

Kubernetes IoT Edge Working Group:

Applications at the Edge



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August 18, 2020 18:30
Central European Summer Time

Agenda

What is Edge?

Characteristics and requirements of different Edge Applications

Language / runtime considerations

Operational considerations with Kubernetes

App development, build, packaging and CI / CD tooling

Serverless @ Edge

How to get involved in the IoT Edge Working Group



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Edge Computing

What is special about it?

- ❑ Compute close to where data is originally generated
- ❑ High security and compliance/privacy requirements
- ❑ Scale in the range of thousands, millions or tens of millions
- ❑ Tons of data and some is real time
- ❑ Heterogeneous and diversified
 - ❑ Hardware, operating system, infra.
 - ❑ Local resource in form ranging from Raspberry Pi, server or cluster
 - ❑ Different vertical: telco (MEC/5G), IIOT, retail, connected cars, smart city, agriculture, etc.
- ❑ Coordination/Synchronization with cloud and local autonomy
- ❑ Zero touch with observability and remote management



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Edge Applications

Characteristics and Requirements



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Edge Applications

Characteristics of Workloads

Same capabilities as cloud applications: HA, reliability, scalability, performance, security, etc.

Much higher security requirements: data encryption; secret at hardware; attestation at run time

Lightweight to meet resource limit

Realtime data handling and lower latency requirement

Larger amount of data to be processed

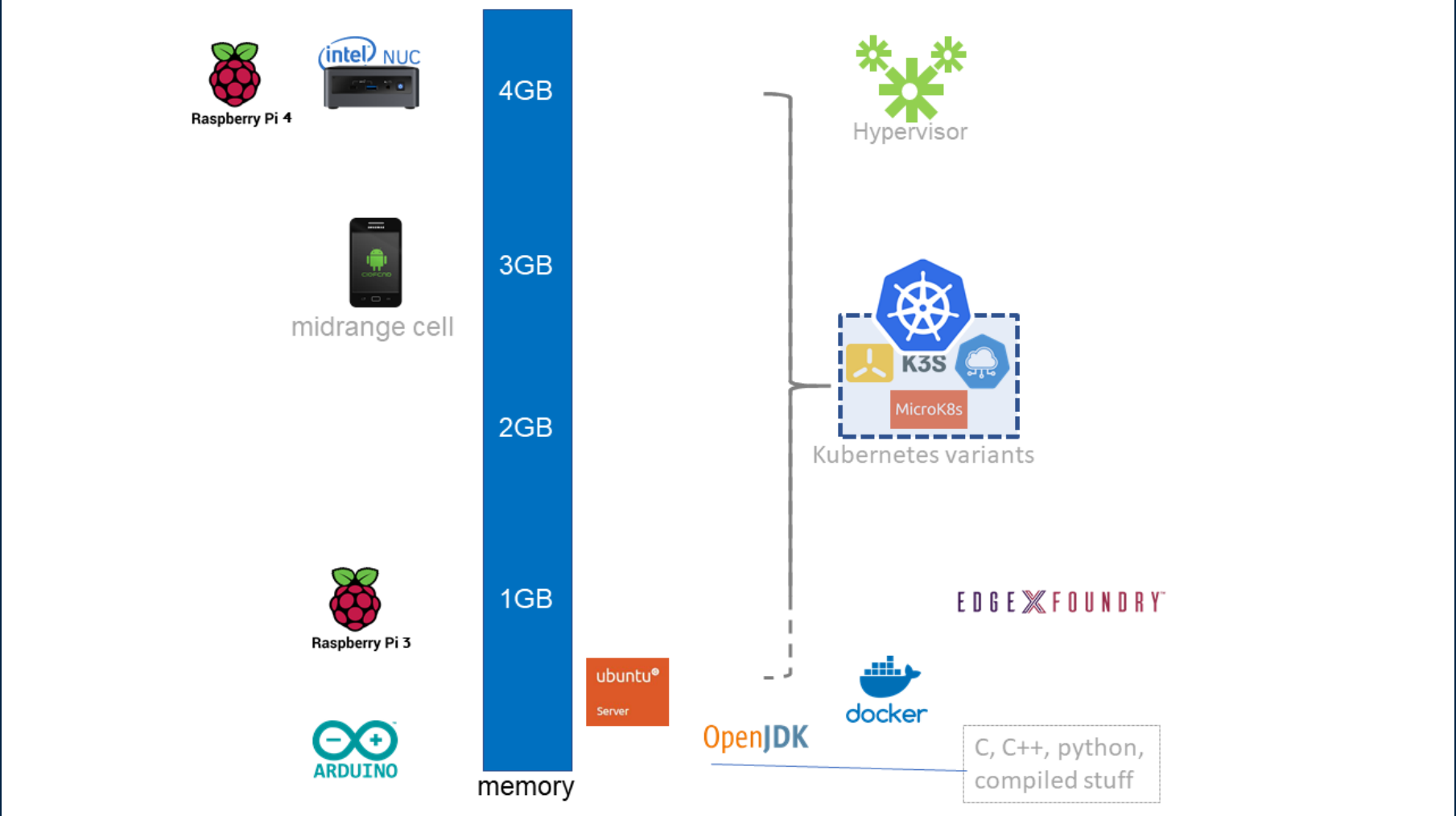
Need to ensure data locality/compliance

Identity provisioning and credential management

Highly distributed and run under complicated network topology

Language and Runtime consideration

in the perspective of some common platforms, does Kubernetes go low enough?



Operation Considerations

Kubernetes alone doesn't solve all the challenges

What kinds of app. Model meets the needs?

Docker, K8s, OAM, Helm chart

How will workload be operated?

- VM, container, kata, native process, web assembly

Where to store applications; application packaging and how to access

- Container registry deployment; credential to access; mirror
- Docker image, CNAB, tar file, package



Operation Considerations continued

Kubernetes alone doesn't solve all the challenges

What are the available programming model?

Reactive, Dapr, Knative, Digital Twin

How do you monitor and manage health and updates?

What about remote debugging?

How do you ensure OS, firmware, driver, runtime, etc. update at the underline nodes



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Tooling

Source repo and version control: GitHub, GitLab, git

Code editor/debugger: Visual Studio Code, Eclipse, IntelliJ, GoLand

build and CI/CD: Jenkins

Packaging

Docker, CNAB, apt package

Serverless at Edge



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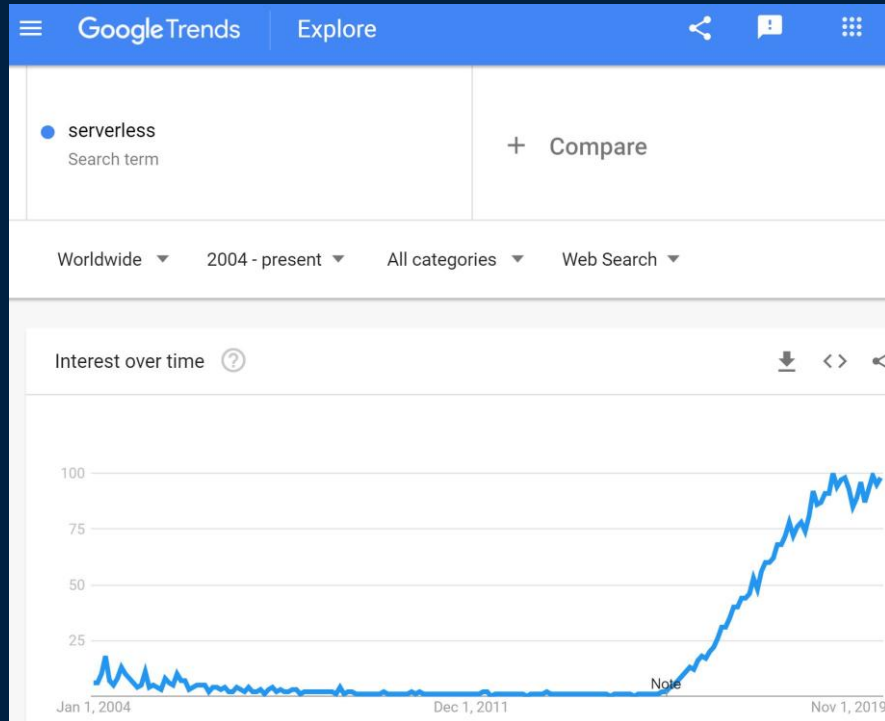
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What is serverless?

Origin in a [Re:invent talk](#) in 2014



“AWS Lambda is a compute service that lets you run code without provisioning or managing servers. AWS Lambda executes your code only when needed and scales automatically, from a few requests per day to thousands per second. You pay only for the compute time you consume - there is no charge when your code is not running.”

github.com/cncf/wg-serverless#landscape

Serverless at edge

Let's evaluate some key elements

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Let's evaluate some key elements

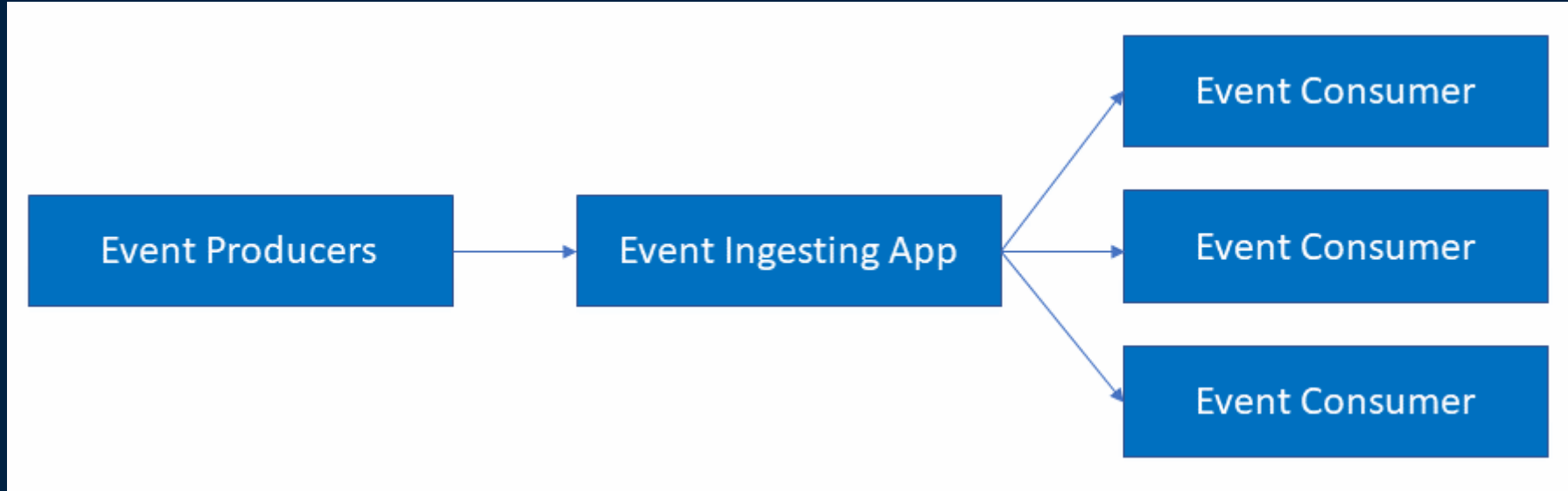
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“You can use AWS Lambda to run your code in response to events, such as changes to data”

“You can also build serverless applications composed of functions that are triggered by events”

Serverless at edge

Event driven architecture



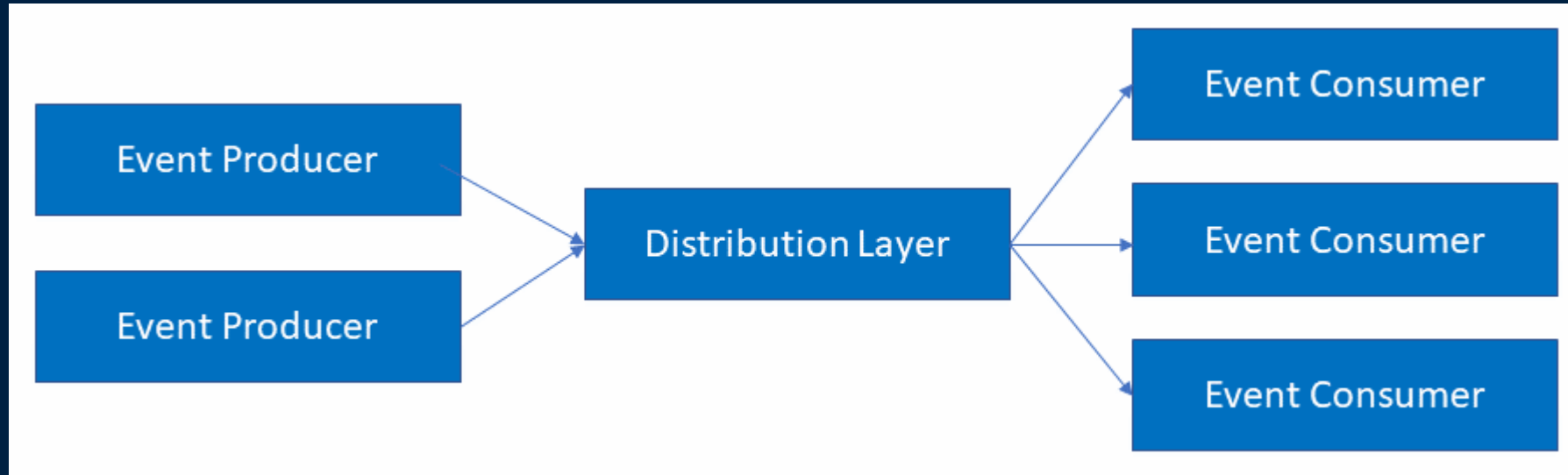
An event is a piece of information

It could be a fact - a measurement or a notice that something was detected

It could be a command – “I want the light turned on”

Serverless at edge

Optional distribution layer: router, queue, resilient storage, pub sub catalog



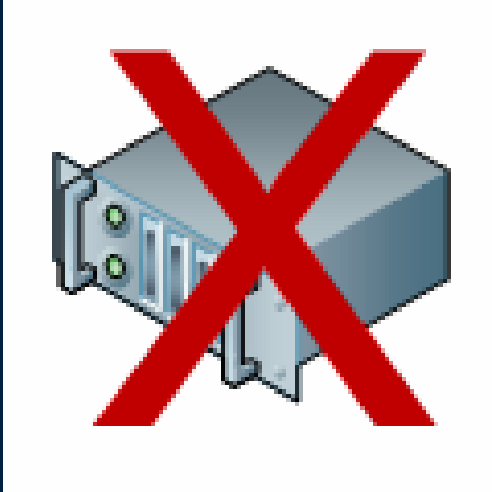
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Serverless at edge isn't "server-less"

So what is it?



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Serverless at edge isn't "server-less"

So what is it?



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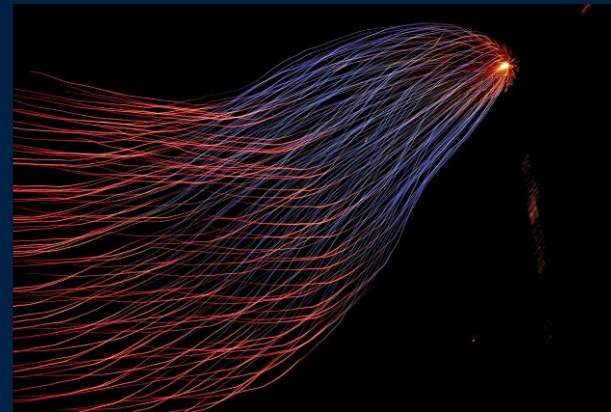
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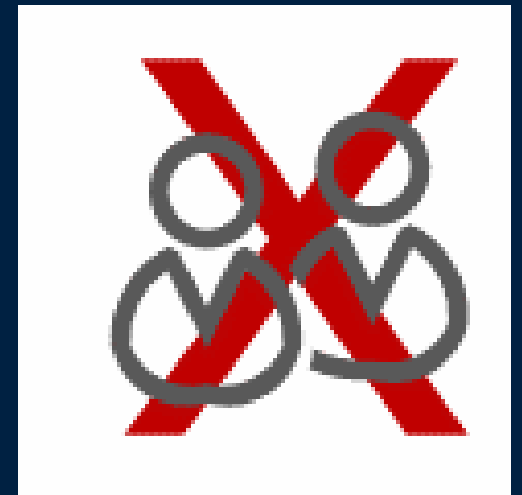
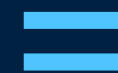
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[Freestocks](#) on [Unsplash](#)



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Serverless at edge

Challenges

Some frameworks are resource intensive for resource constrained edge

Storage of state – you probably need it,

Open Source Communities – how to learn more + get involved

The Kubernetes IoT Edge Working Group + more

Regular Work Group Meeting:

USA WG Meeting Wednesday 9am PT, every 4 weeks, next on August 12

APAC WG meeting Wednesday 5 UTC every 4 weeks, next on August 26

- [Meeting notes and agenda](#)

Link to join the group

- groups.google.com/forum/#!forum/kubernetes-wg-iot-edge

Link to join Slack

- <https://kubernetes.slack.com/messages/wg-iot-edge>

White Paper

- <http://bit.ly/iot-edge-whitepaper>



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Speaker contact info

Deck link: <https://sched.co/ZeuP>



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Thank You

