

Building and Deploying Serverless Applications and Infrastructure

—

David Nugent
Developer Advocate, IBM

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Instructions: ibm.biz/jsla2019-lab

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—
David Nugent
Developer Advocate,
Cognitive, Data & Analytics

Holiday Gift Ideas



Holiday Gift Ideas



IBM Cloud



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Hi, I'm Dave

I'm a developer advocate for IBM in San Francisco. I also help organize:

- The SF JavaScript Meetup
- IBM Developer SF Meetup
- ForwardJS San Francisco && Ottawa

I participate in meetups, hackathons, webinars and write articles about technology for IBM and other organizations.

Warning: I am a lowly developer



My Goal Today

Educate about open source

Learn from you

Walk through some Labs

Agenda

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Lab Instructions

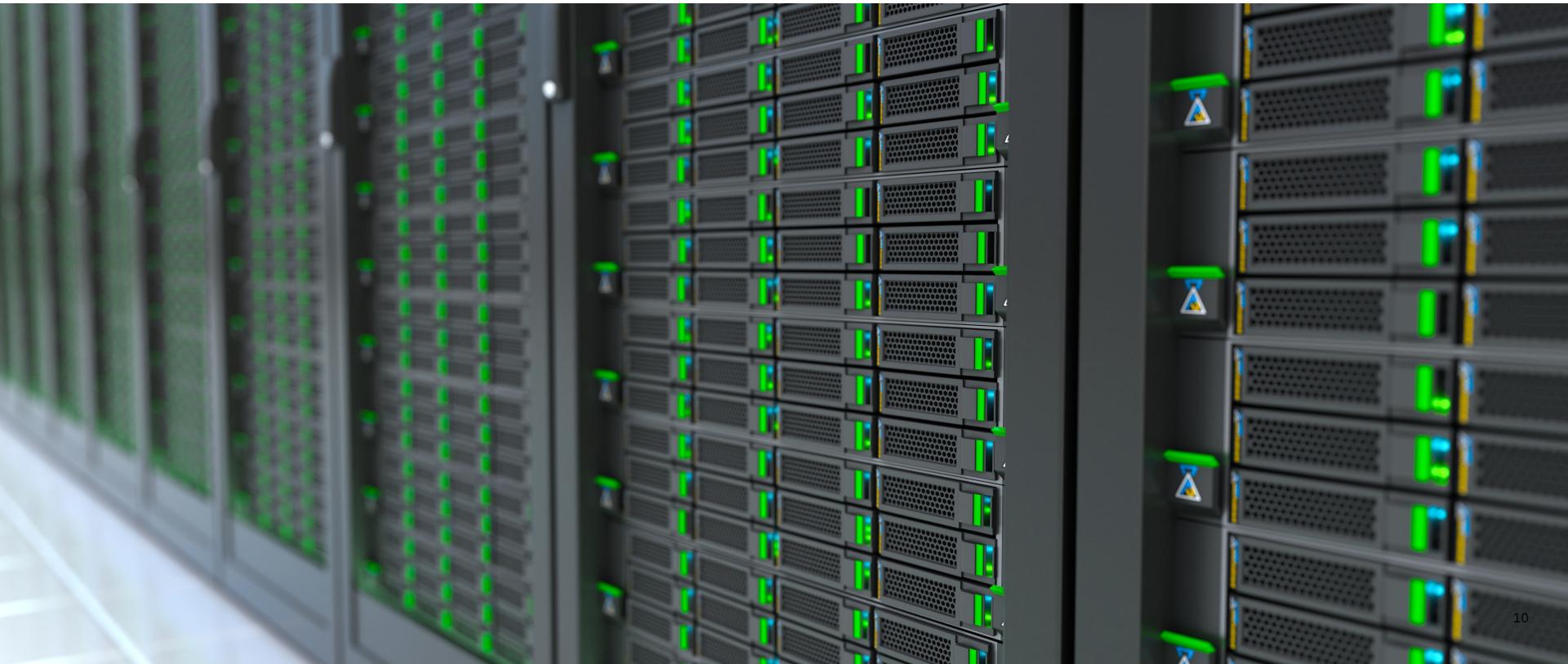
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redhat.[®]



↳ What is Serverless?



Projected market for serverless architecture market, 2025

Source: Technavio

\$21.9B

Commits made to the [Apache OpenWhisk](#) repo on GitHub

Source: [2019 Container Adoption Survey](#)

2,678

What is Serverless?

Serverless computing refers to the concept of building and running applications that do not require server management.

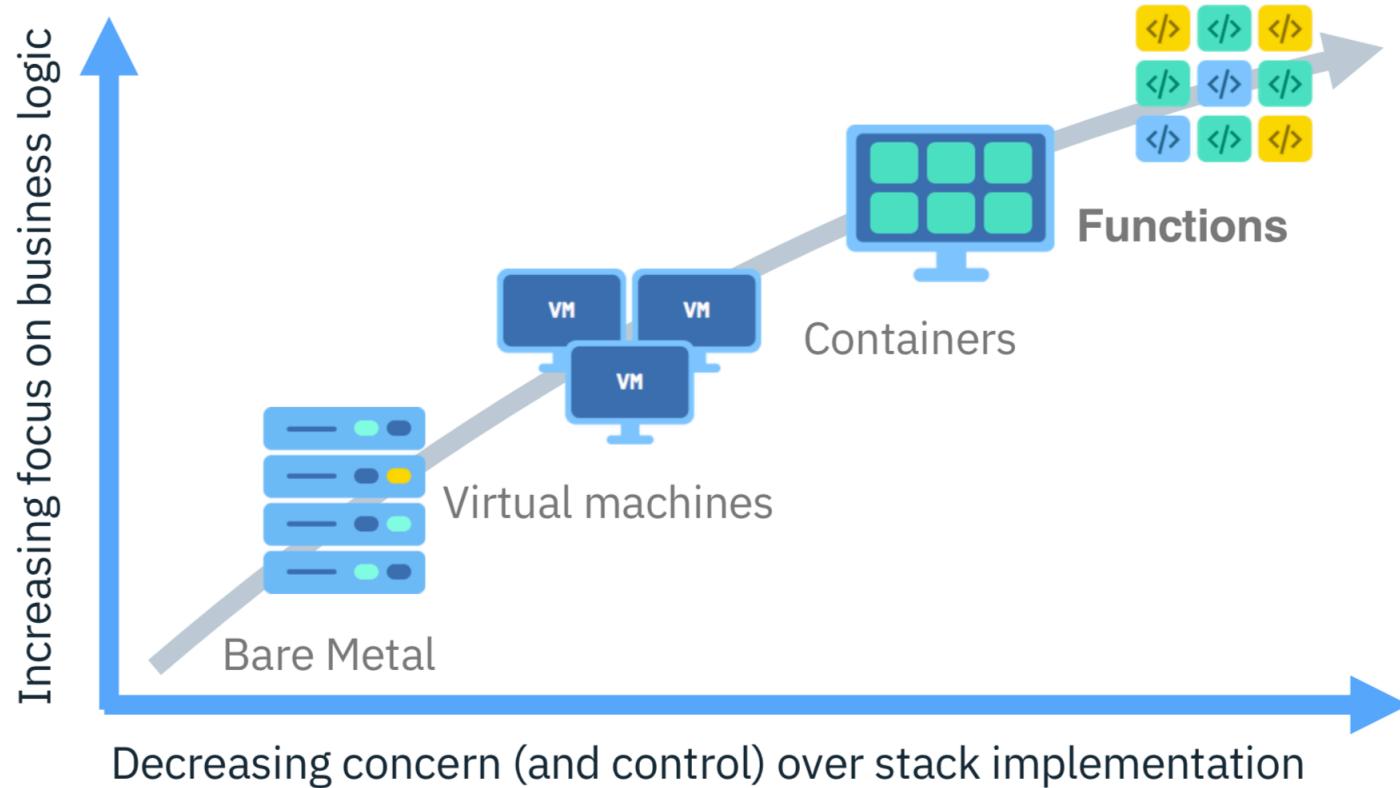
It describes a finer-grained deployment model where applications, bundled as one or more functions, are uploaded to a platform and then executed, scaled, and billed in response to the exact demand needed at the moment.

It refers to the idea that consumers of serverless computing no longer need to spend time and resources on server provisioning, maintenance, updates, scaling, and capacity planning. Instead, all of these tasks and capabilities are handled by a serverless platform and are completely abstracted away from the developers

<https://github.com/cncf/wg-serverless/tree/master/whitepapers/serverless-overview>



What is Serverless?



What is Serverless?

#5273 + (30077) - [x]

<erno> hm. I've lost a machine.. literally _lost_. it responds to ping, it works completely, I just can't figure out where in my apartment it is.

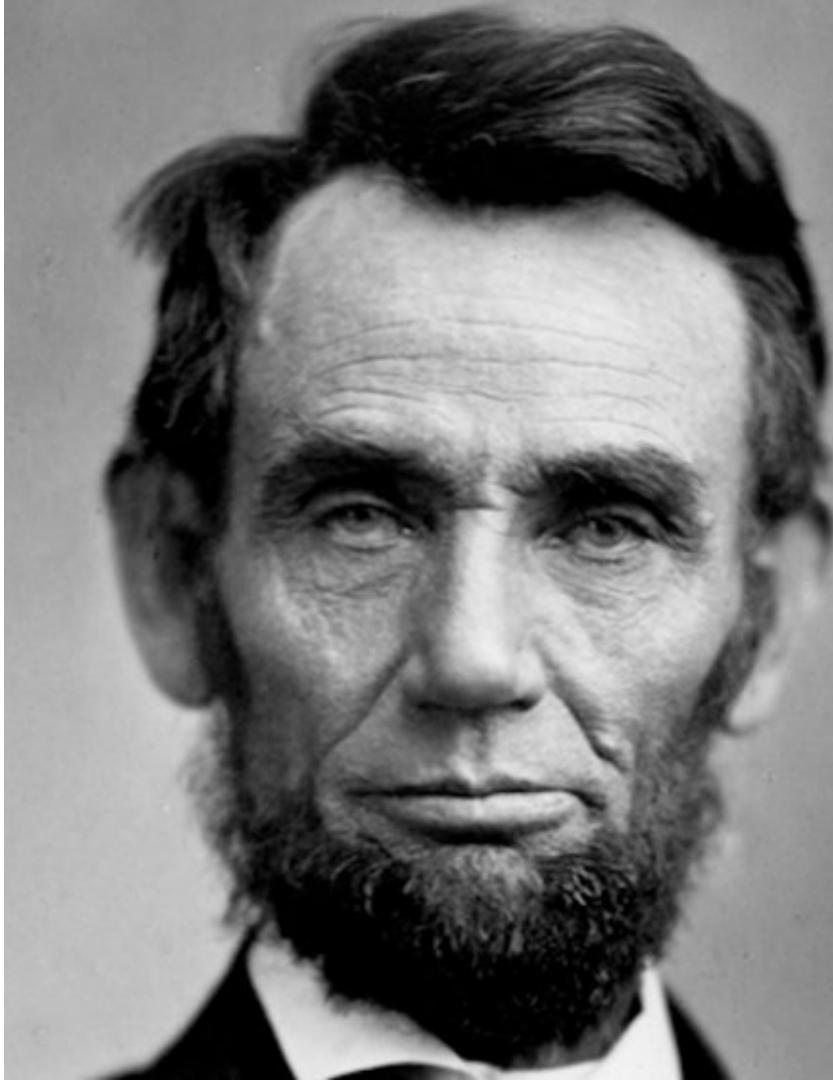
“If you call it software architecture instead of software planning, your salary goes up by 50%.”

-Steve Jobs*



“Don’t believe
everything you see on
the internet just because
there’s a quote with a
picture next to it.”

-Abraham Lincoln



What is Serverless?

Run code without provisioning or managing servers.



↳ Microservice Architectures



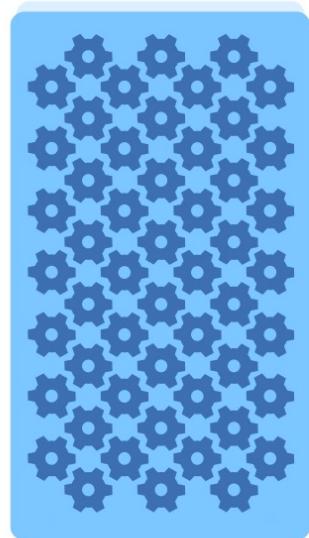
Microservices Defined

Martin Fowler: Microservices

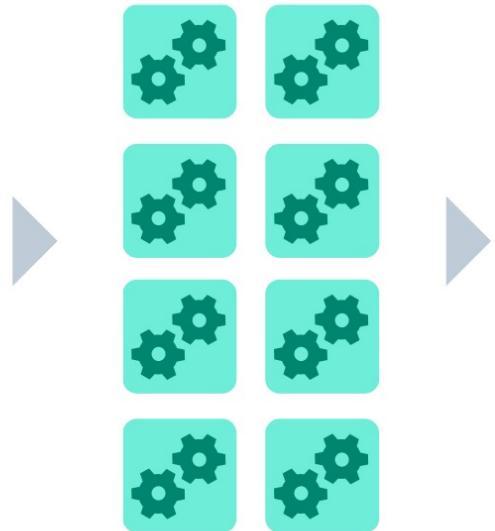
“In short, the microservice architectural style is an approach to developing a single application as a suite of small services, each running in its own process and communicating with lightweight mechanisms, often an HTTP resource API. These services are built around business capabilities and independently deployable by fully automated deployment machinery. There is a bare minimum of centralized management of these services, which may be written in different programming languages and use different data storage technologies. “



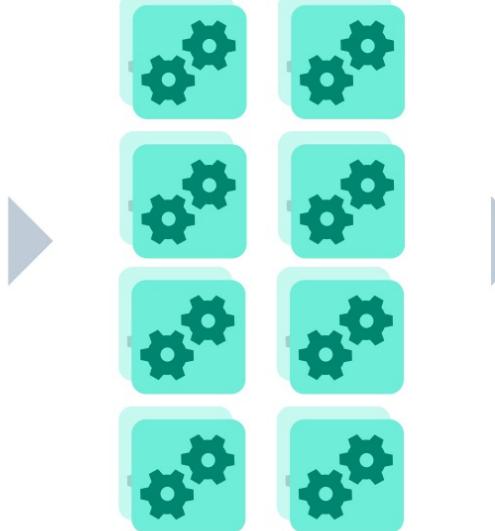
Serverless Patterns: Microservices



Monolithic Application



Break-down into microservices



Make each microservice HA

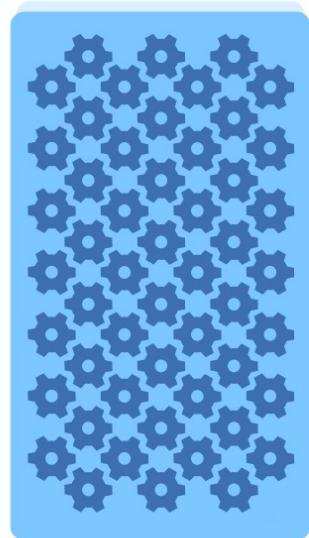


Protect against regional outage

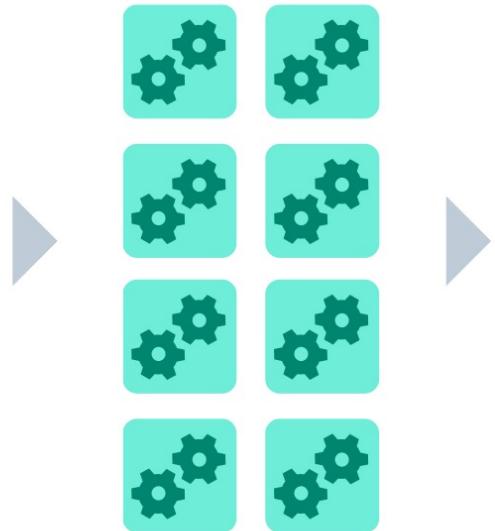
↳ Why Serverless?



Serverless Patterns: Microservices



Monolithic Application



Break-down into microservices



Make each microservice HA



Protect against regional outage

Why Serverless: On Request

Runs code **only** on-demand on a per-request basis

Serverless deployment & operations model

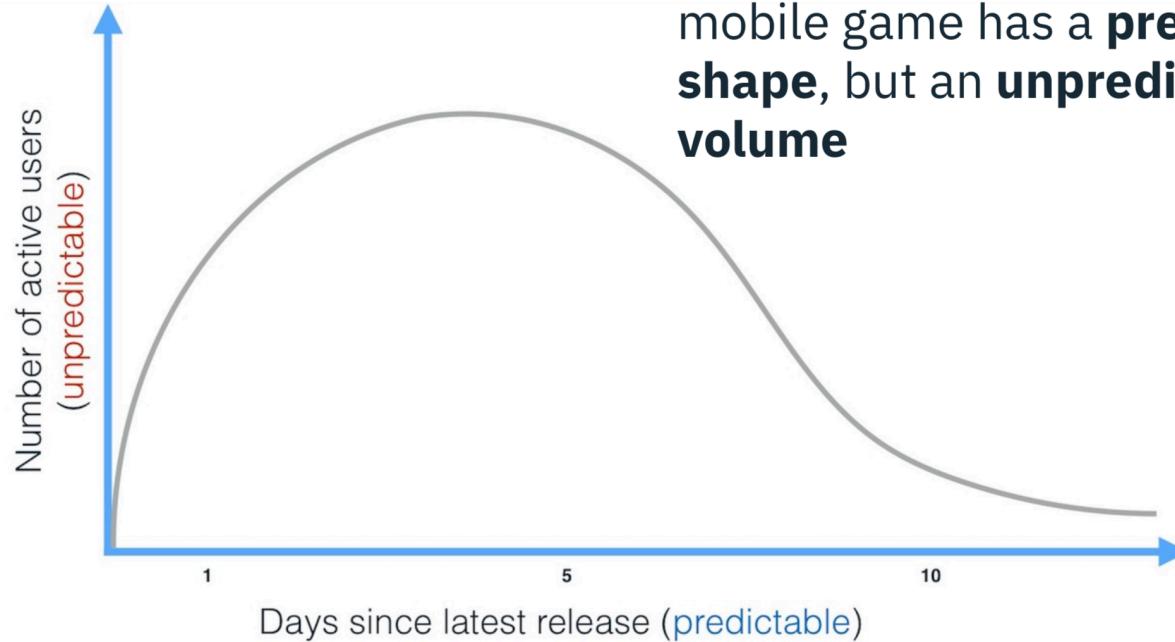


Not your problem



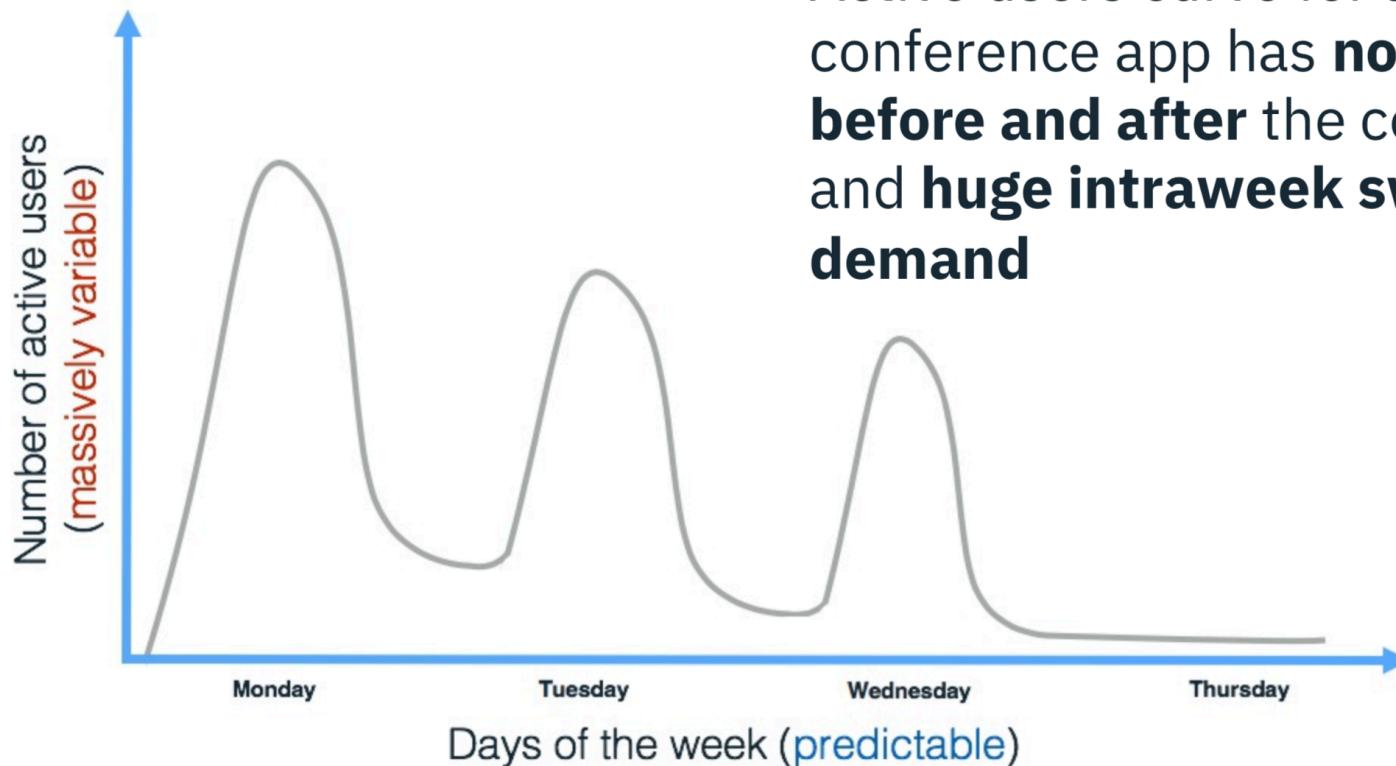
Focus on CODE

Why Serverless: On Request

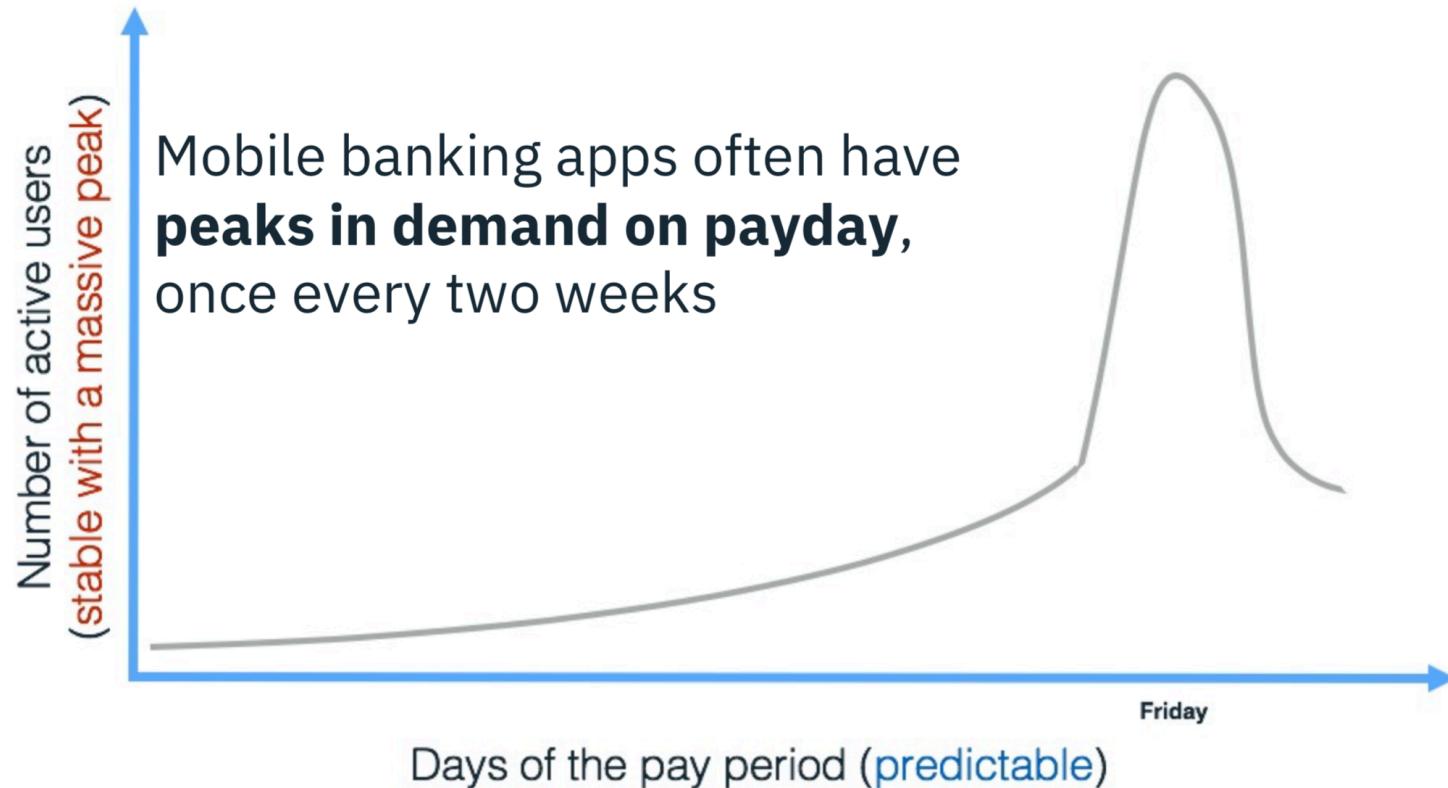


Active users curve for a new mobile game has a **predictable shape**, but an **unpredictable volume**

Why Serverless: On Request



Why Serverless: On Request



Why Serverless: Use Cases

Serverless Backends



Mobile Backend



Data Processing



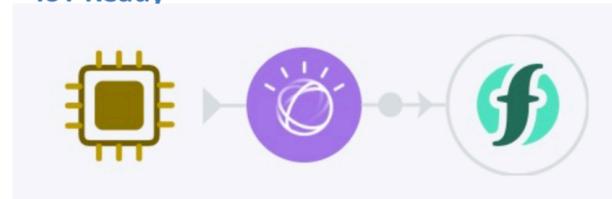
Conversational Scenarios



Cognitive Data Processing



IoT Ready



Event Stream Processing



Scheduled Tasks



Why Serverless: Use Cases

- Asynchronous, concurrent, easy to parallelize into independent units of work
- Infrequent or has sporadic demand, with large, unpredictable variance in scaling requirements
- Stateless, ephemeral, without a major need for instantaneous cold start time
- Highly dynamic in terms of changing business requirements that drive a need for accelerated developer velocity

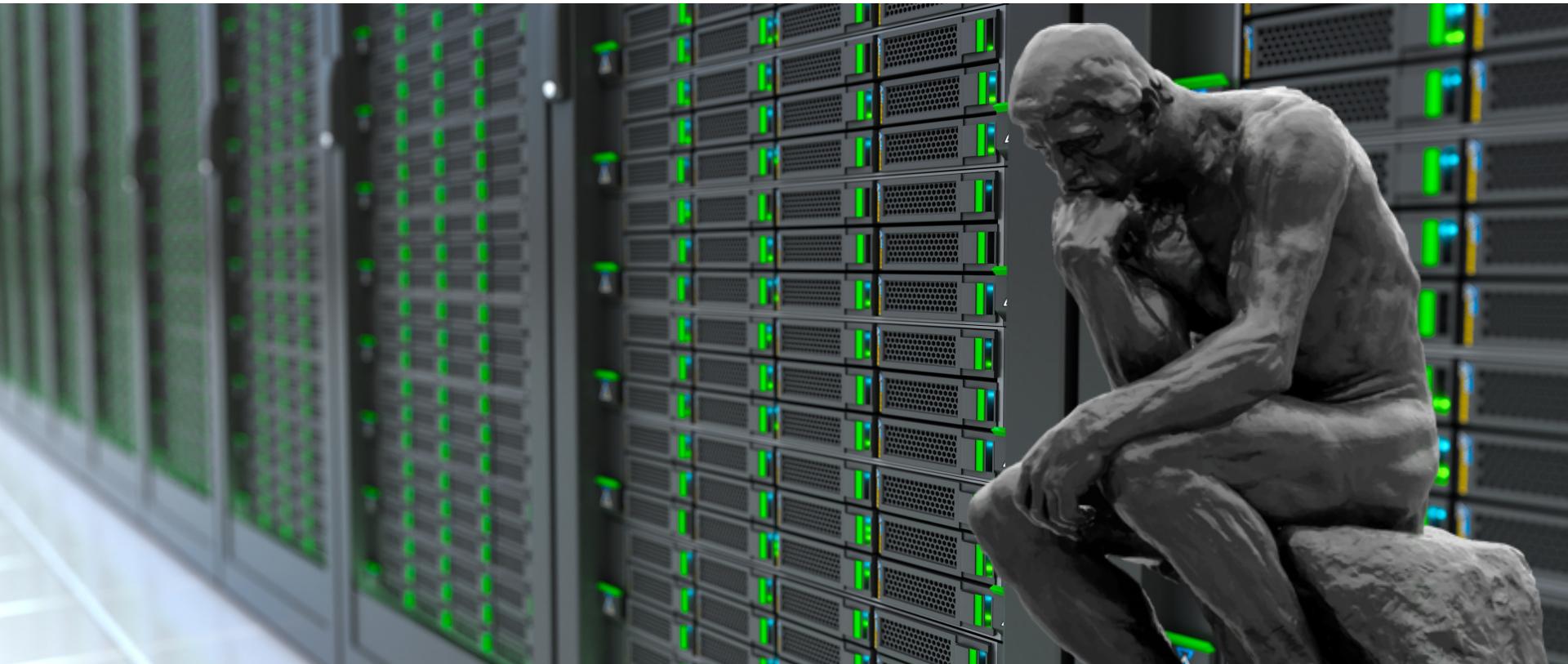


Why Serverless: Use Cases

- Static web sites (Contact forms)
- Automated backups
- Bots
- Tasks like uptime checks, policy enforcement
- Background jobs
- Prototypes



↳ Serverless Considerations



Serverless Considerations: Languages

Amazon Lambda

Node.js, Python, Java, C#, PowerShell, Ruby, Go, additional via runtime API

IBM Cloud Functions

Node.js 10 & 8, Node.js 6, Python 3, PHP 7, Swift 4, Go 1.11, Ruby

(Other languages can be added via Docker container based on open source OpenWhisk serverless platform)

Microsoft Azure

C#, F#, Node.js 10 & 8, Java, Python, TypeScript, PowerShell (PHP experimental/preview)

Google Cloud Functions

Node.js 10 & 8, Python, Go

Serverless Considerations: Execution Time Limits

Amazon Lambda

15 minutes (prev. 5 minutes)

IBM Cloud Functions

10 minutes

Microsoft Azure

10 minutes

Google Cloud Functions

9 minutes (if extended from 1 min.)

Serverless Considerations: Latency

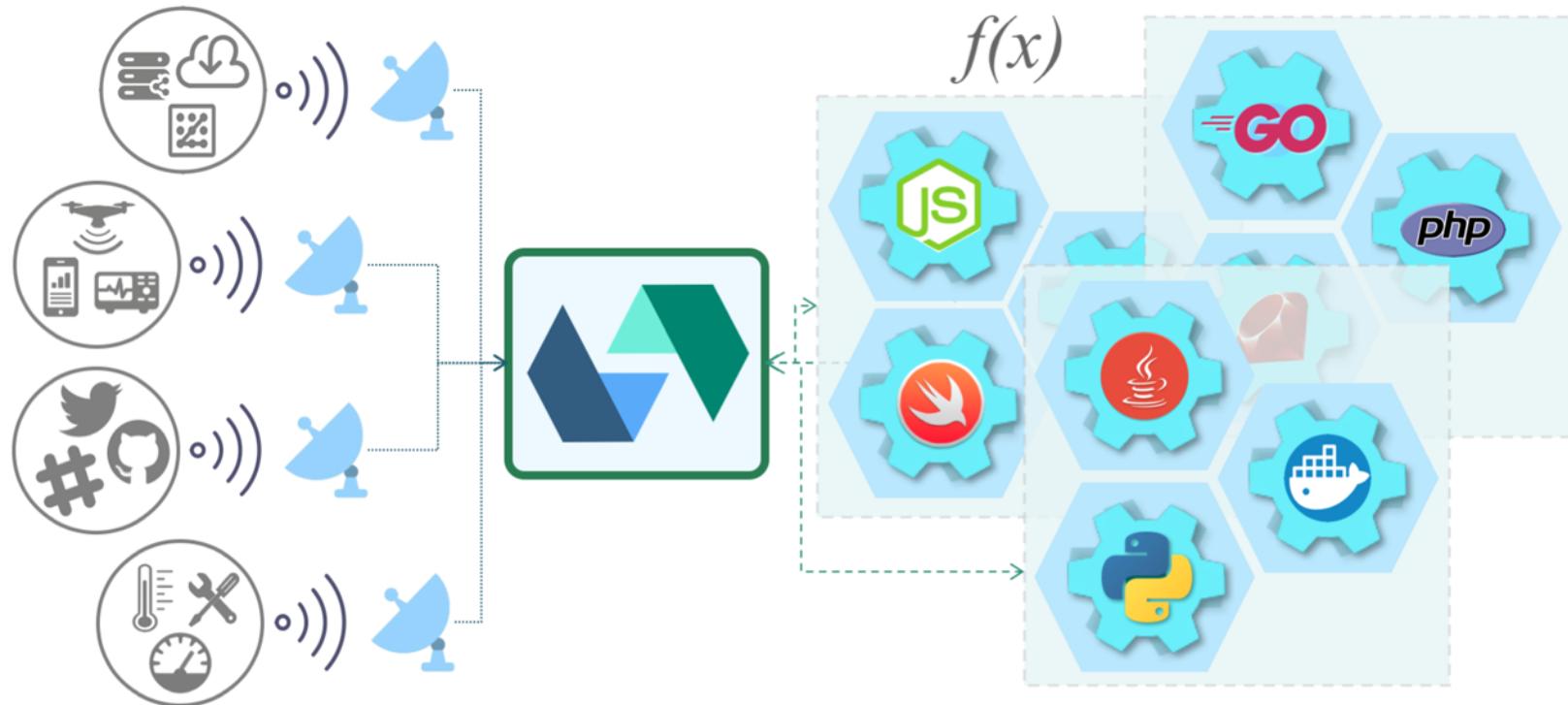
Cold Start (when functions start after a long time, it may take longer)

Workaround: keep your function warm with schedule invocations

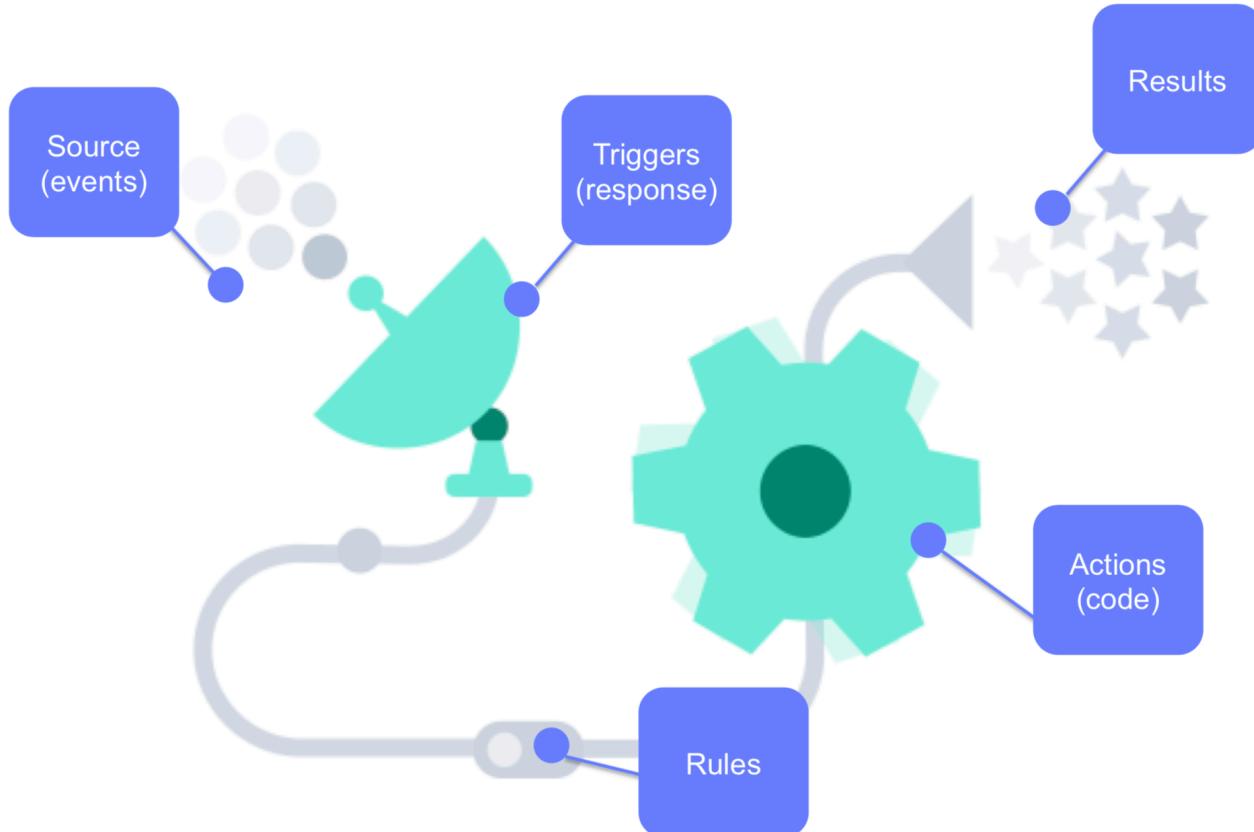
Type of application you're building is important:

- Cold start may be OK for a backend app
- Not if you're sending a rocket into space

↳ Apache OpenWhisk



Apache OpenWhisk: Terminology



Apache OpenWhisk: Terminology

	Open source	Hosted service
Serverless engine	Apache OpenWhisk	IBM Cloud Functions
API Gateway	LoopBack	IBM API Gateway
Databases	Apache CouchDB MySQL	IBM Cloudant IBM Compose
Message streams	Apache Kafka	IBM Message Hub

Serverless Reviewed

- Functions are stateless. Need some sort of persistence between runs.
- Are you able to test and develop locally?
ibmcloud fn CLI
- Can you easily version your functions? Source control?
- Can you easily monitor your functions?
- Security and API gateway
- Avoid long-running loops / mini-monoliths?
- Latency (cold, warm and hot loads)
- How do you track dependencies?



Let's Get to the Labs!

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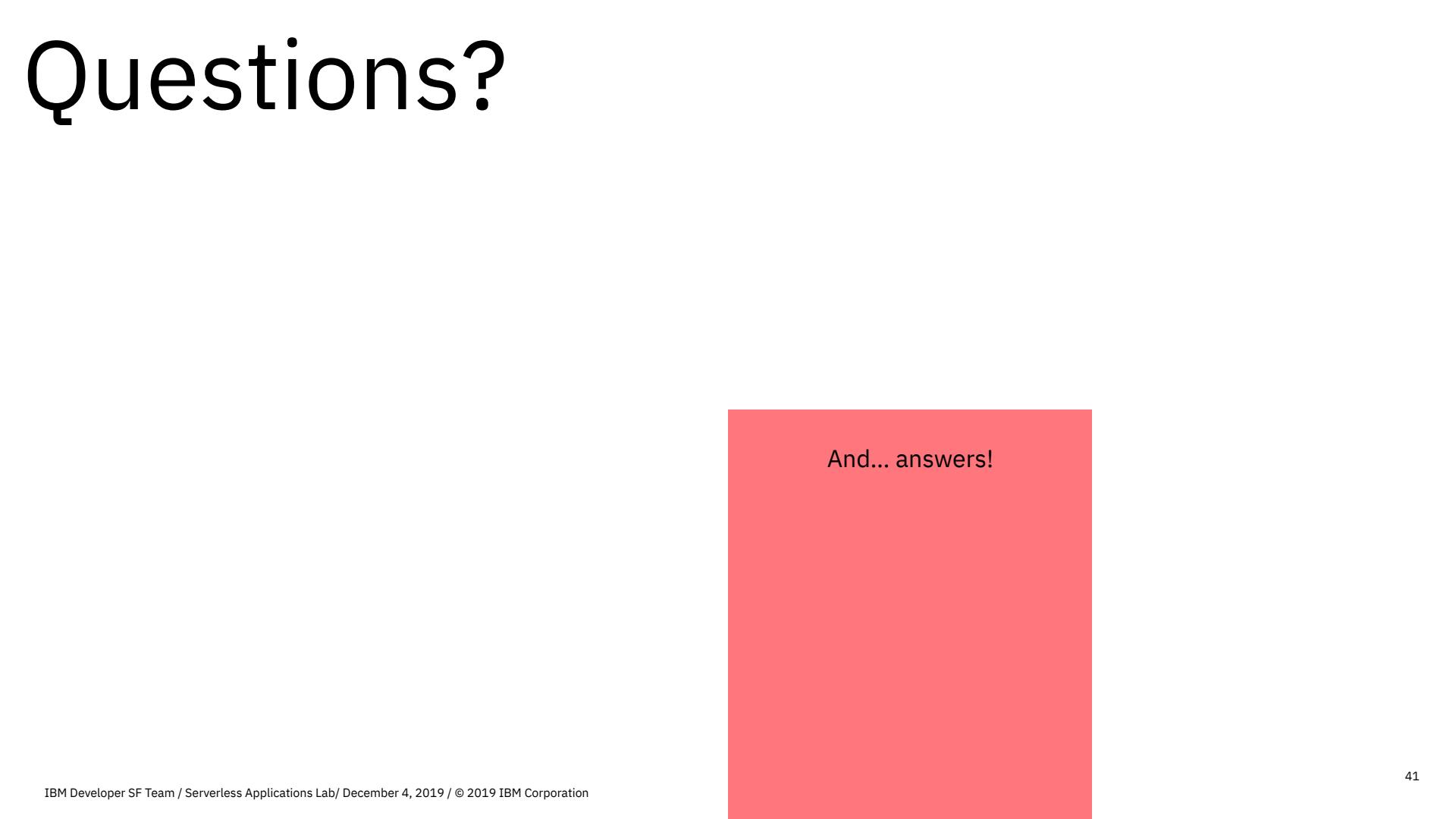
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Questions?



And... answers!

