

# SERVERLESS APPLICATIONS & INFRASTRUCTURE

CHICAGO JS MEETUP - MARCH 26, 2019

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SIGN UP: [IBM.BIZ/CHIJS-SERVERLESS](http://IBM.BIZ/CHIJS-SERVERLESS)



PROJECT

# YOUR PRESENTER: DAVE NUGENT FORWARDJS CONFERENCE CO-ORGANIZER

DATE

JANUARY, 2019

CLIENT

[FORWARDJS.COM](http://FORWARDJS.COM)



PROJECT

# YOUR PRESENTER: DAVE NUGENT SAN FRANCISCO JAVASCRIPT MEETUP ORGANIZER

DATE

DECEMBER, 2018

CLIENT

SF JAVASCRIPT MEETUP



PROJECT

# YOUR PRESENTER: DAVE NUGENT

## HACKATHON MENTOR

DATE

NOVEMBER 2018

CLIENT

CALHACKS, BERKELEY



PROJECT

# YOUR PRESENTER: DAVE NUGENT HACKATHON MENTOR

DATE

FEBRUARY 2019

CLIENT

TREEHACKS, STANFORD

**MY GOAL TONIGHT**

# What is Serverless?

# What is Serverless?

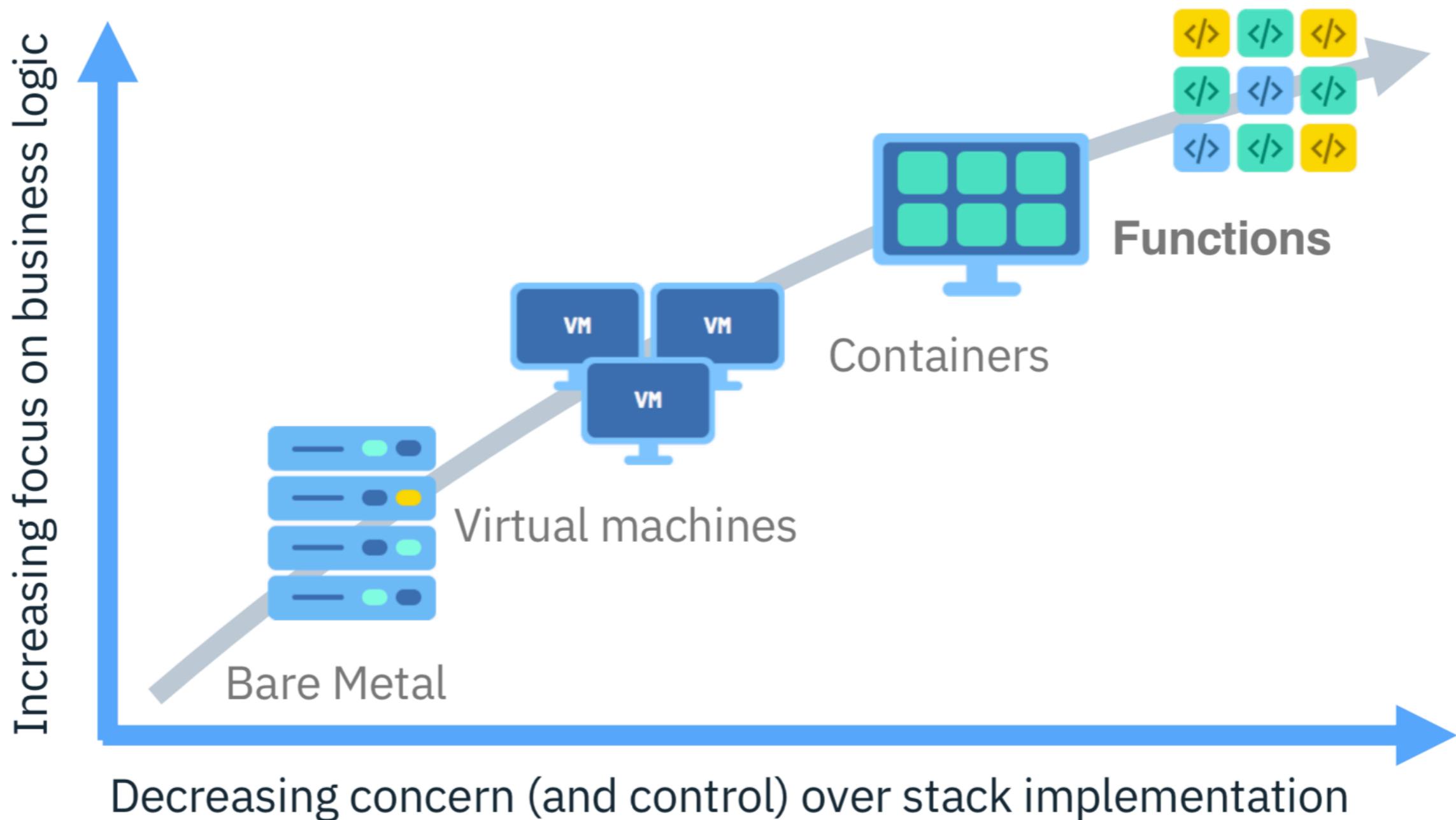
Serverless computing refers to the concept of building and running applications that **do not require server management**.

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?

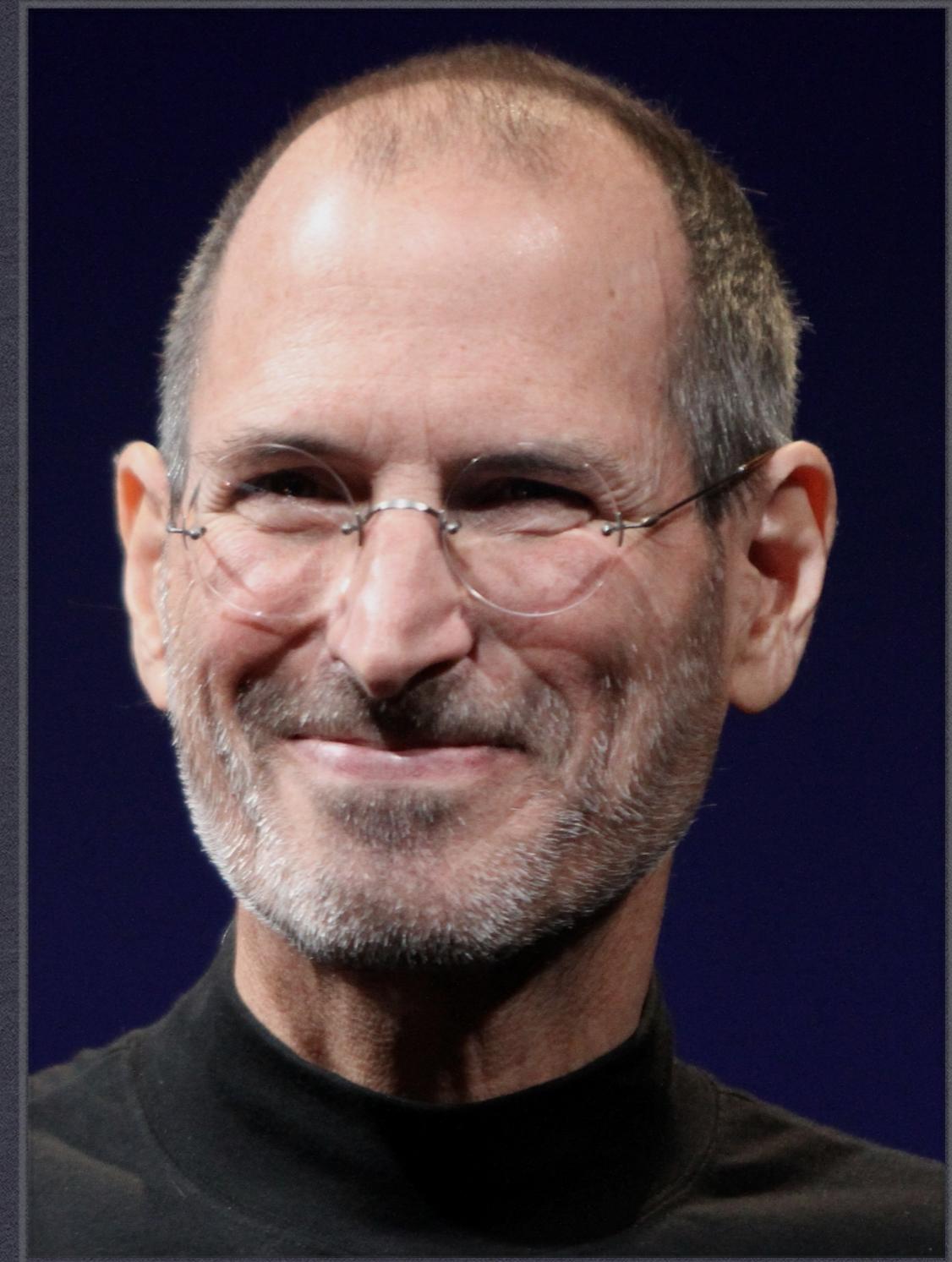


#5273 + (30077) - [X]

<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.

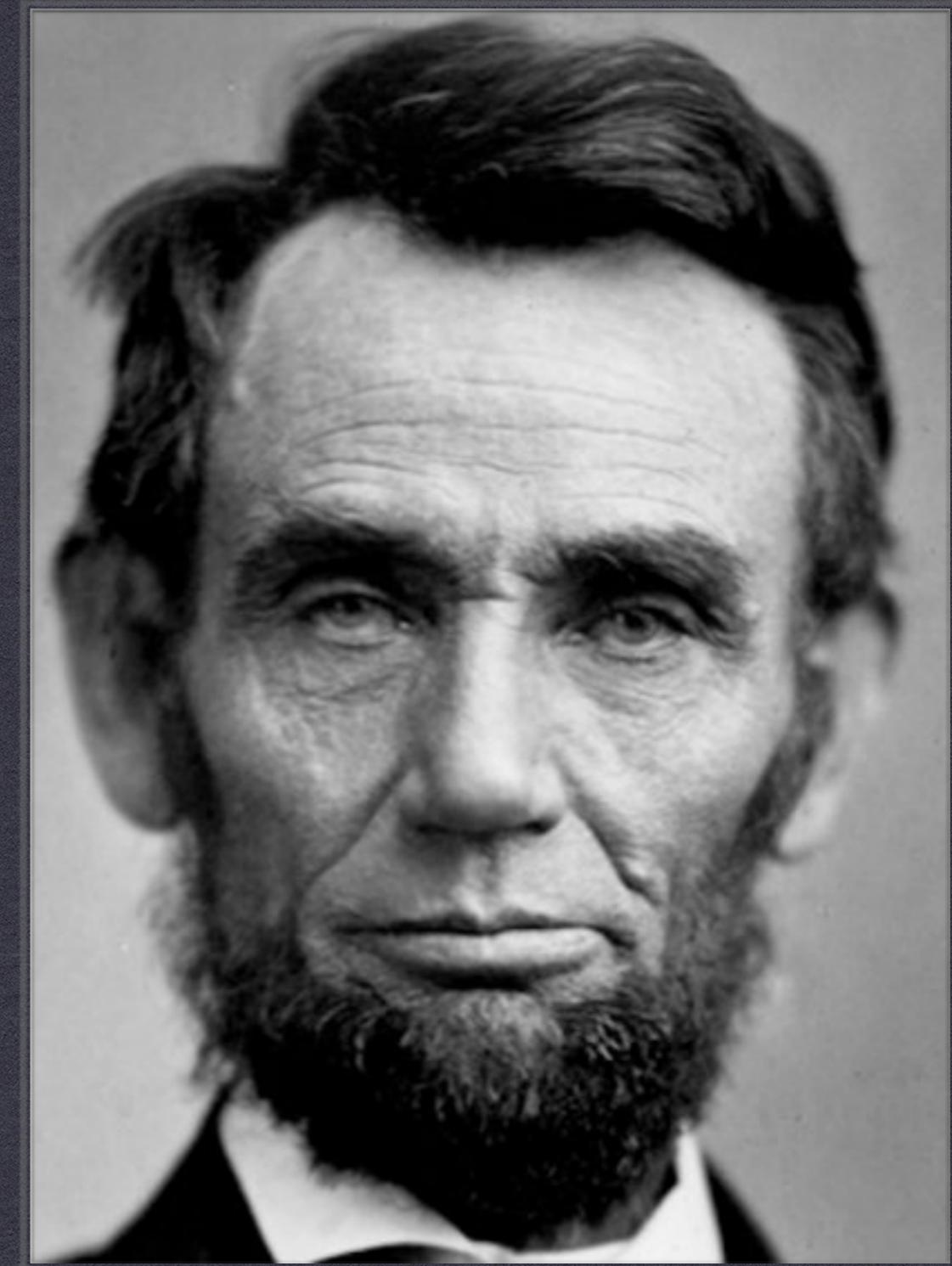
**“IF YOU CALL IT  
SOFTWARE  
ARCHITECTURE INSTEAD  
OF SOFTWARE  
PLANNING, YOUR SALARY  
GOES UP BY 50%.”**

**-STEVE JOBS\***



**“DON’T BELIEVE  
EVERYTHING YOU SEE  
ON THE INTERNET  
JUST BECAUSE  
THERE’S A QUOTE  
WITH A PICTURE  
NEXT TO IT.”**

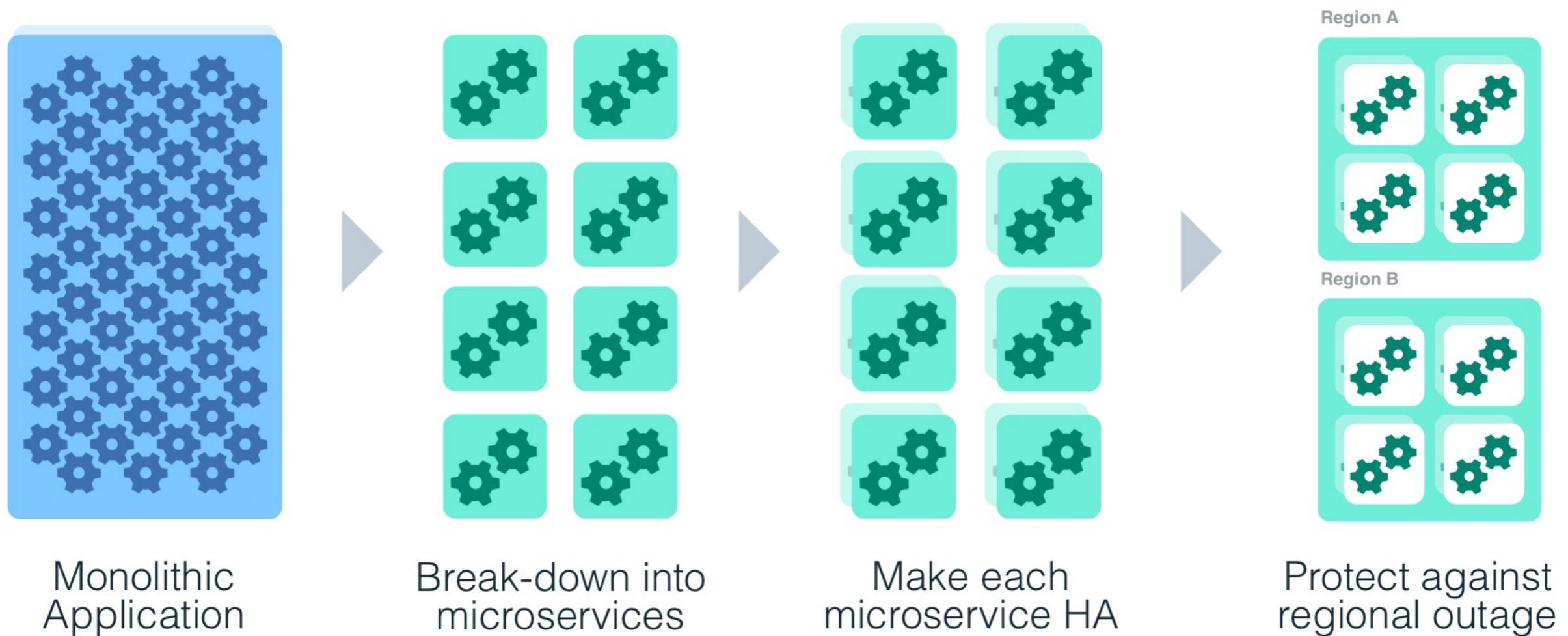
**-ABRAHAM LINCOLN**



# What is Serverless?

Run Code without  
Provisioning or  
Managing Servers

# What is Serverless?



# What is Serverless?

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

Serverless deployment & operations model



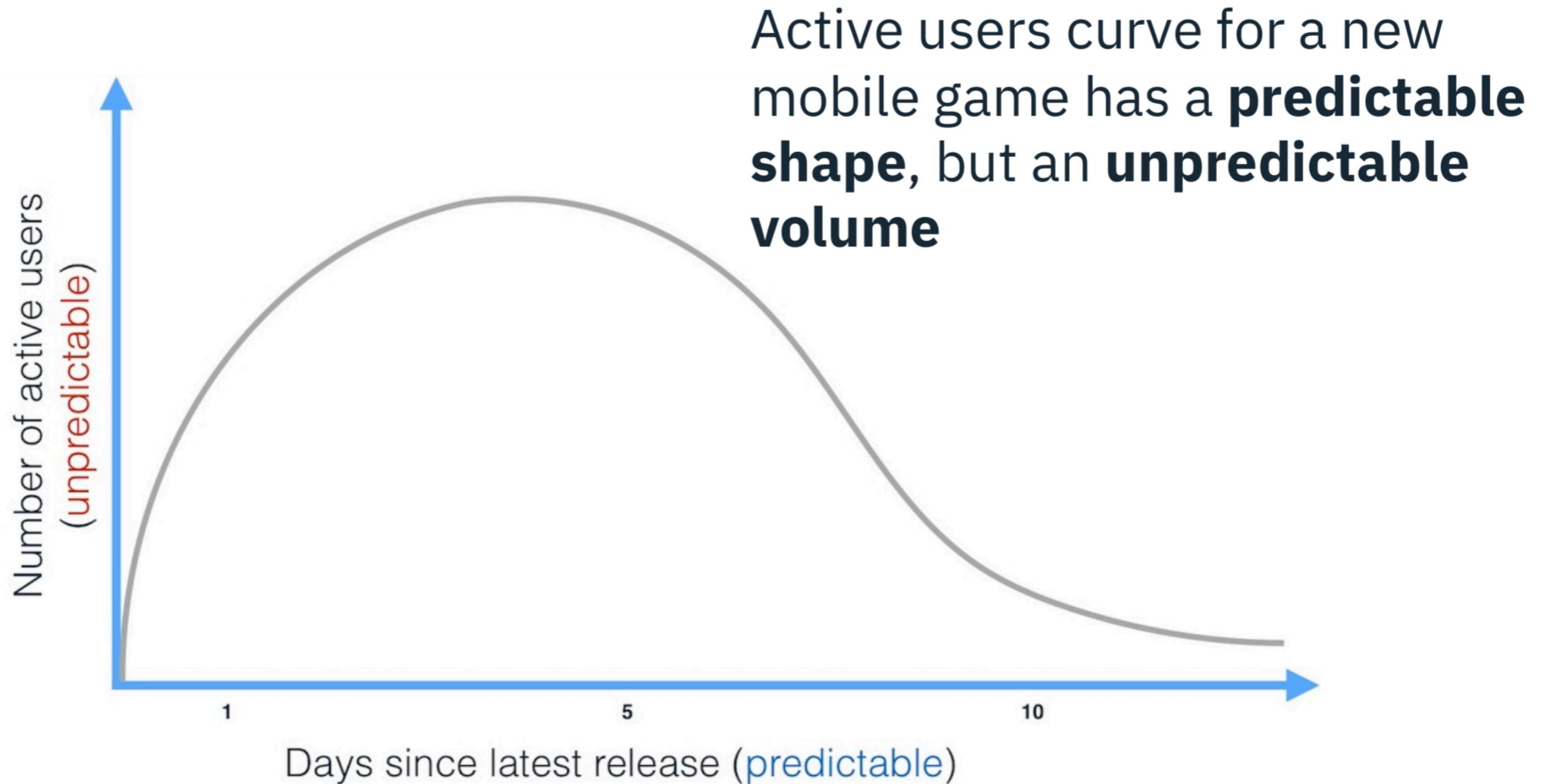
Not your problem



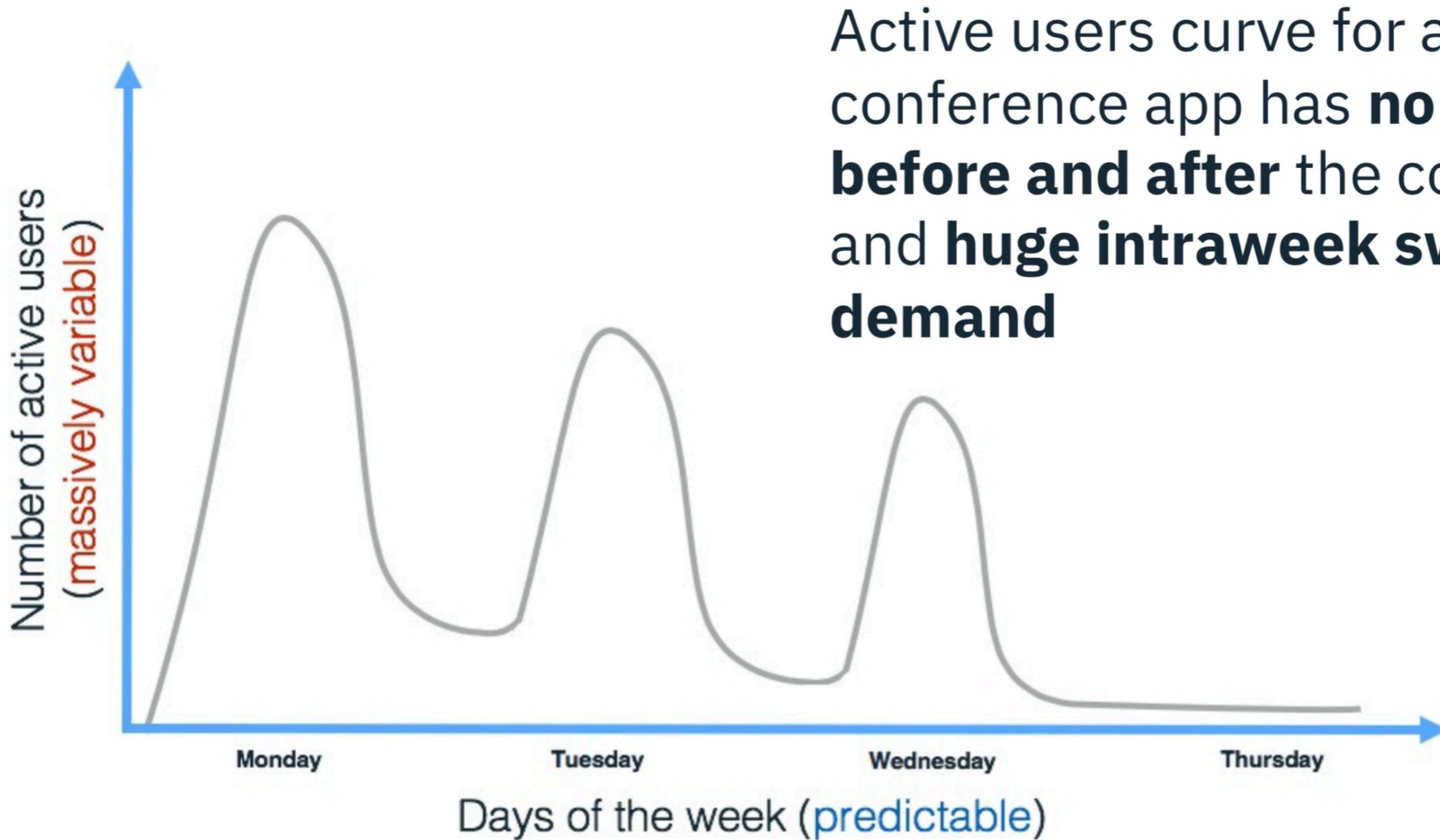
Focus on CODE

# Why Serverless?

# Why Serverless?

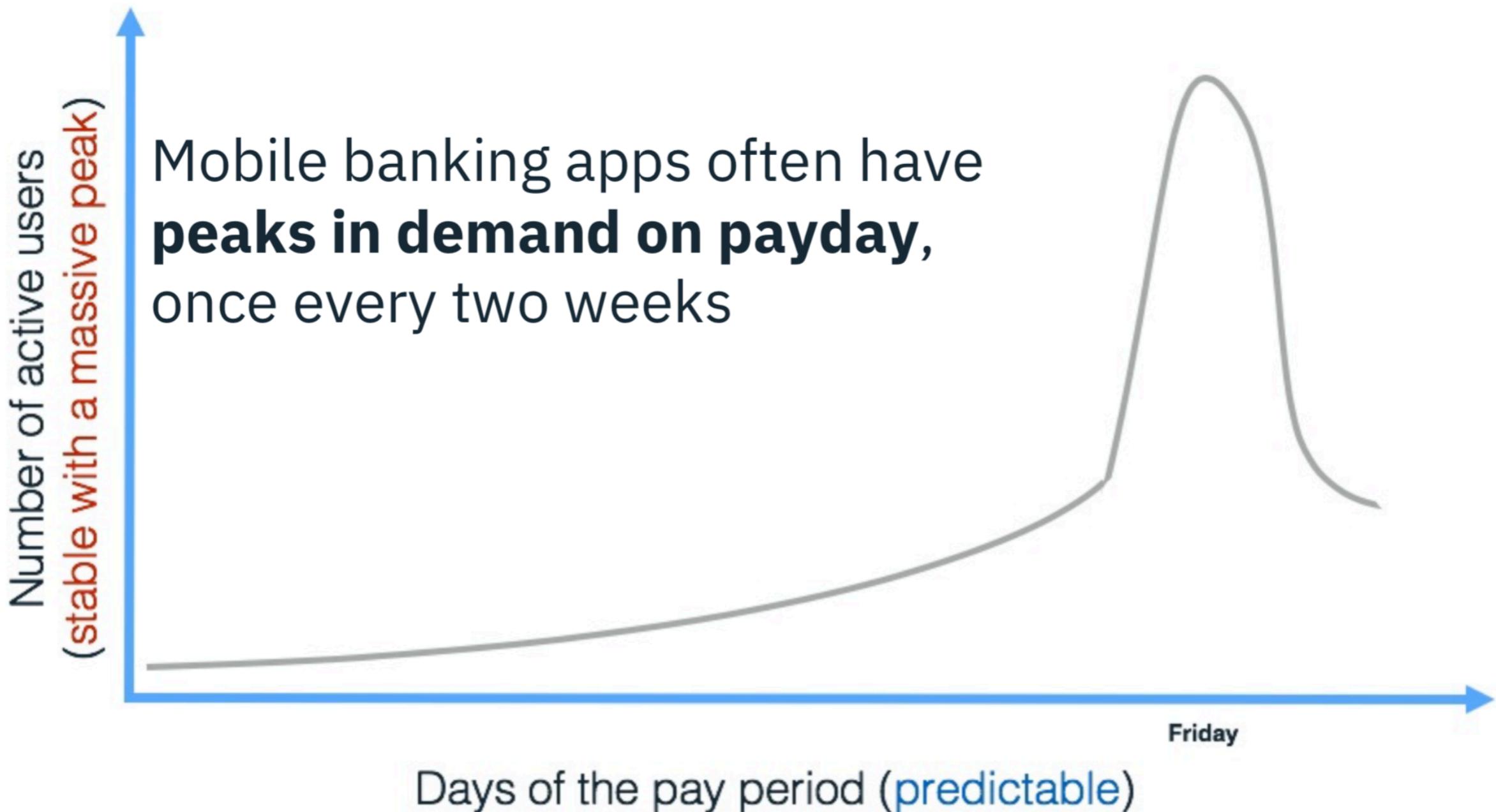


# Why Serverless?



Active users curve for a mobile conference app has **no demand before and after** the conference, and **huge intraweek swings in demand**

# Why Serverless?



# Serverless Use Cases

## Serverless Backends



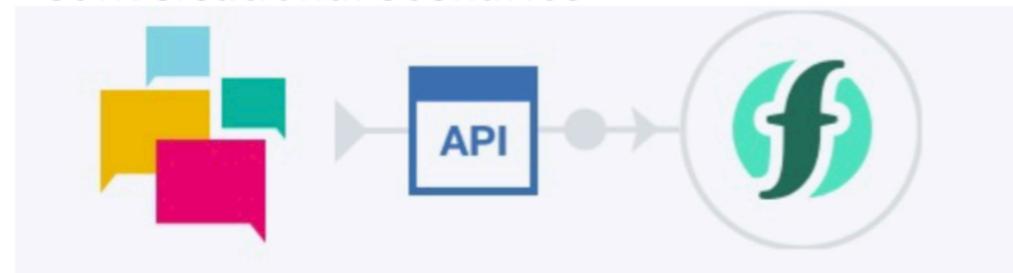
## Mobile Backend



## Data Processing



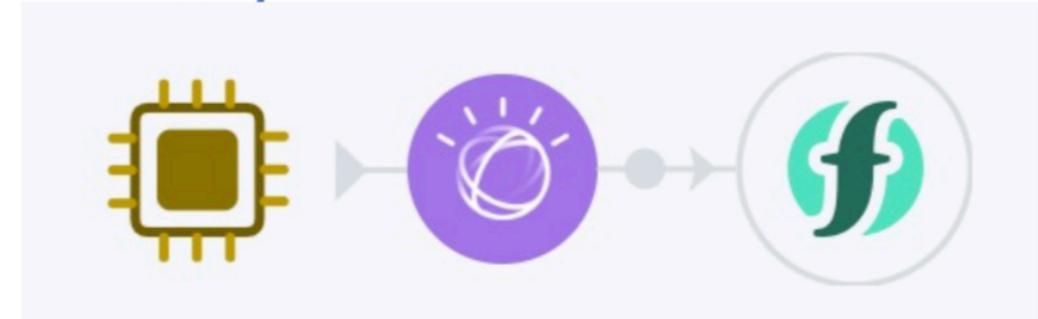
## Conversational Scenarios



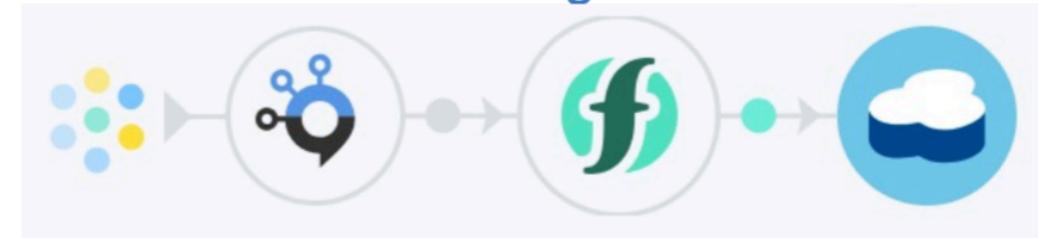
## Cognitive Data Processing



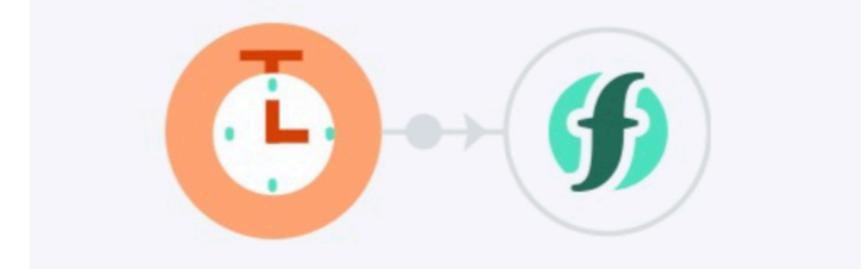
## IoT Ready



## Event Stream Processing



## Scheduled Tasks



# 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

# Serverless Use Cases

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

# Serverless Use Cases

## **Amazon Lambda**

Node.js, Python, Java, C#, PowerShell, Ruby and Go

## **IBM Cloud Functions**

Node.js 8, Node.js 6, Python 3.6.4, Python 3.6.1, PHP 7.1, PHP 7.2, and Swift 4, Swift 3.1.1, Ruby, Other languages can be added via Docker container (for example Java)

Based on open source OpenWhisk serverless platform. Can create your own serverless platform based on OpenWhisk

## **Microsoft Azure**

C#, F#, Node.js (in GA) Java, Python, PHP, TypeScript, Bash, PowerShell (experimental mode)

## **Google Cloud Functions**

Node.js, Python, Go

# Execution Time Limit

## **Amazon Lambda**

15 minutes (prev. 5 minutes)

## **IBM Cloud Functions**

10 minutes

## **Microsoft Azure**

10 minutes

## **Google Cloud Functions**

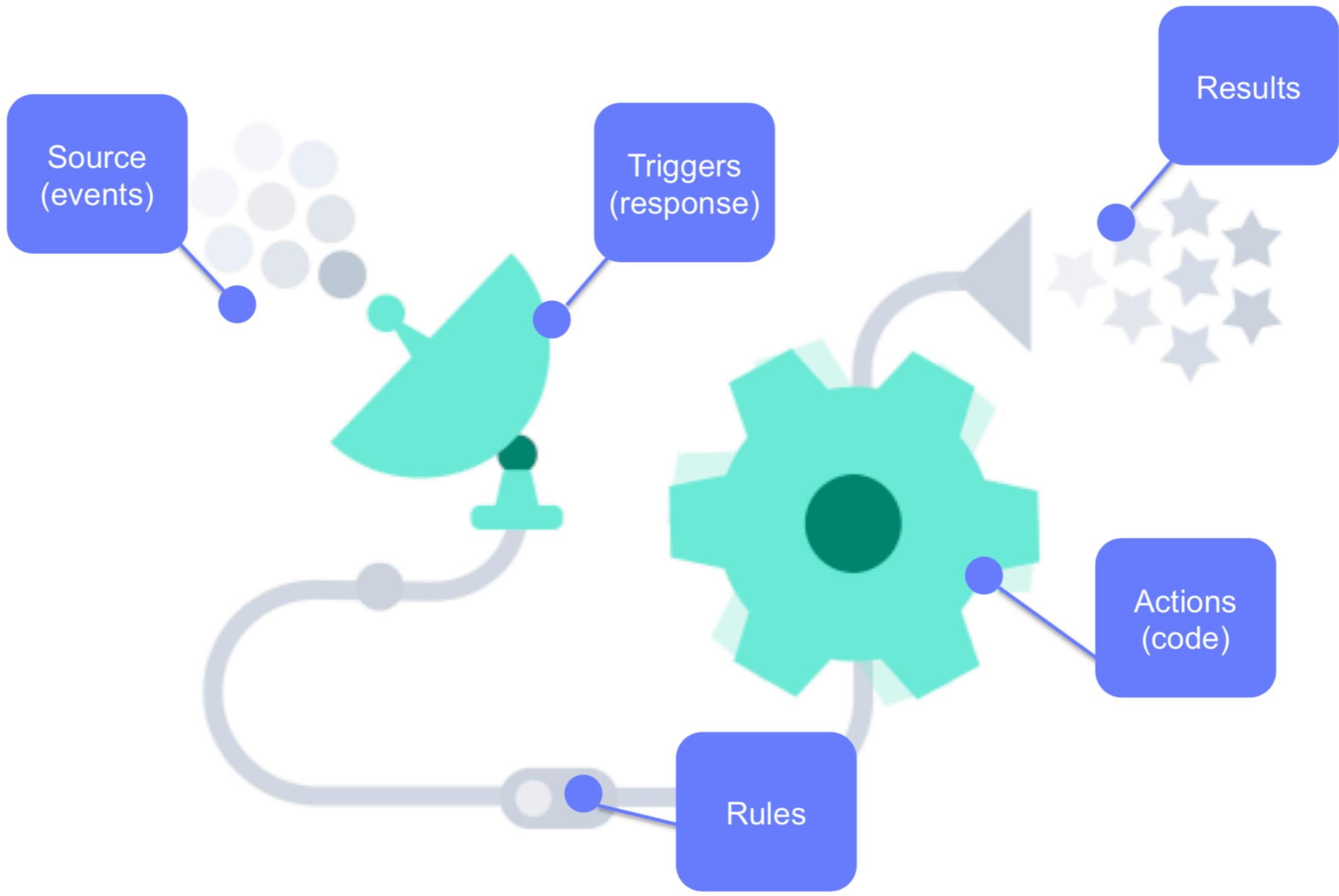
9 minutes

# Serverless 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

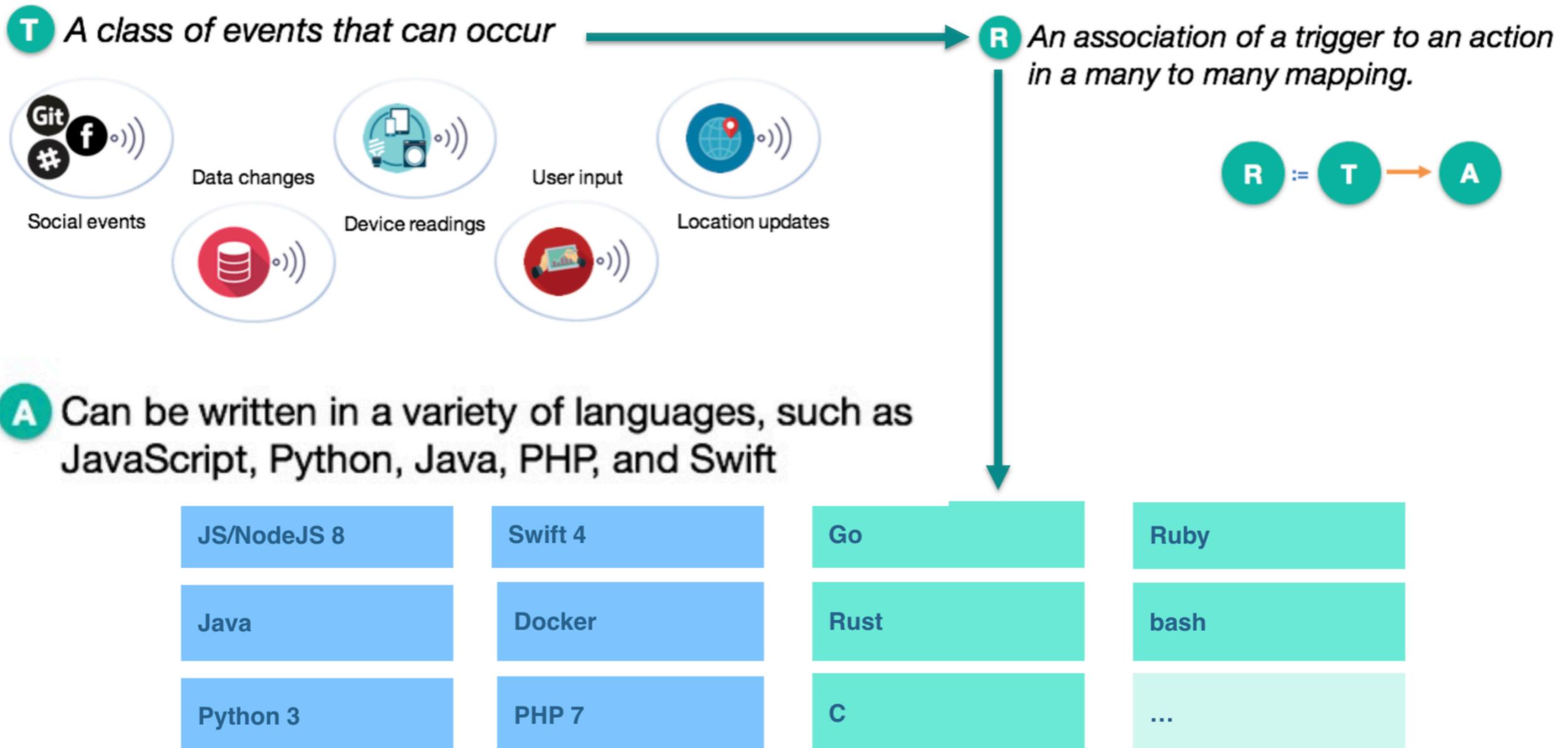
# IBM Cloud Functions

(Apache OpenWhisk)



# IBM Cloud Functions

## (Apache OpenWhisk)



# IBM Cloud Functions

(Apache OpenWhisk)

P

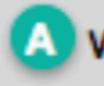
*A shared collection of triggers and actions*



IBM Cloudant\*



A read



A write



T changes



IBM Watson



A translate



The Weather Company



A forecast

Open  
Source



A post  
T topic

Third  
Party

Git

T commit

Yours



A myAction  
T myFeed

# IBM Cloud Functions

(Apache OpenWhisk)

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

# IBM Cloud Functions

(Apache OpenWhisk)

- \* 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 CREATE A FUNCTION

[IBM.BIZ/CHIJS-SERVERLESS](https://ibm.biz/chijs-serverless)

# Don't Use Serverless!

When should you not use Serverless?

- \* Extensive customization/flexibility
- \* Very long-running task that can't be broken down
- \* Complex computation, high memory requirements
- \* Extremely fast response time
- \* Service availability > cloud functions service availability

# Resources

## Lists

- <https://github.com/anaibol/awesome-serverless>
- <https://github.com/pmuens/awesome-serverless>
- <https://twitter.com/tmclaughbos/lists/serverless>

## Email newsletter

- <https://serverless.email/>

## Code Patterns

- <https://developer.ibm.com/patterns/category/serverless/>

## Serverless architecture

- <https://martinfowler.com/articles/serverless.html>

# Code Patterns

**CODE PATTERN** | NOV 28, 2018

Implementing mobile user authentication

[Get the Code »](#)

IBM Cloudant Local (NoSQL)  
Mobile Development +

**CODE PATTERN** | NOV 28, 2018

Analyze large data sets collected from a long-range IoT system that uses LoRaWAN networking

[Get the Code »](#)

Data Science IoT +

**CODE PATTERN** | NOV 27, 2018

Technical support ticket classification using Watson Natural Language Classification

[Get the Code »](#)

Artificial Intelligence Data Science +

**CODE PATTERN** | NOV 26, 2018

Stream and store retail order data for analysis

[Get the Code »](#)

Akka Analytics +

**CODE PATTERN** | NOV 19, 2018

Build a handwritten digit recognizer in Watson Studio and PyTorch

[Get the Code »](#)

Analytics Artificial Intelligence +

**CODE PATTERN** | NOV 16, 2018

Build an AR avatar for the iPhone

[Get the Code »](#)

Artificial Intelligence Conversation +

**CODE PATTERN** | NOV 16, 2018

Implement digest authentication in unsupported tools

[Get the Code »](#)

API Management Docker +

**CODE PATTERN** | NOV 14, 2018

Develop a voting application using Hyperledger and Ethereum

[Get the Code »](#)

Blockchain Hyperledger Fabric

# THANK YOU!

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