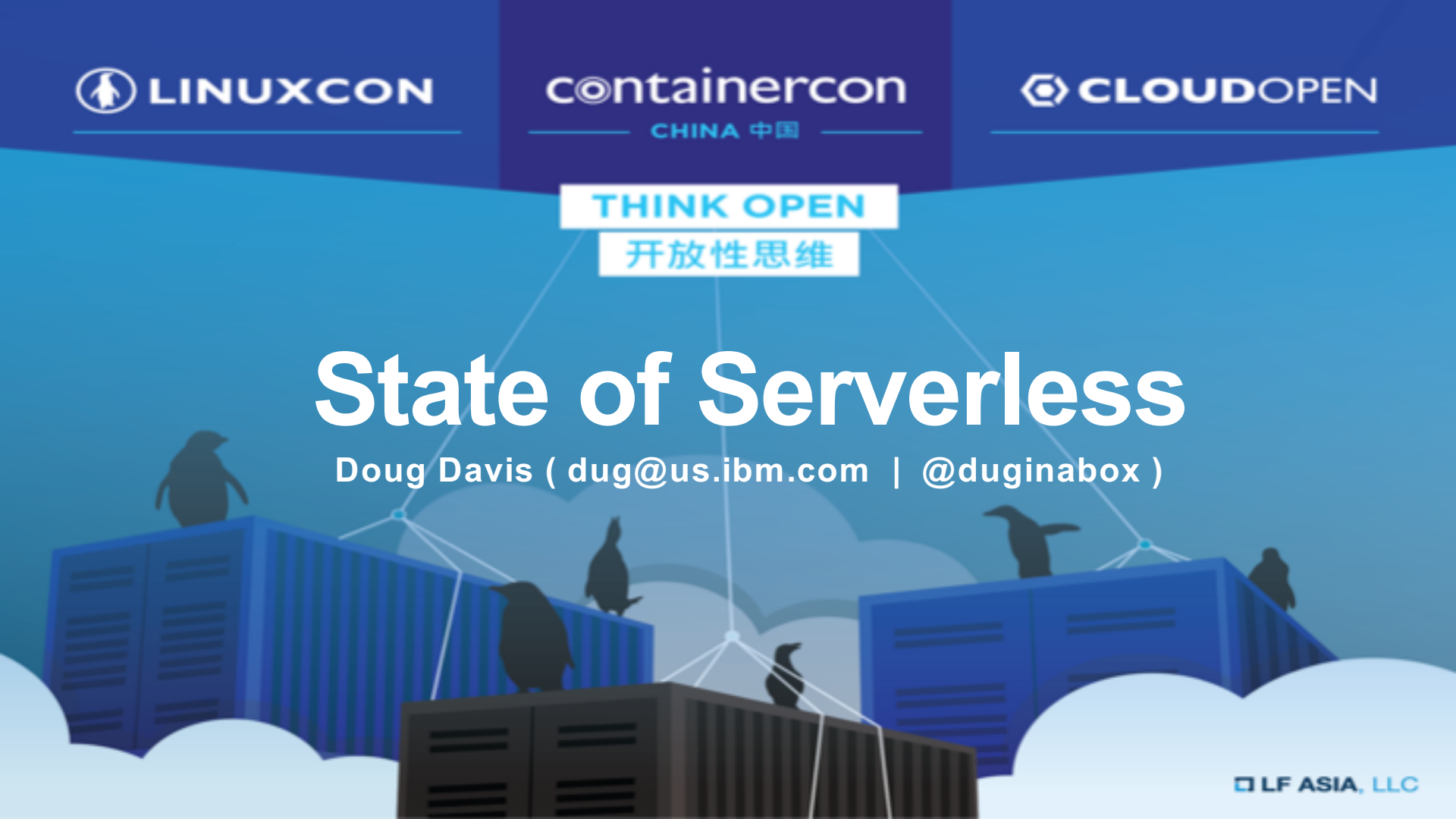
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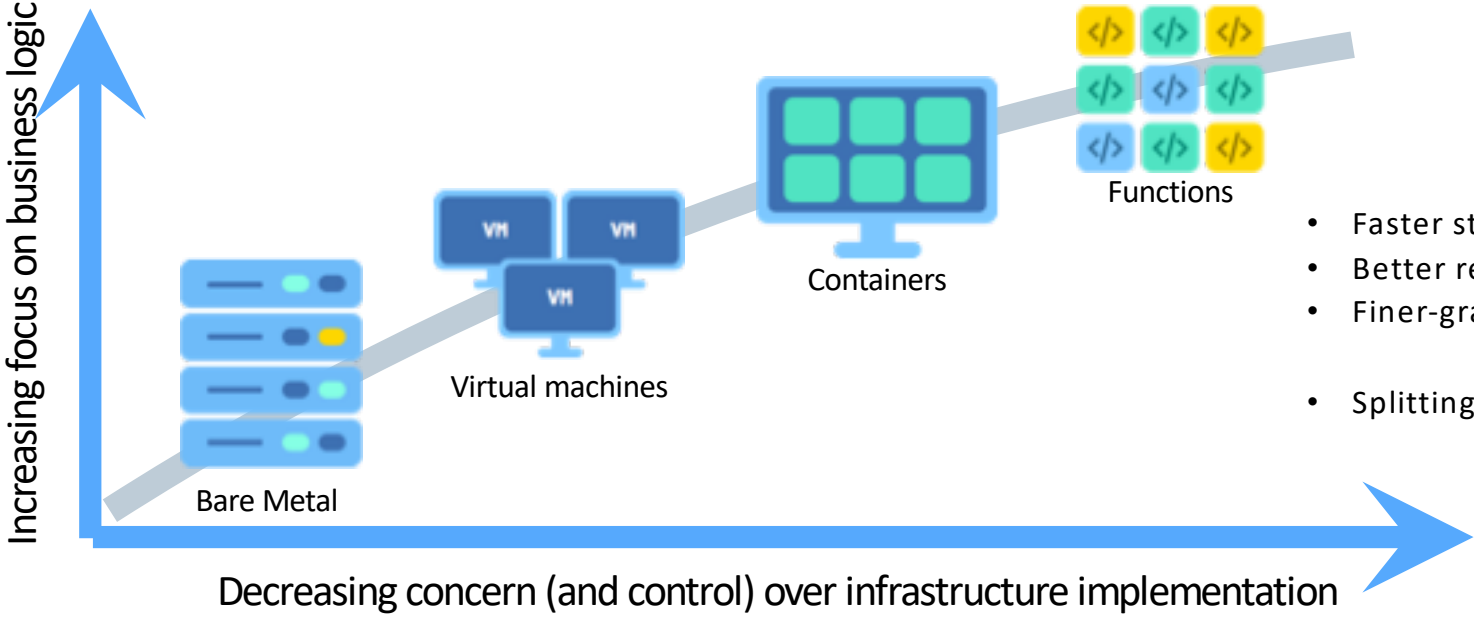
State of Serverless
Doug Davis (dug@us.ibm.com | @duginabox)
LF ASIA, LLC

Agenda

- What is Serverless?
- Why and when to use Serverless?
  - Serverless vs …
  - Use cases
- CNCF Serverless Working Group
- CloudEvents and beyond

But first...Functions as a Service (FaaS)



- Faster start-up times
- Better resource utilization
- Finer-grained management

- Splitting up the monolith

What is a Function?

EVENT DRIVEN

SHORT DURATION

STATELESS

LOWER COST

What is a Function?

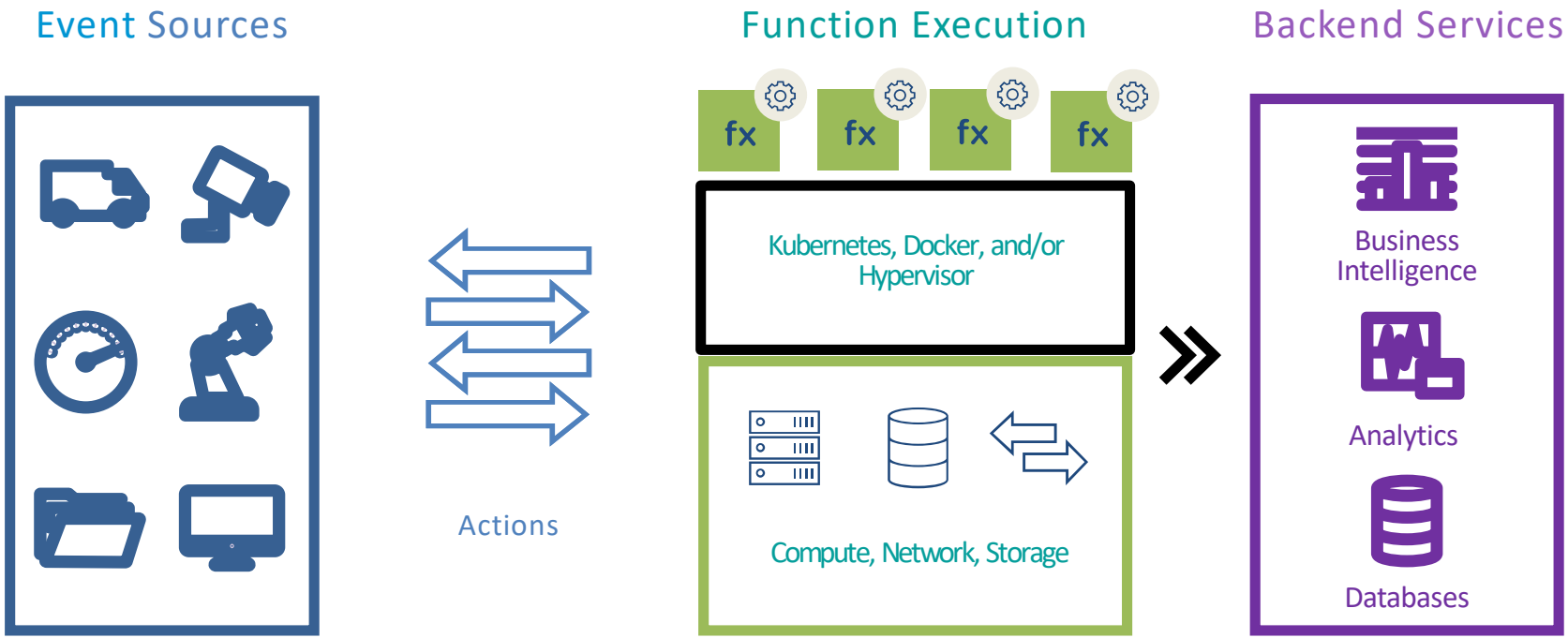
- Example:

```
/* Javascript example */
function main(params) {
    var name = params.name || 'World';
    return {payload: 'Hello, ' + name + '!'};
}
```

e.g.
https://openwhisk.ng.bluemix.net/api/v1/web/dug%40us.ibm.com_dev/default/test.json

- Framework handles hosting and infrastructure to deal with incoming messages and response
  - Provide access via an HTTP(s) API
  - Connect to a set of "Actions"
  - Chaining functions to orchestrate

Functions as a Service



Back to Serverless...

- Serverless takes FaaS and adds the notion of:
  - Infrastructure manages the **auto-scaling of the functions based on demand**
  - Infrastructure manages the **scaling down to zero instances when not being invoked**
  - Fine grained, pay just for what you use, cost model
  - **Zero cost when not being executed (more on this later)**
  - Except for persistent storage type of resources
- "Serverless" means not needing to worry about managing the server

Serverless vs PaaS / CaaS

- Very similar
  - Especially if PaaS / CaaS has auto-scaling feature
- Similar mind-shift for VM -> PaaS / CaaS
  - Remove the OS and just deploy your app
  - Remove the "app" and just deploy a "set of functions (APIs)"
- Biggest difference is the scope of the code being deployed
- Function vs Application
  - Decompose monolithic app to individual function endpoints
  - E.g. can scale just "GETs" vs "Entire App" (or microservice) based on demand

Serverless / FaaS use cases

	**micro-service**	Easily implement fine-grained, micro-service APIs.
	**IoT**	Power various mobile, web and IoT app use cases by scaling and simplifying the programming model of orchestrating various services.
	**Batch and Stream Processing**	Automate and control batch and stream processing
	**DevOps**	Automate DevOps pipeline based on events triggered from successful builds or completed staging or a go-live event.
	**IT/Ops**	Allow an easier deployment model for administrative functions (bots) to run for IT/Ops.

Net: Event Driven & Reusable Utilities

CNCF Serverless Working Group

CNCF Serverless Working Group

- June 2017 at the request of CNCF Technical Oversight Committee (TOC)
- State of tech/community & recommendations for possible involvement
- Most key Serverless players involved
  - IBM, VMWare, Google, Red Hat, Huawei, Microsoft, AWS, SolarWinds, Docker, iguazio, Amazon, MasterCard, Pivotal, Serverless Inc., Clay Labs, The New Stack, A Cloud Guru, Platform9, Bitnami, Auth0, Hyper, ...
  - To date, 51 different companies have been involved
  - On average ~30 people join our weekly calls

CNCF Serverless WG: White Paper

- Describes & defined Serverless as it exists today in the community
  - Common vocabulary
  - Differentiates Serverless from FaaS, PaaS, CaaS and Container Orchestration
  - Describes the mechanics of a generic Serverless system
  - Roles: Provider vs Developer
  - *Zero cost when idle (except e.g. stateful storage costs)*
  - *Public vs Private*
- Highlights promising use cases and areas where already proven value
- Recommendations for potential future CNCF activities

CNCF Serverless WG: Landscape

Project Name (Serverless/FaaS)	Sponsors	Homepage	Orchestration	Languages
AWS Lambda	Amazon	https://aws.amazon.com/lambda/		Node.js (JavaScript), Pyt
Google Cloud Functions	Google	https://cloud.google.com/functions/		Node.js
Hyper Func	Hyper.sh	https://docs.hyper.sh/Feature/container/func.html		Any language, Docker im
IBM Cloud Functions	IBM	https://console.bluemix.net/openwhisk/		Node.js, Swift, Python, Ja
Iguazio Data Platform	iguazio	https://www.iguazio.com/		Go/C (native), Python/Jav
Microsoft Azure Cloud Functions	Microsoft	https://azure.microsoft.com/en-us/services/functions/		Node.js, C#, F#, Python,
Huawei Function Stage	Huawei	https://www.huaweicloud.com/product/functionstage.html	Kubernestes	Node.js, Python, Java, gc
Apache OpenWhisk	OSS	https://github.com/apache/incubator-openwhisk	Kubernetes, Standalone, Docker	Node.js, Python, Java, PH
fission.io	OSS	https://github.com/fission/fission	Kubernetes	NodeJS, Python, Go, Rub
OpenFaaS	OSS	https://github.com/openfaas/faas	Docker Swarm, Kubernetes, any other c	Python, Ruby, C#, Node.j
Iron.io functions	OSS	https://github.com/iron-io/functions	Any that supports Docker images	Any language, Docker im
kubeless	OSS	https://github.com/kubeless/kubeless	Kubernetes	Python, Node.js, Ruby
microcule	OSS	https://github.com/Stackvana/microcule	Any Node.js HTTP middleware	Over 20 languages
Nuclio (by iguazio)	OSS	https://github.com/nuclio/nuclio	Docker, Kubernetes, Single binary	Go/C (native), Python/Jav

Projects | Dev Tools | Services | Explo

CNCF Serverless WG: Recommendations

- Maintain the landscape of Serverless implementations and features
- Produce additional documents and samples that educate community
- Document integration with other CNCF projects, such as how to monitor and observe
- Potential collaboration / harmonization on:
  - Event format
  - Function definition / packaging & deployment / workflow

CNCF Serverless WG: CloudEvents

- Proposed and got agreement from CNCF TOC to work on Events
- Creating a common format for events
  - Useful across entire Cloud Native deployments, beyond just Serverless
- Considering a few proposals as a starting point:
  - OpenEvents – (Serverless, Inc.)
  - Cloud Native Event Mapping (CNEM) – (iguazio)
  - Cloud Auditing Data Federation (CADF) – (DMTF, IBM)
- CloudEvents was born
  - https://cloudevents.io

CloudEvents Project

cloudevents

- Define the common metadata of an Event

```
{   "cloudEventsVersion" : "0.1",
    "eventType" : "com.example.someevent",
    "eventTypeVersion" : "1.0",
    "source" : "/mycontext",
    "eventID" : "A234-1234-1234",
    "eventTime" : "2018-04-05T17:31:00Z",
    "contentType" : "text/xml",

    "data" : "<much wow=\"xml\"/>"
}
```

Its not about data.

Its about metadata!

CloudEvents Use Cases

- Normalize events, web-hooks, across environments
- Facilitate integrations across platforms
  - Leave the event business logic processing to the application
- First step towards portability of functions

CloudEvents Deliverables

- **CloudEvents Specification** – define the metadata
- Serialization Rules Specifications
  - **JSON** event format
  - **AMQP** event format
- Transport Bindings Specifications
  - **HTTP** – binary and structured
  - **MQTT**
  - **AMQP**
  - **NATS**
  - **Web-hooks**
- **Primer**

CloudEvents Interop Demo – KubeCon EU

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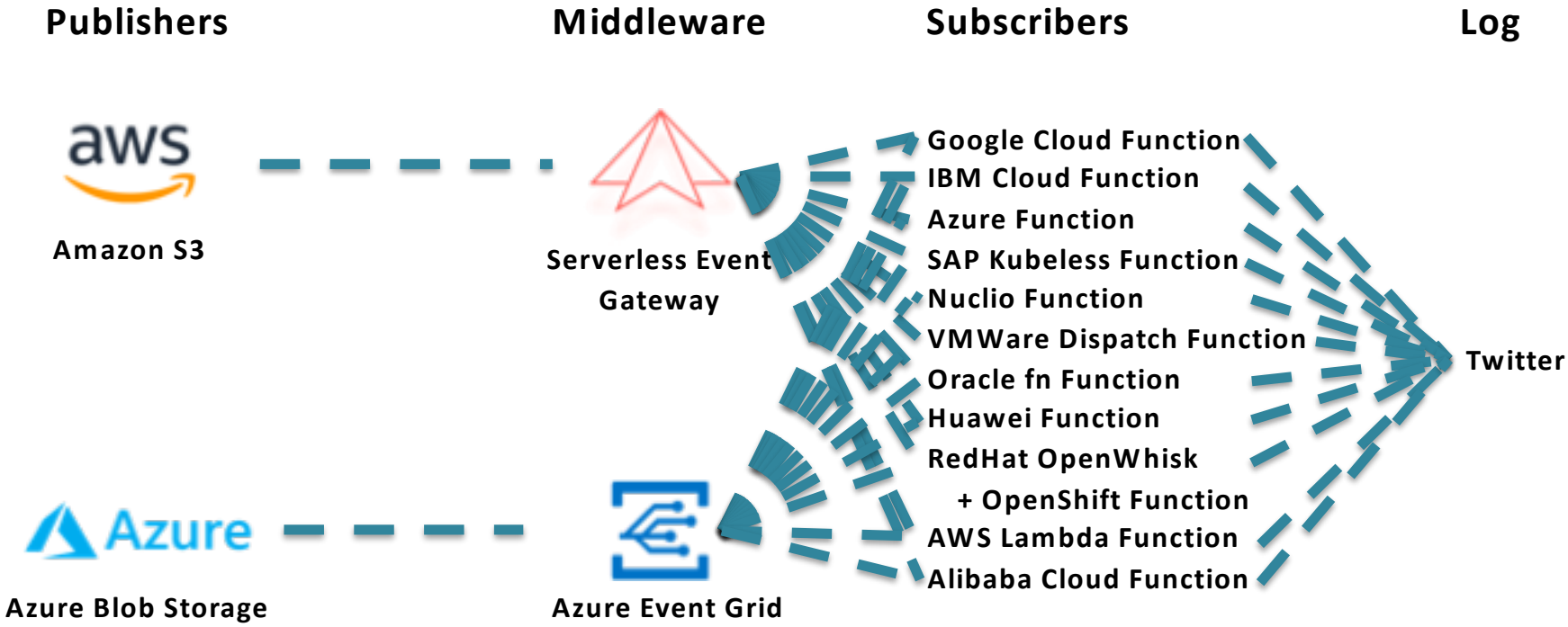

https://youtu.be/TZPPiAv12K

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CloudEvents Interop Demo – KubeCon EU

https://twitter.com/CloudEventsDemo/lists/demo

CloudEvents Status

- Released v0.1 in April 2018
- Multiple implementations planned
  - Kudos to Microsoft for already supporting it in Event Grid
- Approved as a CNCF Sandbox Project !
- Looking at next workstream... Function Workflow Definition
  - Chaining, orchestrating functions
- Considering others too...

Additional Information

- CNCF Serverless Working Group
  - https://github.com/cncf/wg-serverless
  - **Weekly calls on Thursdays at 8am PT** Come join in!
- CNCF Serverless Working Group White Paper
  - https://docs.google.com/document/d/1UiW8bt5O8QBqQRILJVKZJej_luNnxl20AJu9wA8wcdI
- CNCF Serverless Landscape
  - https://docs.google.com/spreadsheets/d/10rSQ8rMhYDqf_ib3n6kfzwEuoE88qr0amUPRxKbwVCk
- CloudEvents
  - https://github.com/cloudevents/spec
  - http://cloudevents.io

Questions

Thank You

Doug Davis
STSM, IBM (dug@us.ibm.com)
duglin @duginabox


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