported

⛔ Have to optimize for type/size of workload

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Scalability

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Scalability

- The ability of the system to withhold large amounts of load and to cope with changing loads
- The ability to respond in time to load changes



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Serverless

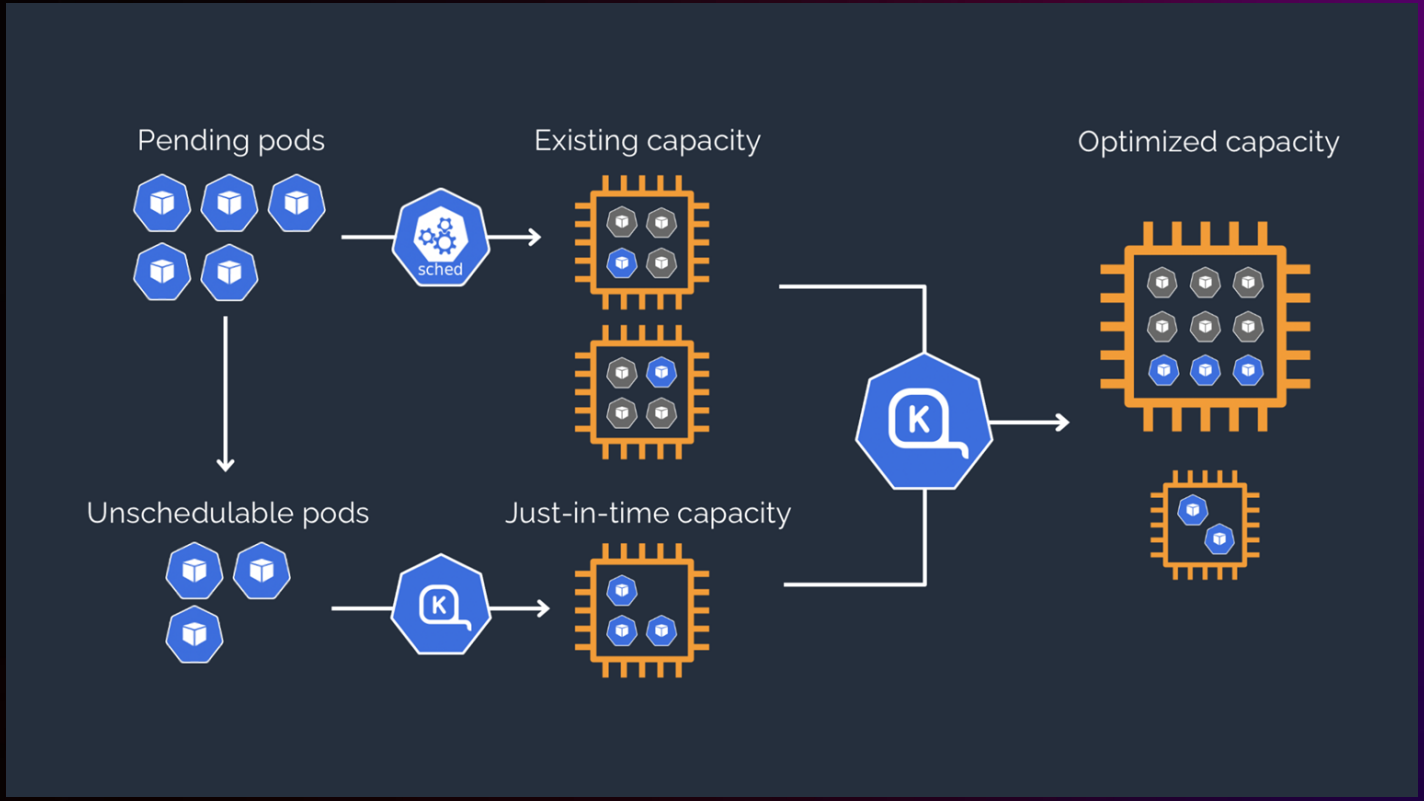
Always take into consideration AWS quotas

Run as many workloads as you want

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Kubernetes

- Node-based auto scaling
  - Karpenter
  - Cluster Autoscaler
- Pod-based autoscaling
  - K8s Vertical Pod Autoscaler
  - Horizontal Pod Autoscaling



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Scalability – Pros and cons

Serverless

⛔ Can’t scale over AWS’s hard limits

✅ Easy to scale horizontally and vertically

✅ No need to worry about physical servers restrictions

Kubernetes

⛔ Scaling is the admin’s responsibility

✅ Automatic autoscalers available by the community and AWS

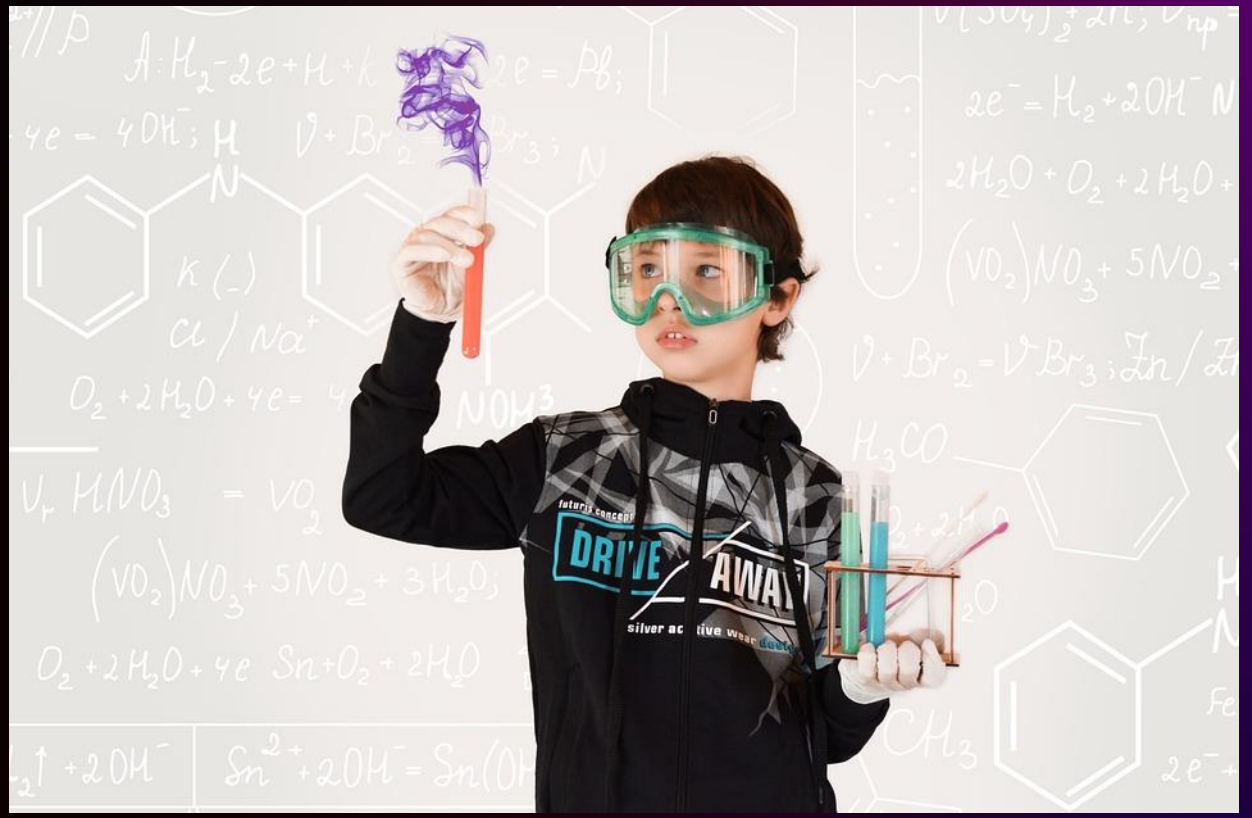
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Developer experience

How developer friendly is it?

Feedback loop



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Kubernetes

- ✅ Container as entry point standardized across clouds
- ✅ Run a local K8s stack (minikube) everywhere
- ✅ Standardized runtime across clouds, edge, and local

- ⛔ Serverless – Multiple proprietary frameworks (SAM/Serverless) in various programming languages

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Serverless

- Developers need to be aware that they are developing on AWS Lambda - being aware of its limitations
- Truly DevOps methodology
- It’s harder to work exactly on the same resources than it is on Kubernetes (emulators are not exactly the same)
- Our solution at Melio - Personal accounts

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Developer experience – Pros and cons

Serverless

⛔ Cannot be agnostic to the infrastructure

✅ Implementing actual DevOps methodology

Kubernetes

⛔ Might be complex to orchestrate a big env

✅ Easy to run locally

✅ Easy to replicate envs

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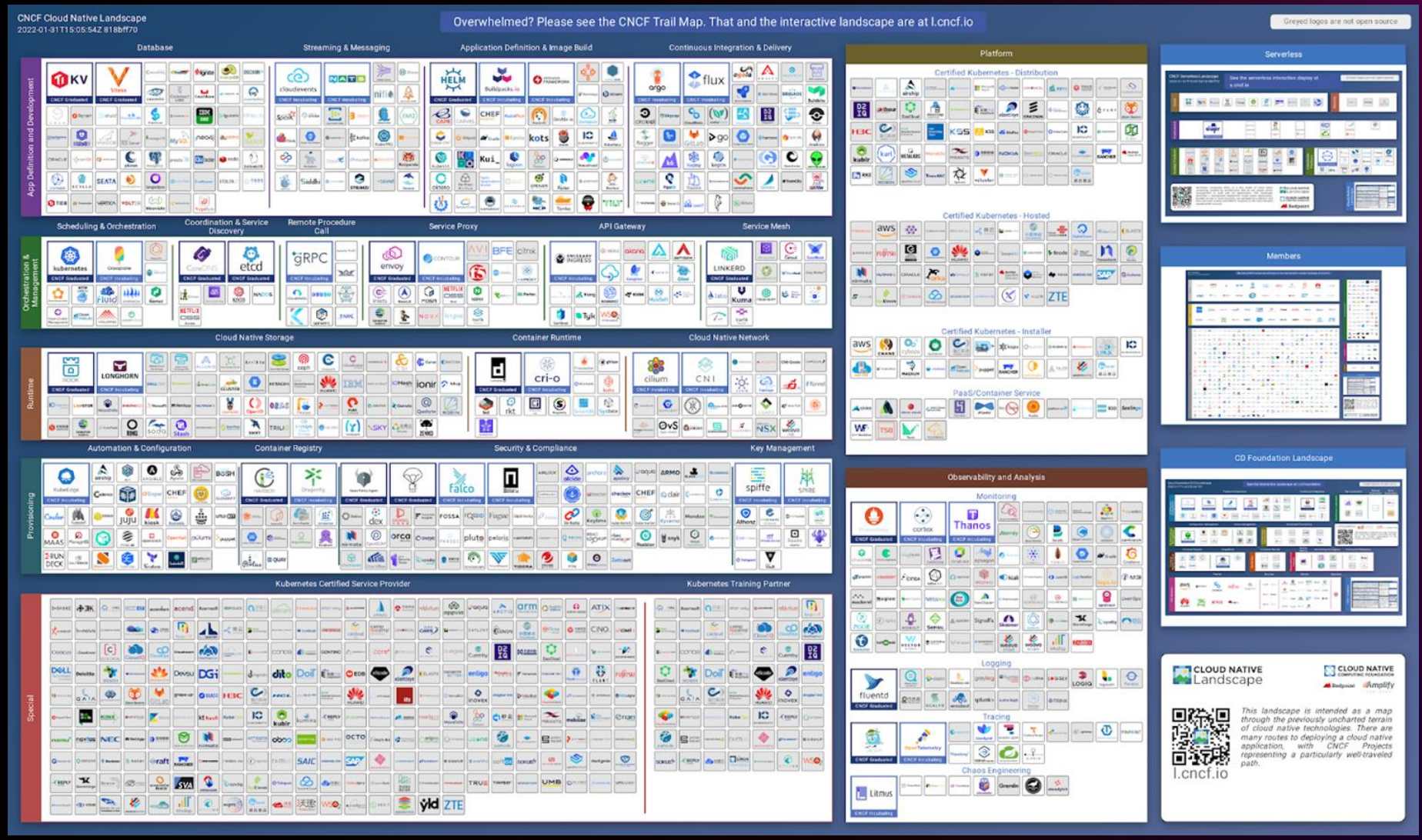
Ecosystem

Other resources that work with the infra



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Kubernetes and CNCF



https://landscape.cncf.io/

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Serverless

Most 3rd-party solutions support serverless

AWS Serverless Application Model (AWS SAM)

AWS has a vast choice of services

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Ecosystem – Pros and cons

Serverless

⊖ Vendor lock-in

☑ More and more solutions become compatible with serverless

☑ Many serverless services in AWS

Kubernetes

☑ Part of the CNCF ecosystem

☑ Standardized protocols and open communication

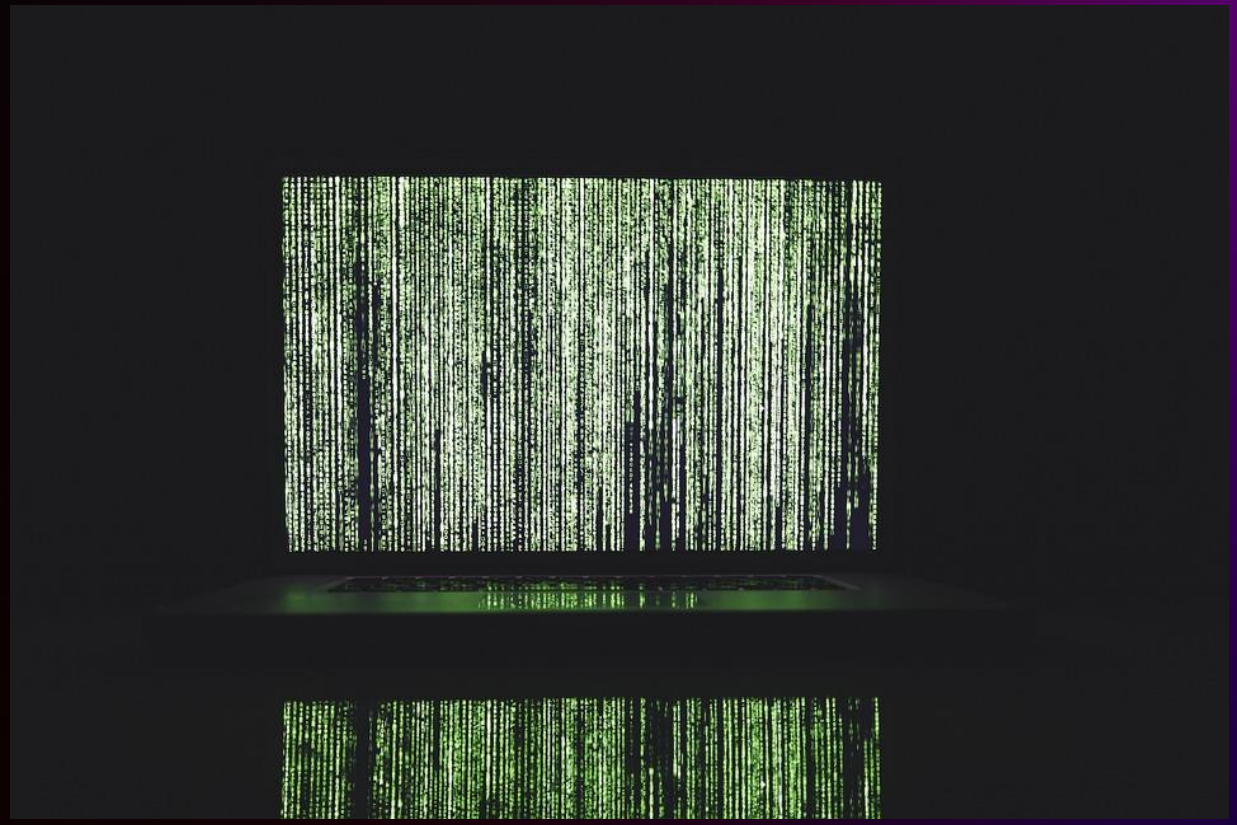
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Monitoring and logging

How and what do you monitor?

How do you debug and troubleshoot?



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Serverless

Adapt to the Serverless way of thinking

Work on test coverage

No need to monitor hardware or its limitations

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Kubernetes

- Use the good old widely used monitoring and logging software you've always had
- Container/OS logging available

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Pros and cons

Serverless

⛔ You cannot connect to a physical server

✅ No need to monitor and take care of servers

Kubernetes

✅ Supports all standardized monitoring protocols (OpenTelemetry/etc.)

✅ Natively integrated with Amazon CloudWatch

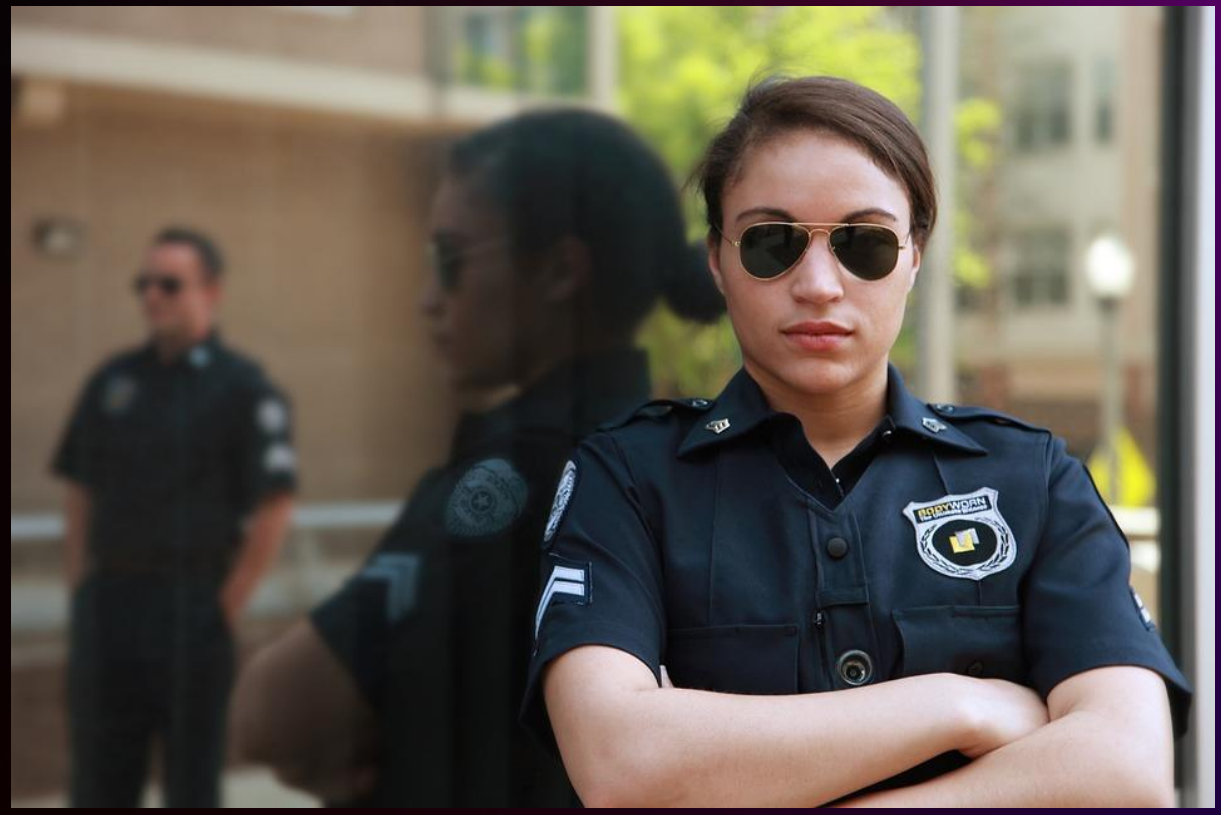
⛔ Has multiple layers and objects that need to be monitored

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Security

What are the security risks and concerns?



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Serverless

No hardware or operating systems to patch

Still need to take care of code security

Compliance is much easier

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Security – Pros and cons

Serverless

⊖ Less defined perimeter

✅ No system vulnerabilities to patch and worry about

✅ Need to consider mostly package and code vulnerabilities

Kubernetes

✅ Vendor neutral

✅ Short release cycle

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And the winner is ...

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In conclusion you can use both

They both run on Firecracker,
so it just depends on your workload

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Thank you!

Niv Yungelson
@nivctl

Shimon Tolts
@shimontolts



Please complete the session survey in the **mobile app**

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