Serverless: The next wave of cloud computing

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Chief Architect, Serverless/FaaS &
IBM Cloud Functions

@Michael_beh

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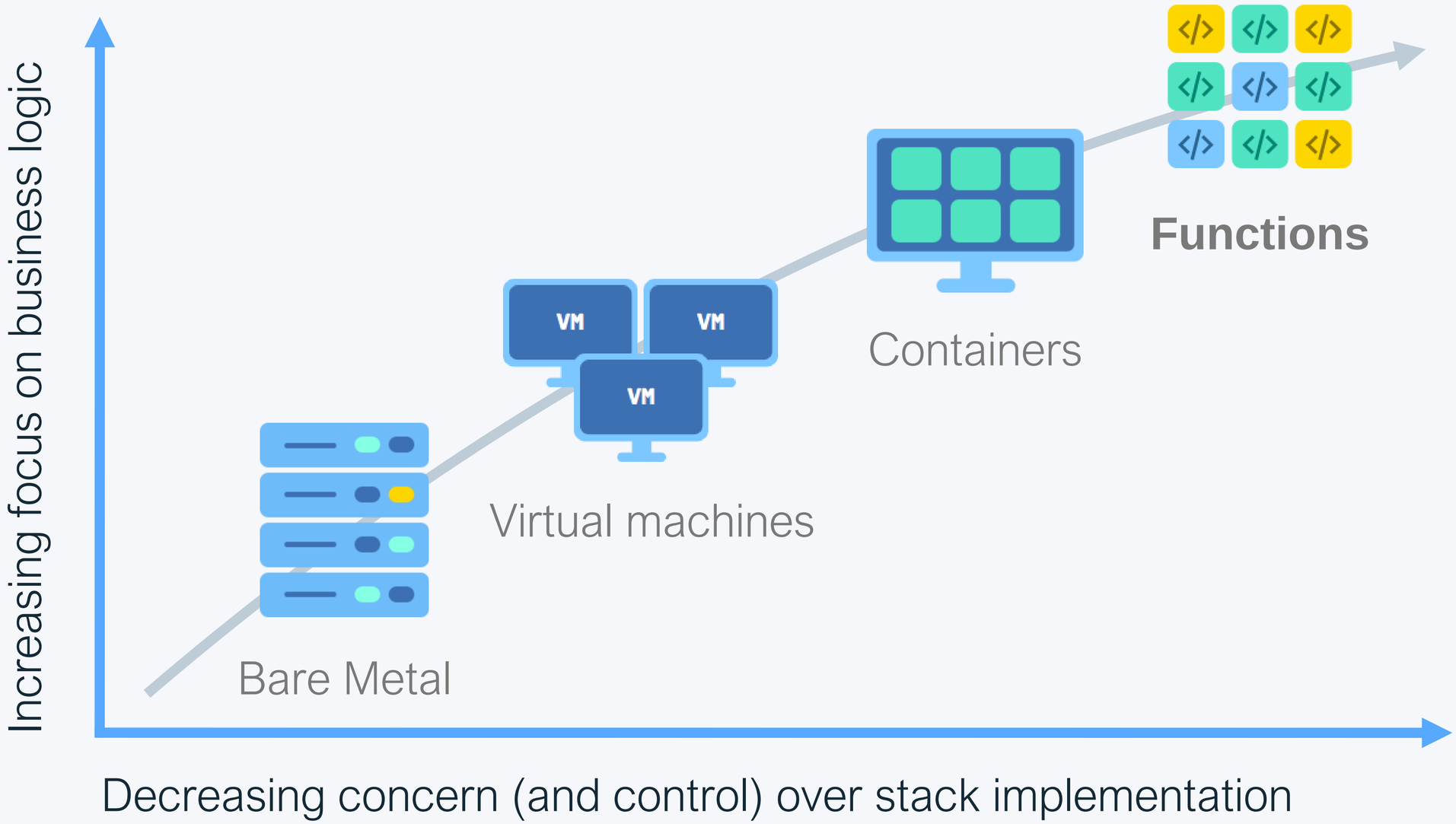
Evolution of serverless



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Traditional model

Worry about scaling

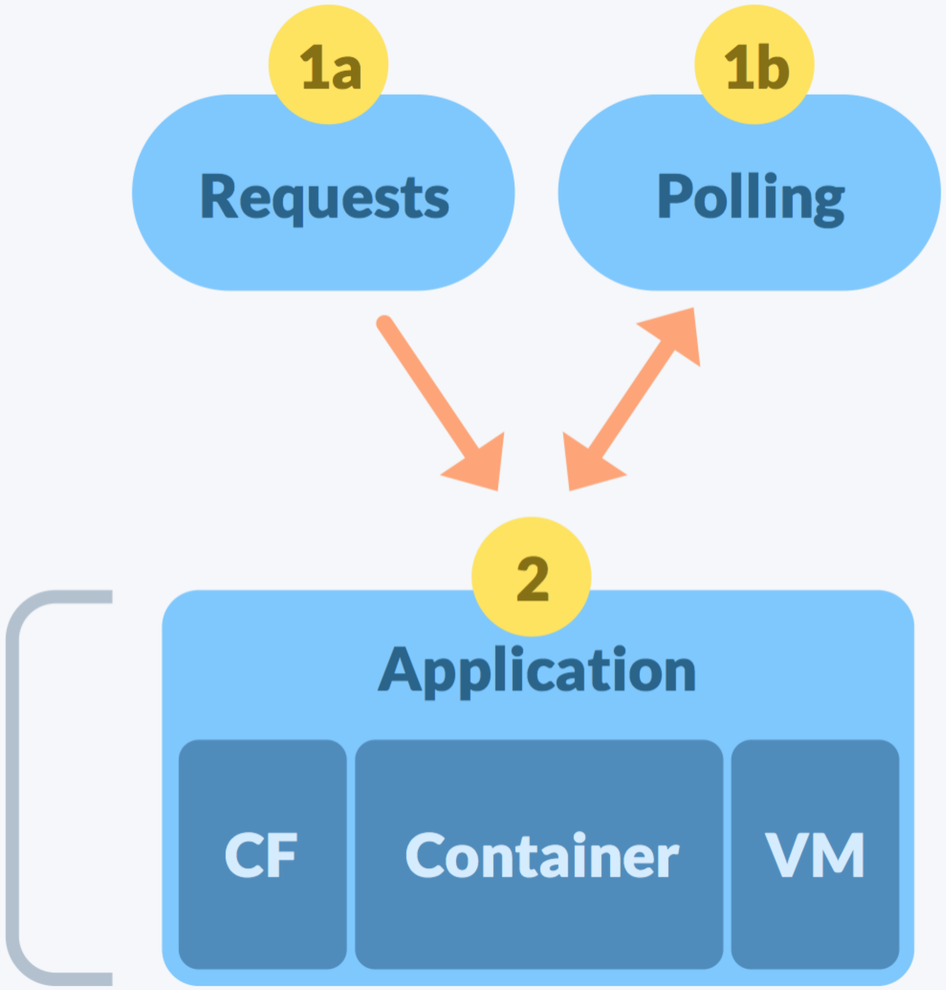
- When to scale? (mem-, cpu-, response time-, etc. driven?)
- How fast can you scale?

Worry about resiliency & cost

- At least 2 processes for HA
- Keep them running & healthy
- Deployment in multiple regions

Charged even when idling / not 100% utilized

Continuous polling due to missing event programming model



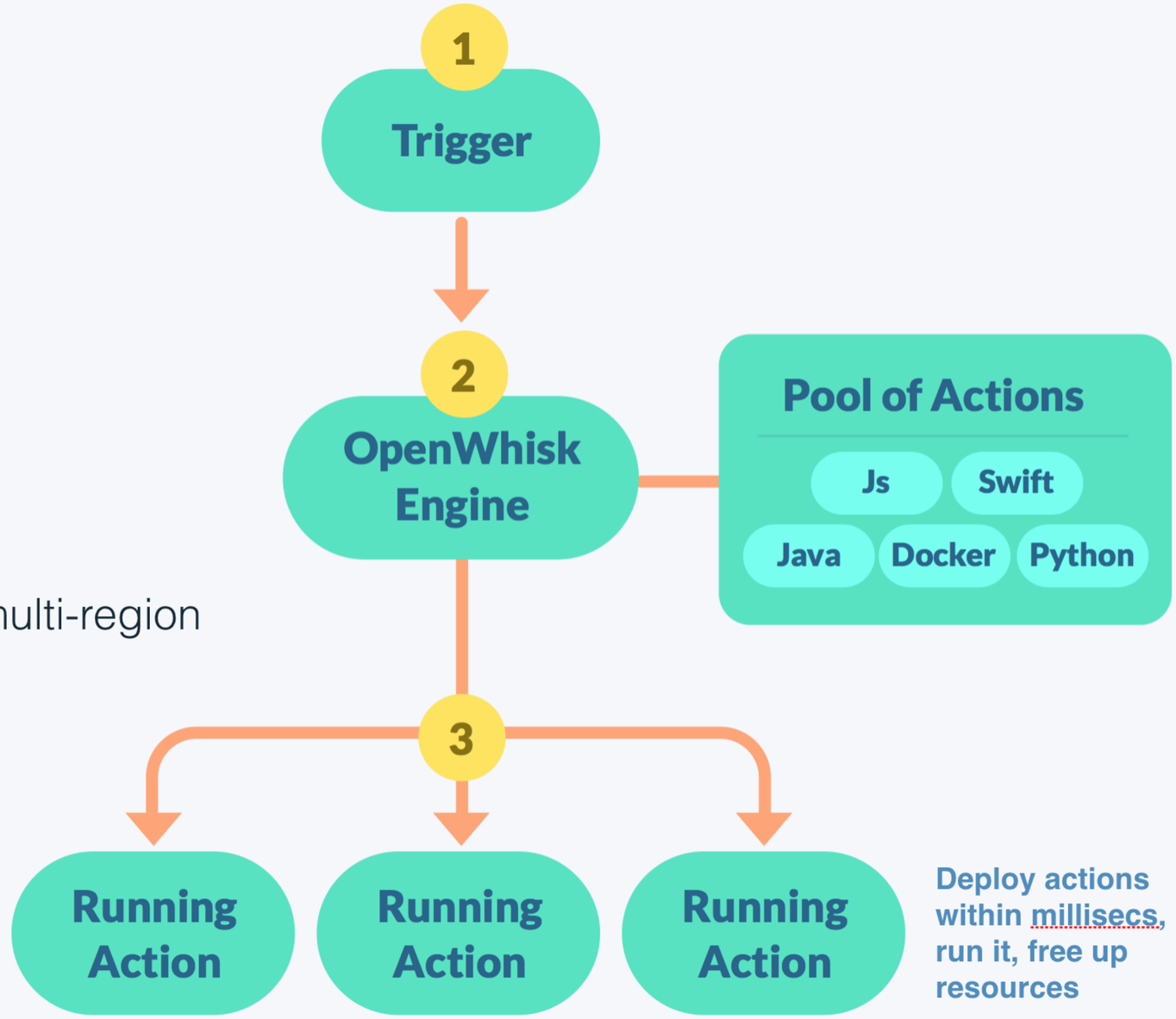
Serverless model

Scales inherently
- One process per request

No cost overhead for resiliency
- No long running process to be made HA / multi-region

Introduces event programming model

Charges only for what is used
- Only worry about code
  higher dev velocity, lower operational costs



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

Serverless deployment & operations model

No servers

Just code

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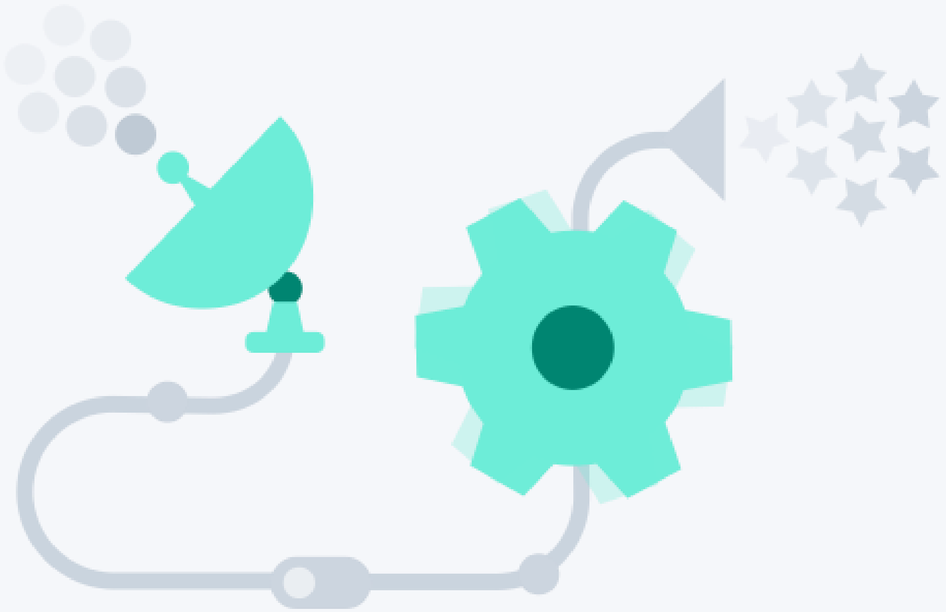
FaaS platform to execute code in response to events

Apache open source project:

openwhisk.org



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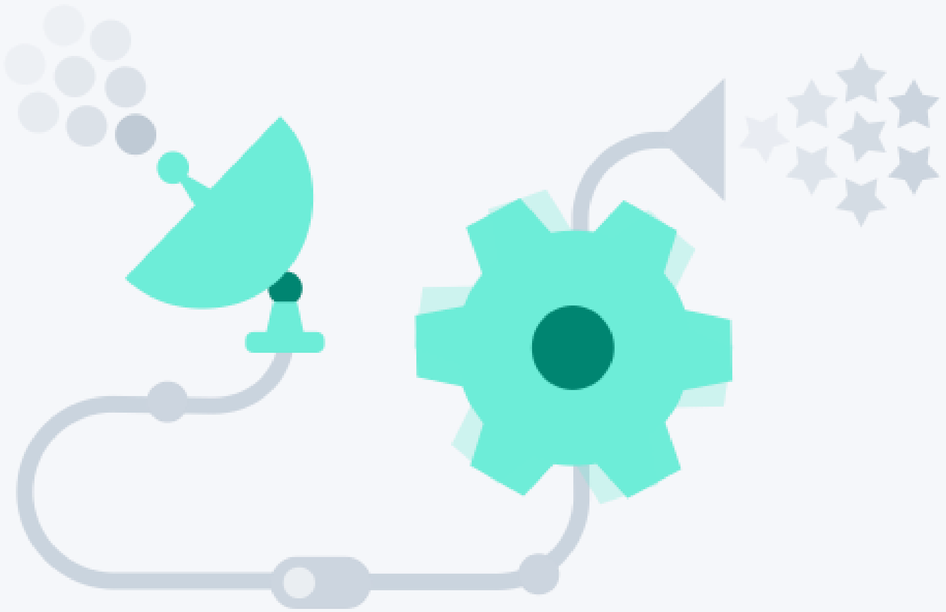
IBM Cloud **Functions**

FaaS platform to execute code in response to events

Managed service as part of the **IBM Cloud**

bluemix.net/openwhisk



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IBM Watson and Cloud Platform

Application

DsX

IoT

Virtual agent

AI

Conversation	Discovery	Compare + Comply	Knowledge Query	Tone Analysis	Personality Insights
Visual Recognition	Speech	Document Conversion	Nat. Language Understanding	Nat. Language Classifier	+ more...

Data

Ingest → Enrich → Store → Analyze → Apply

Public, Private, Licensed

The Watson Data Platform

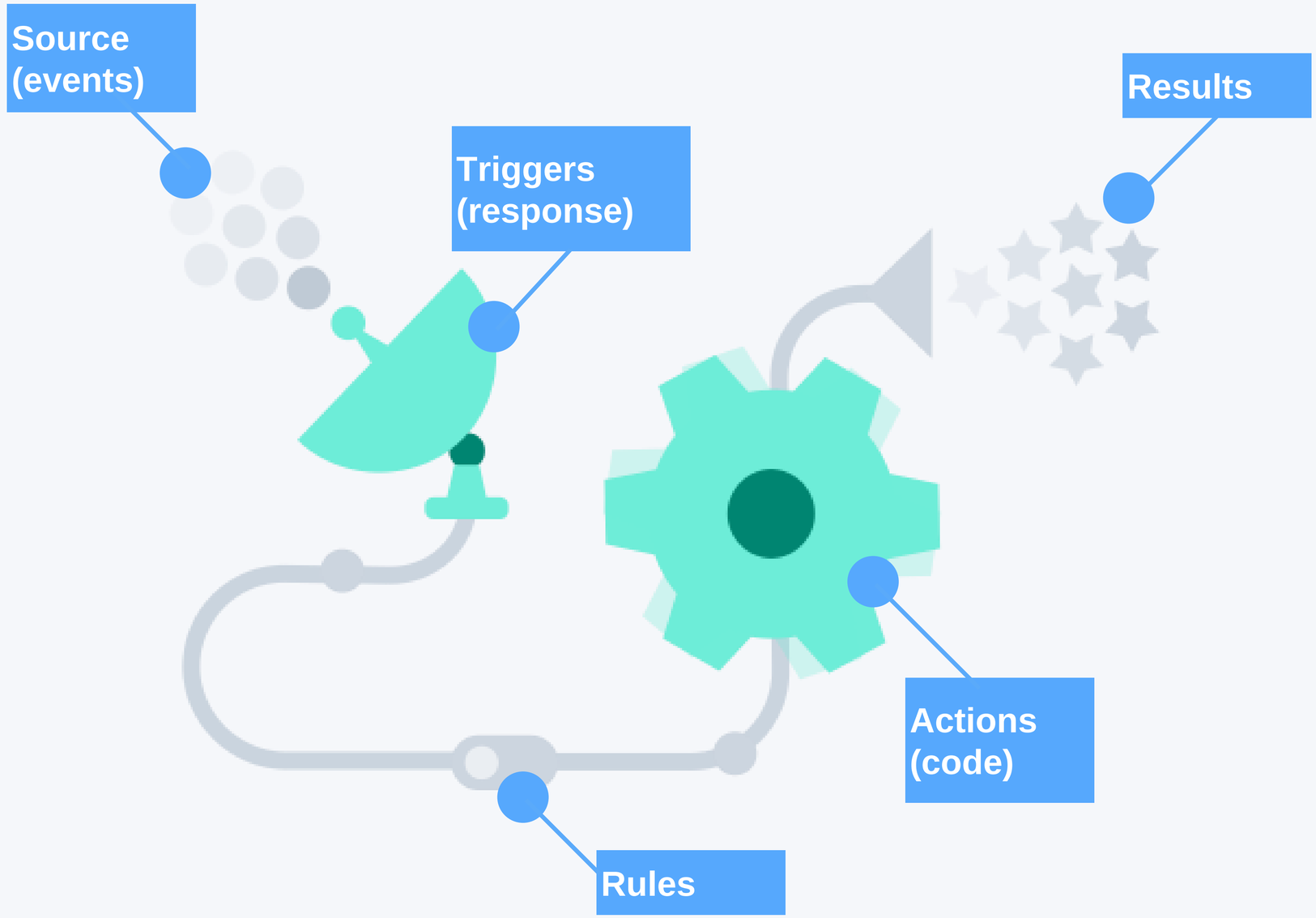
Cloud

Dev Services	Containers	Messaging	Blockchain	Logging	+ more...
Infrastructure	Storage	Compute	Physical Network	Infrastructure Mgmt	+ more...

IBM Confidential

IBM Cloud **Functions**

Concepts



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IBM Cloud **Functions**

Supported Languages

Multi-language Support

- JS/NodeJS 6
- Swift 3
- Java
- Docker
- Python 3
- PHP

Community Efforts

- Haskell
- Scala
- …

… and more to come

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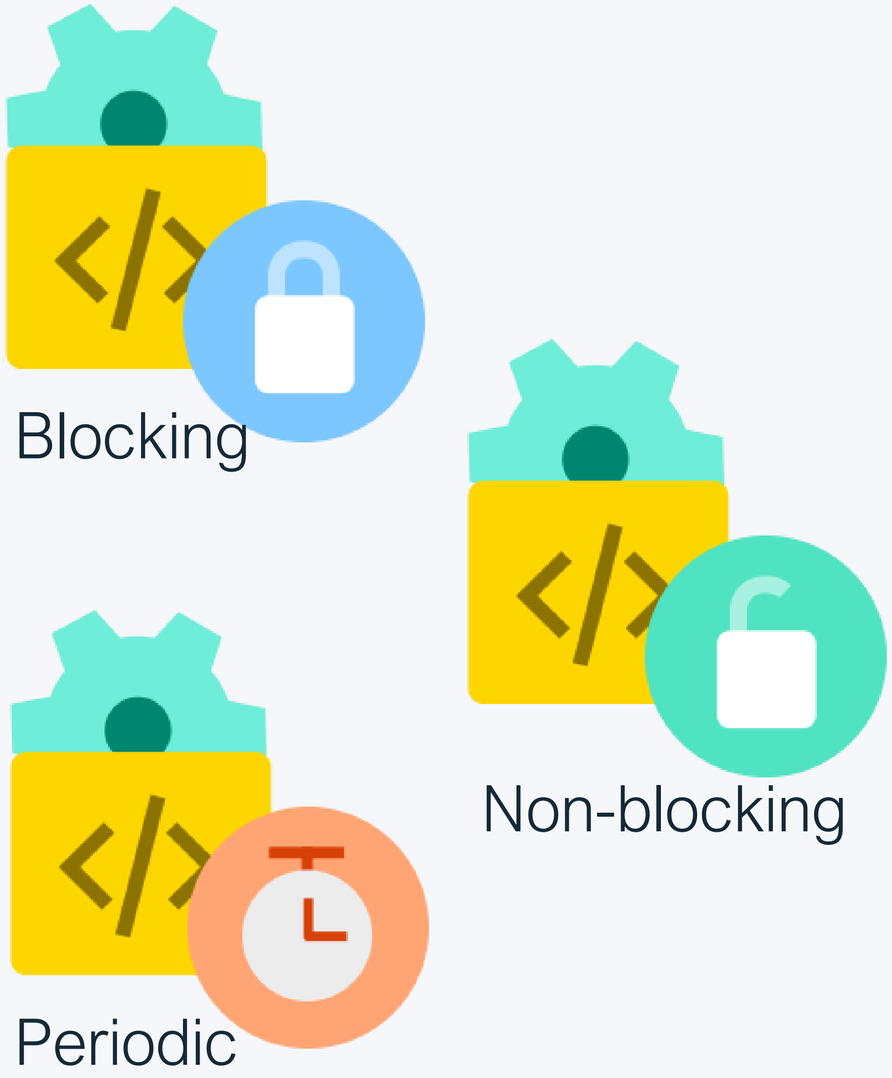
IBM Cloud **Functions**

Support for different invocation models



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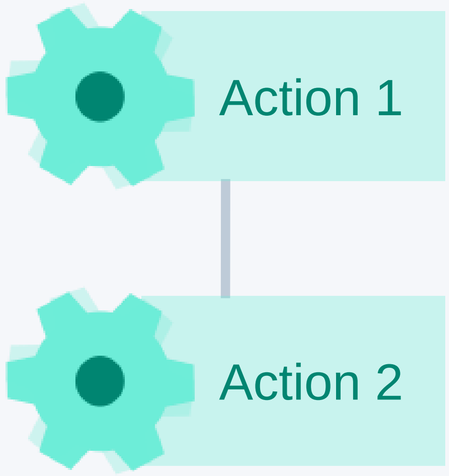
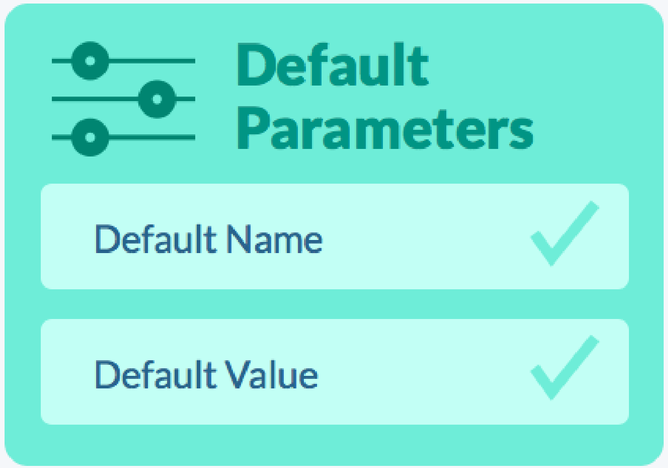
Supports higher-level programming constructs



Chaining/
Sequencing



Parameter
Binding

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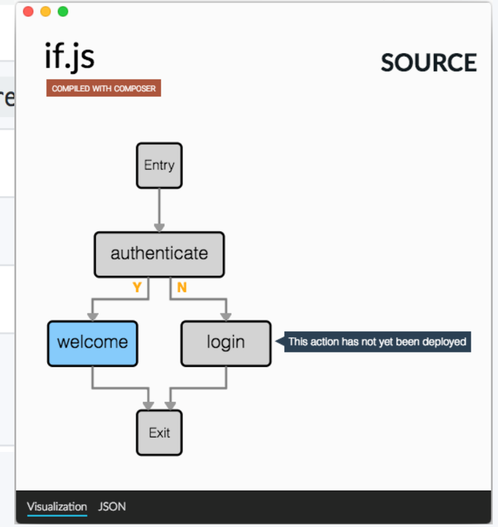
Composition, Control Flow and State Management

A Differentiated Model for FaaS Composition

- Respond to the need for more complex, coordinated flows required for end to end solutions across cloud Services
- Enable more expressive programming through direct integration of new constructs into existing language bindings

Composition	Description	Example
`task`	single task	`composer.task('sayHi', { input: 'userInfo' })`
`dictionary`	constant dictionary	`composer.dictionary({ message: 'Hello World!' })`
`sequence`	sequence	`composer.sequence('getLocation', 'getWeatherForLocation')`
`let`	variables	`composer.let('n', 42, ...)`
`if`	conditional	`composer.if('authenticate', /* then */ 'welcome', /* else */ 'login')`
`while`	loop	`composer.while('needMoreData', 'fetchMore`
`try`	error handling	`try('DivideByN', /* catch */ 'NaN')`
`repeat`	repetition	`repeat(42, 'sayHi')`
`retry`	error recovery	`retry(3, 'connect')`
`retain`	parameter retention	`composer.retain('validateInput')`



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Event Provider

Periodic

IBM **Cloudant**

Message Hub

Mobile Push

Github

IBM App Connect

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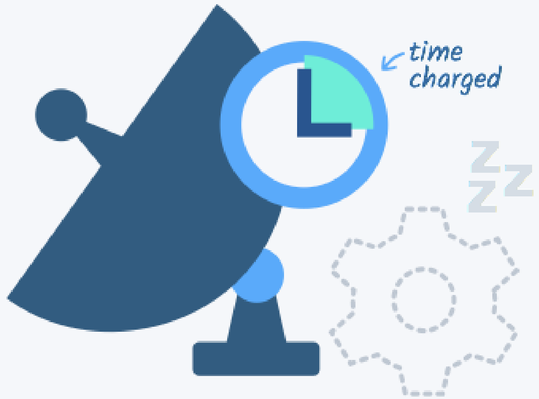
Granular pricing

Pay only for the exact time your actions run. When an action is not invoked, it’s not in memory, so you don’t pay anything.



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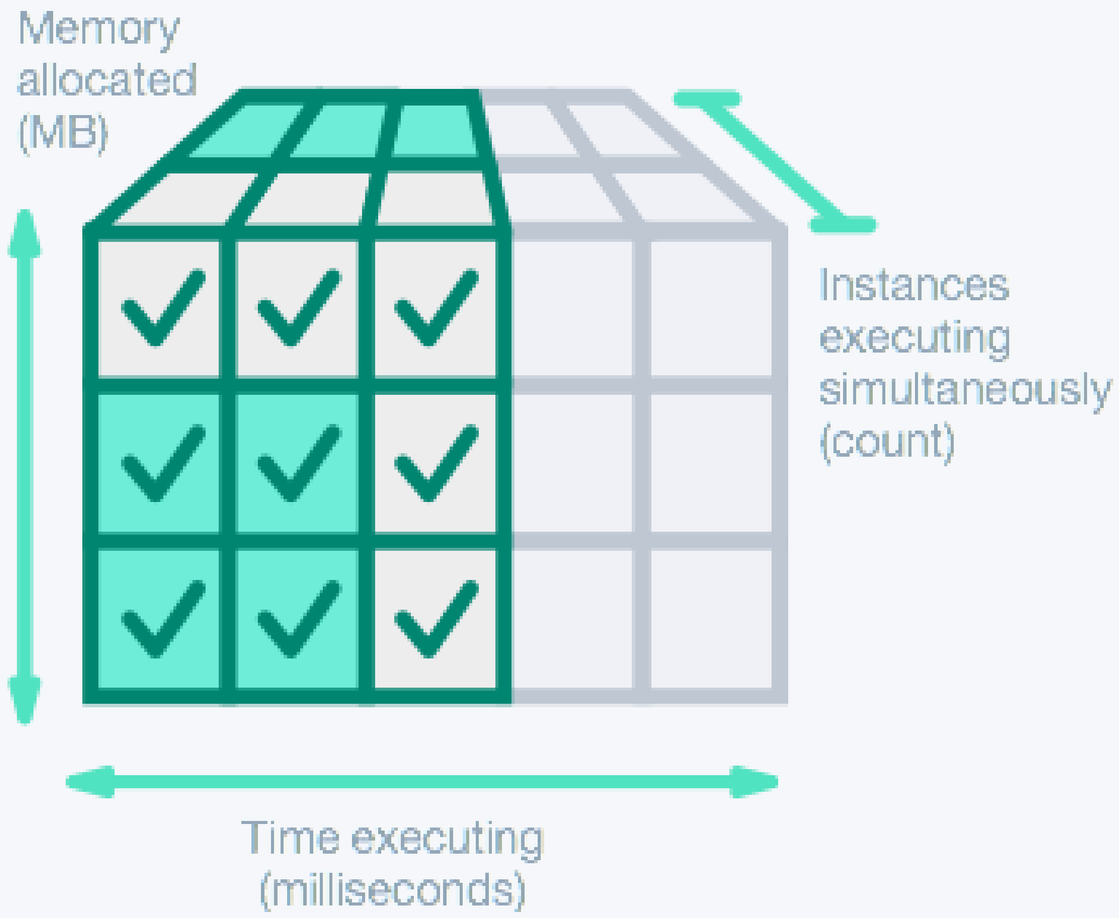
Reduce Costs

Time an action was running
* memory allocated to action

$ 0.000017 per GBs
Free tier: 400000 GBs



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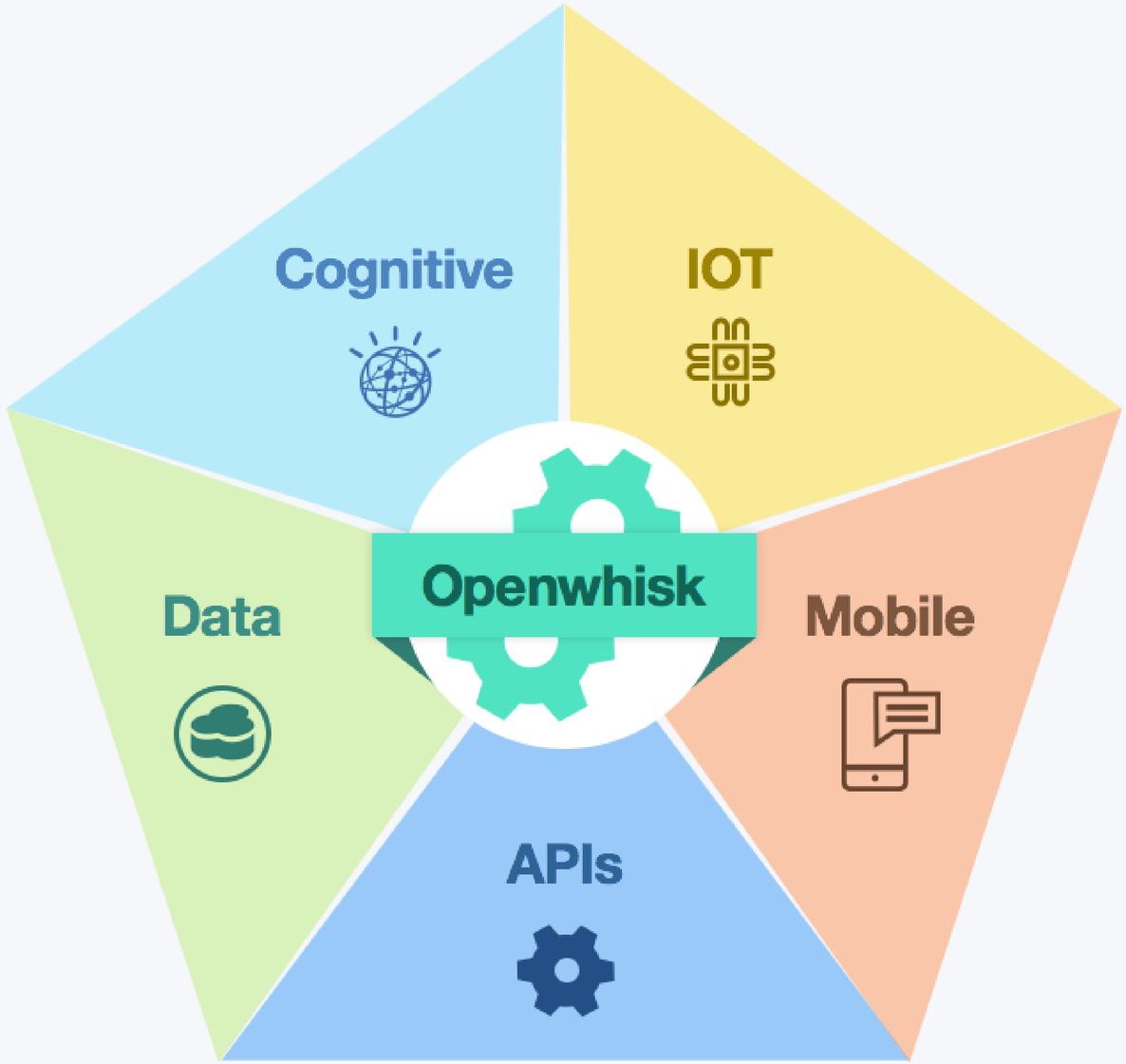
OpenWhisk allows you to build up an **entirely serverless** application architecture



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Customers and Partners

Clients

SiteSpirit
Santander
articoolo
AbiliSense
BIGVU
POCKET TV STUDIO
GreenQ
Making Garbage Trucks Smarter
MAGENTIQ
SEE BEYOND THE VISIBLE
The Weather Company
ADVISOR CONNECT

Partners

Adobe
THE APACHE SOFTWARE FOUNDATION
ALTOROS™
nepente
ARTESANATO DE SOFTWARE
Miracle Systems
SWAGGERhub
PubNub
redhat

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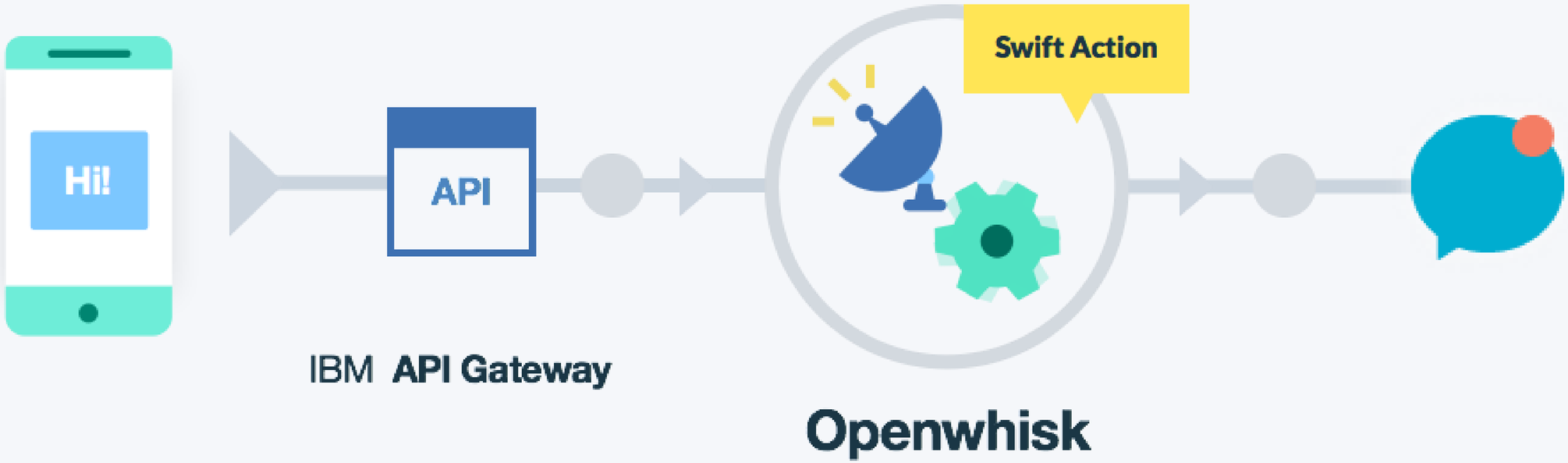
Mobile backend

Outsource compute-intensive tasks to a powerful & scalable serverless platform and implement your actions even without changing the programming language.



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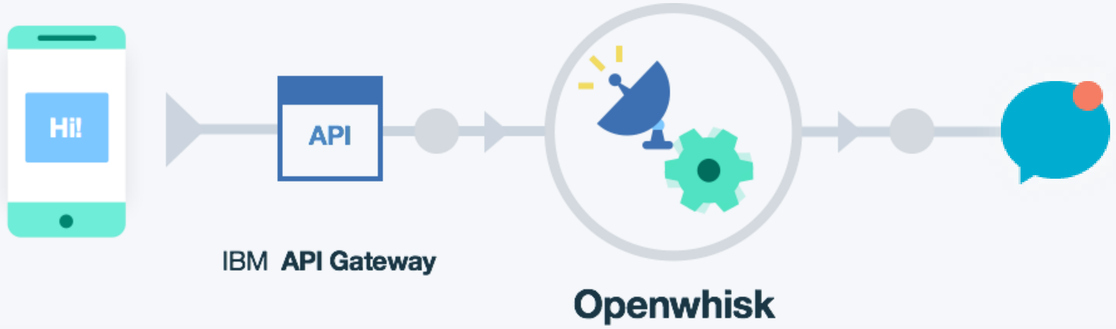
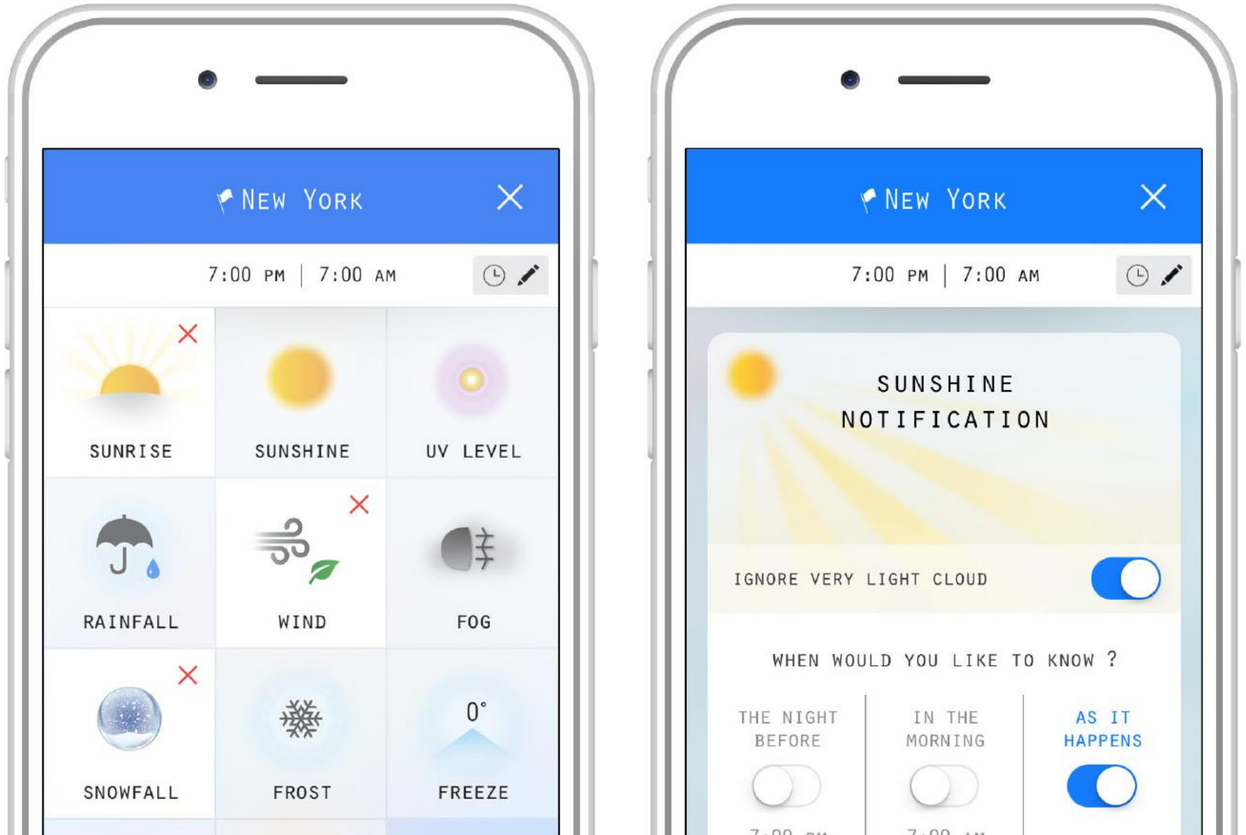
Mobile backend

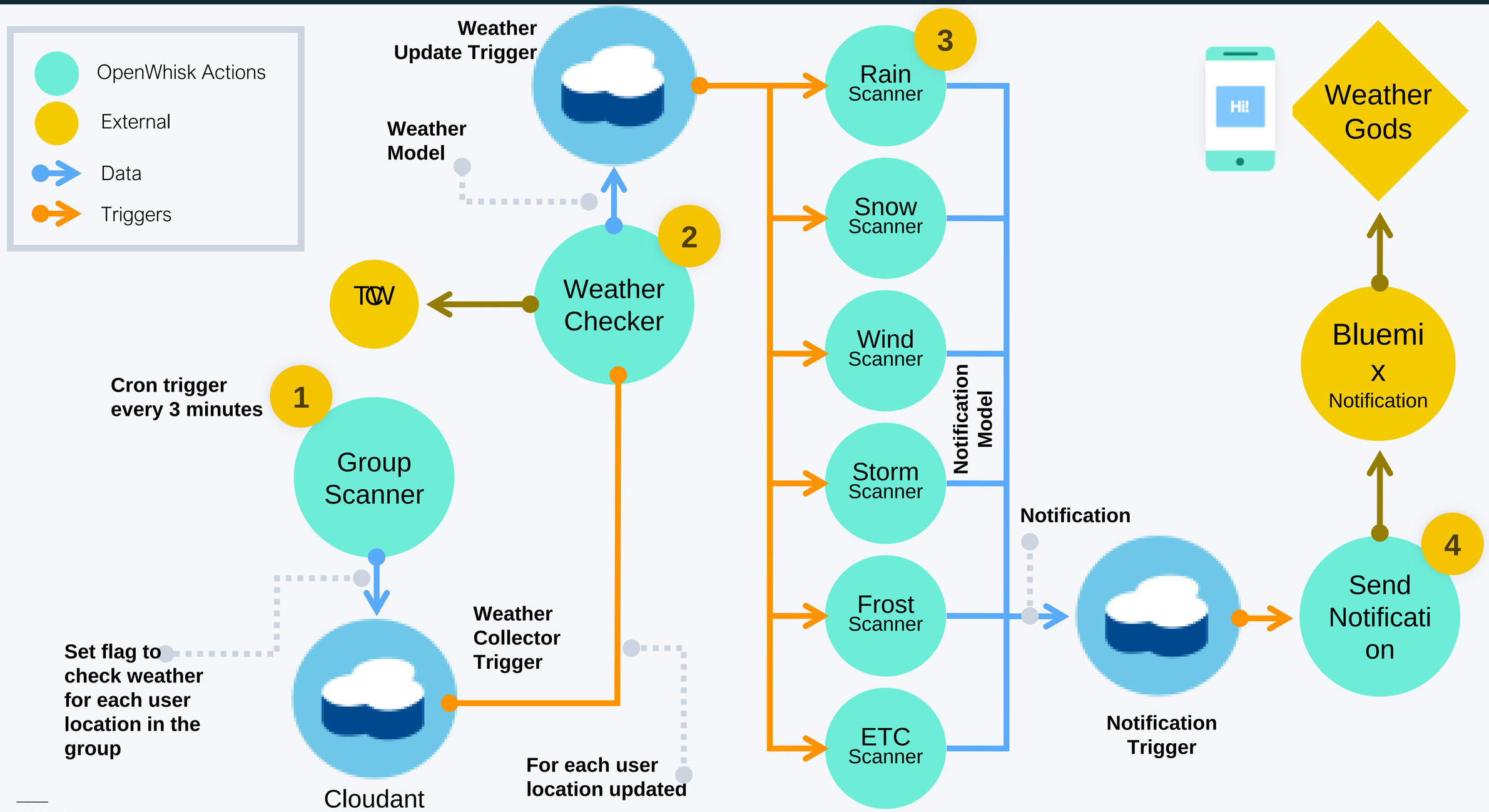


The Weather Gods

https://itunes.apple.com/us/app/weather-gods/id1041512978?mt=8



The Weather Gods High Level Architecture



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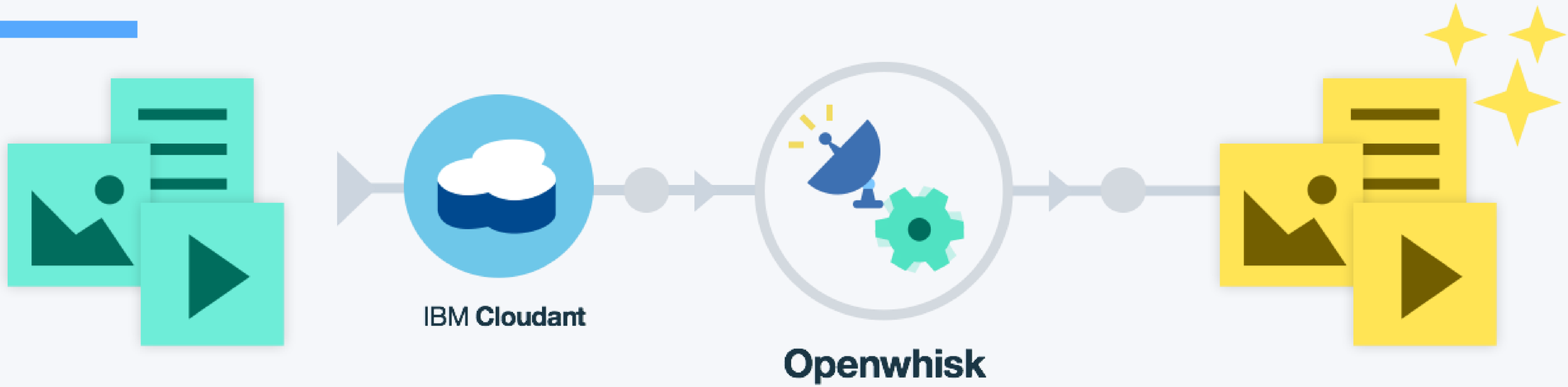
Data processing



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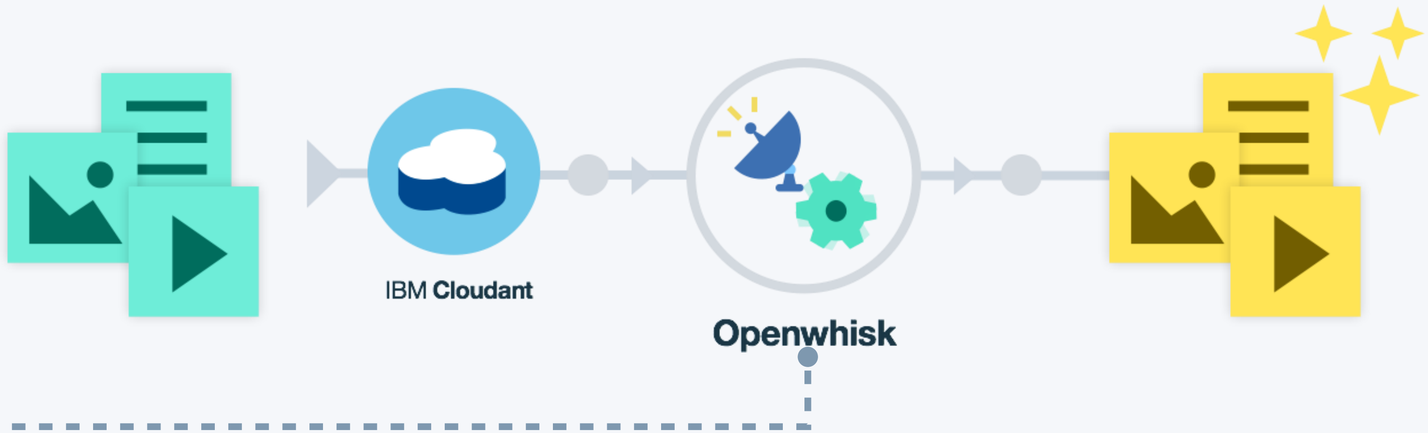
Data processing



Ideally suited for working with multimedia data like audio, image and video data:

Audio normalization
Image rotation, sharpening, noise reduction
or
Thumbnail generation
Image OCR’ing
Video transcoding
…

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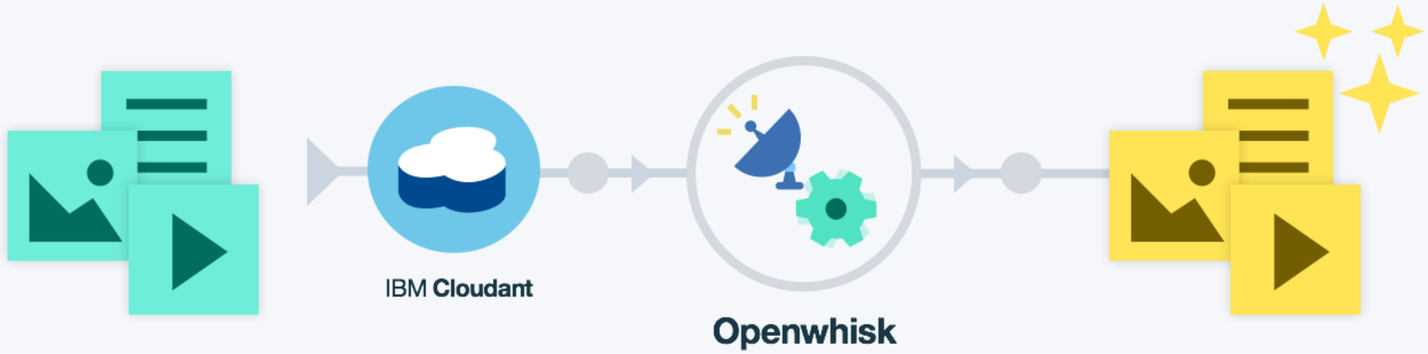
Data processing

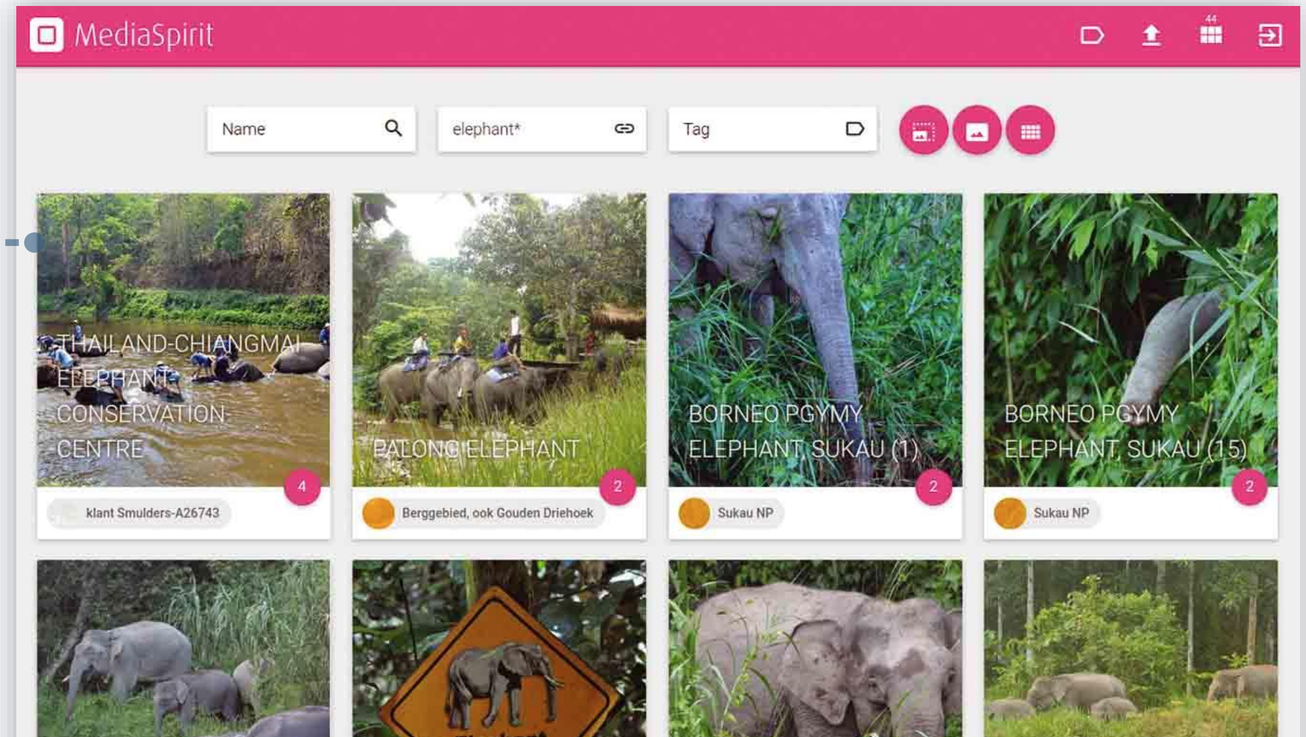


SiteSpirit

http://ecc.ibm.com/case-study/us-en/ECCF-CDC12387USEN

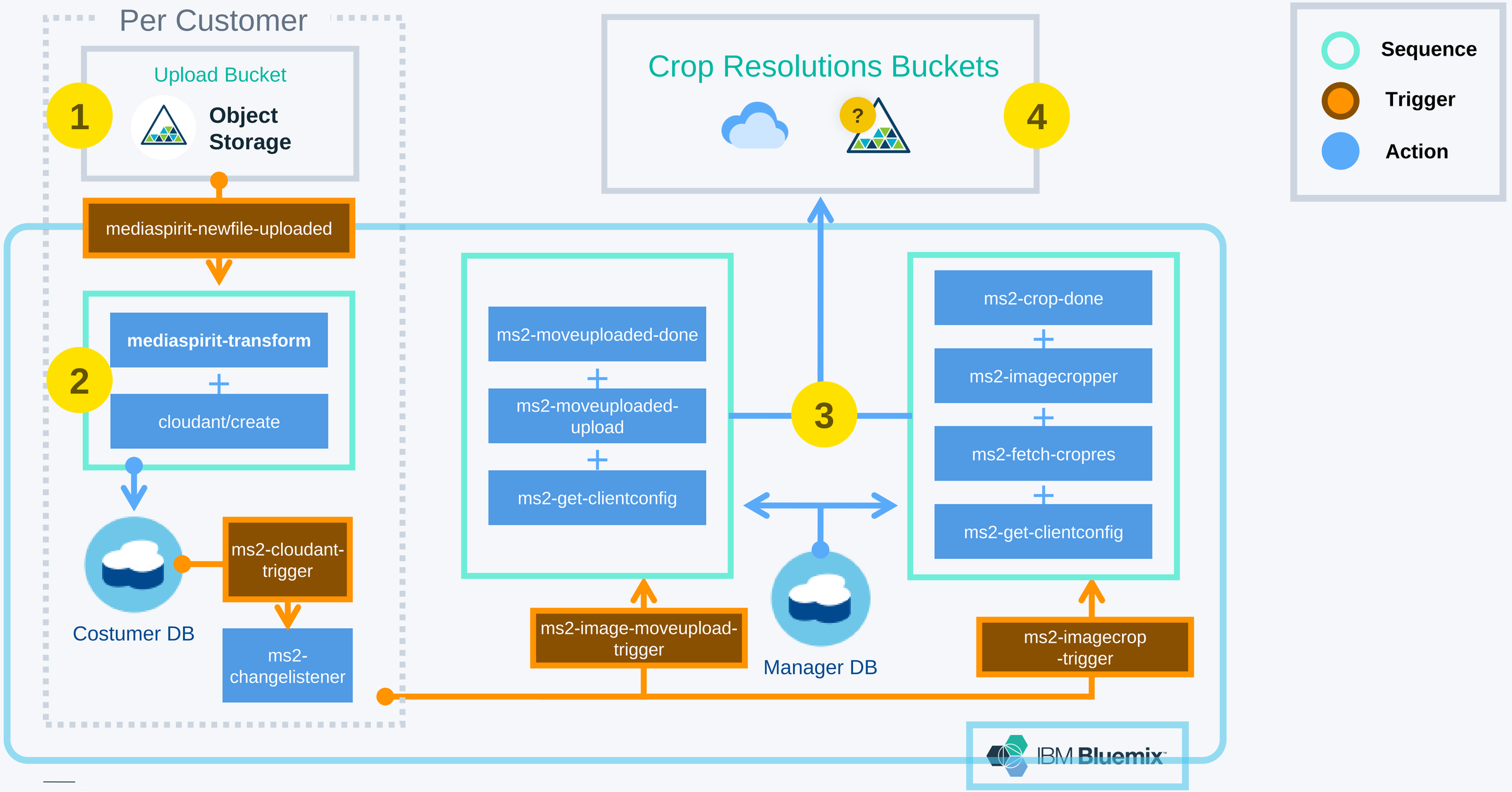
10x faster

90% less cost



SiteSpirit High Level Architecture

IBM Cloud **Functions**



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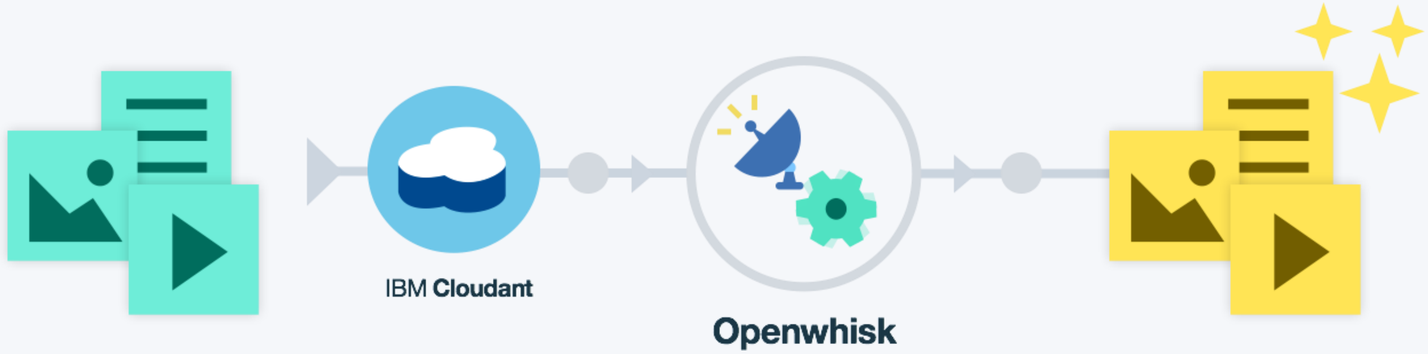
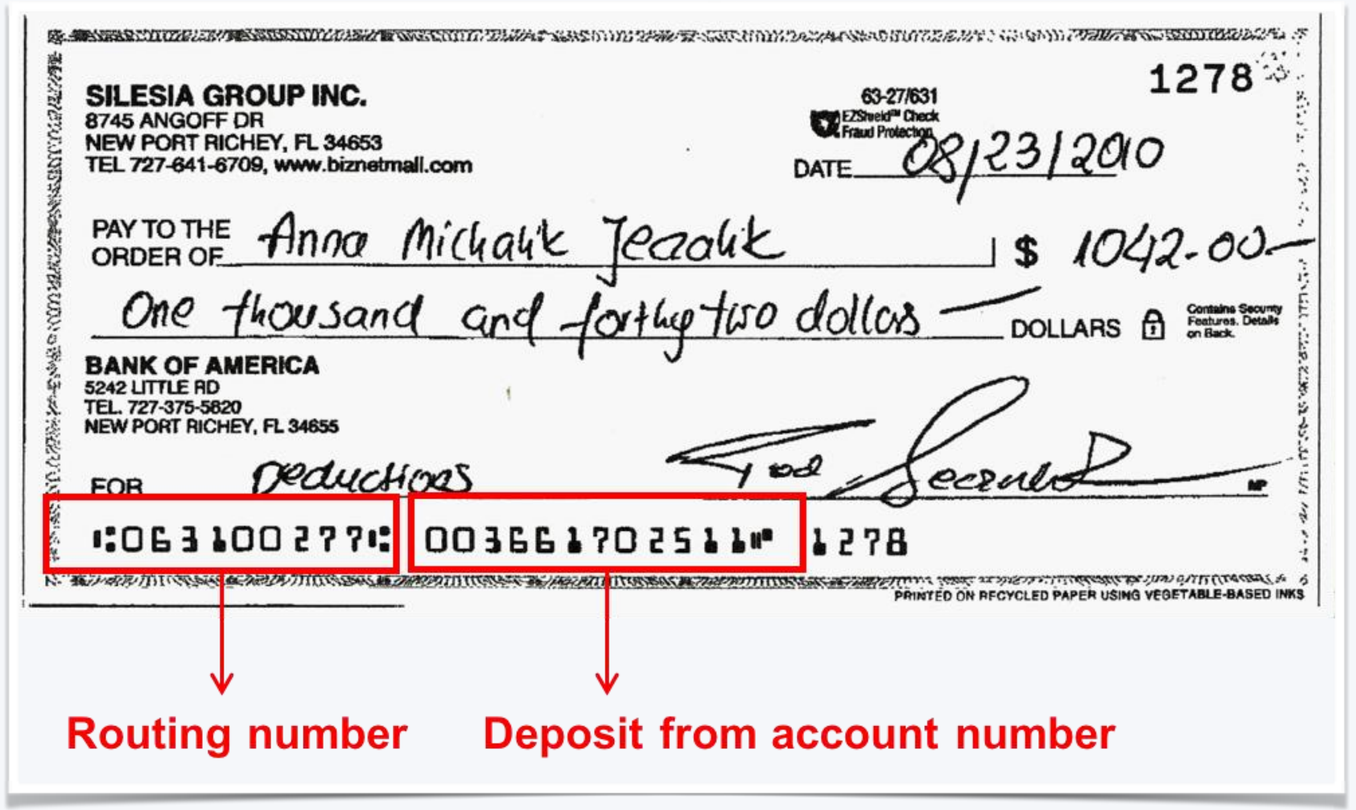
Data processing

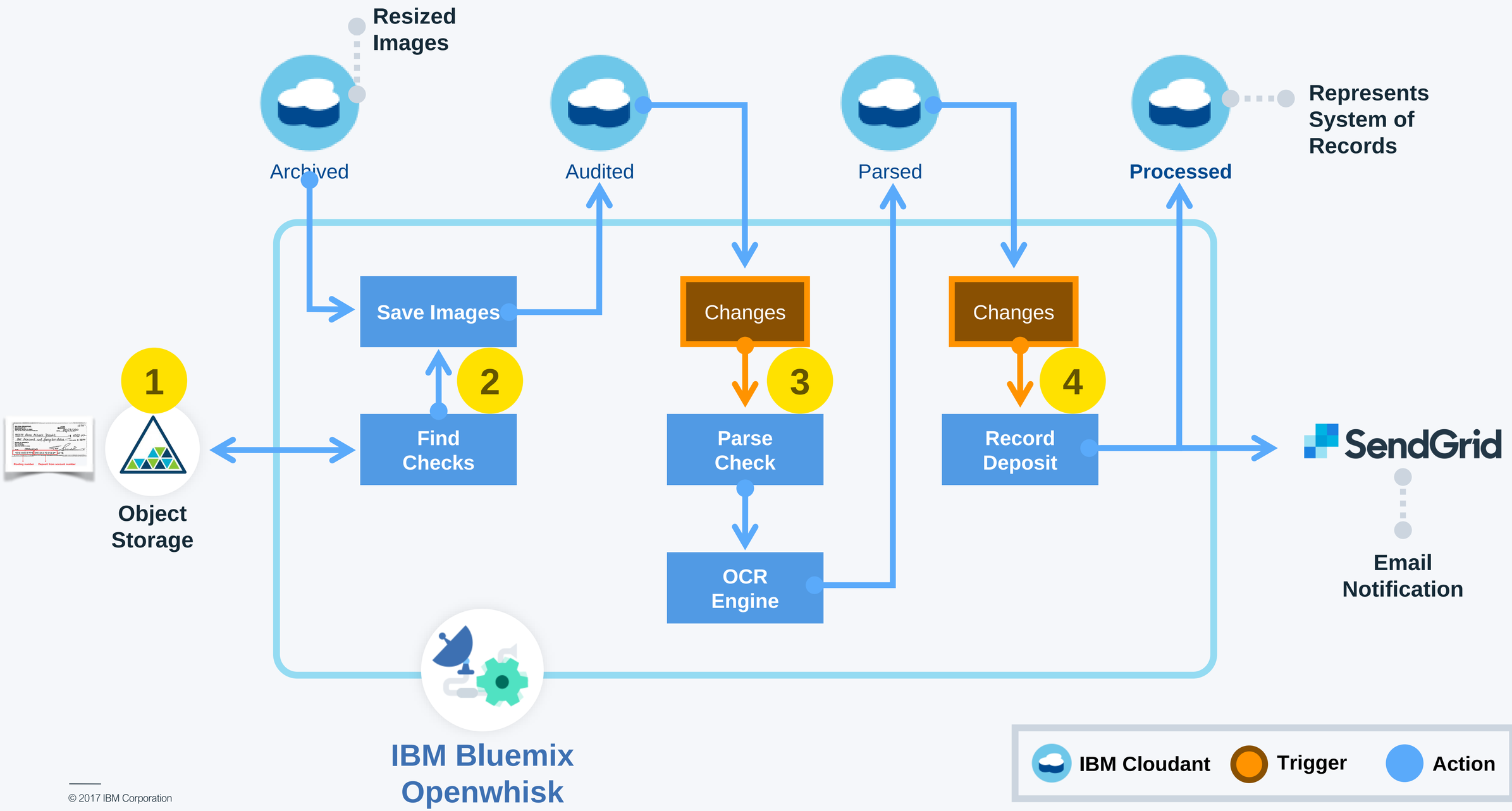


Santander

Less cost
<$2 for all paper checks processed within 1 year



Santander High Level Architecture



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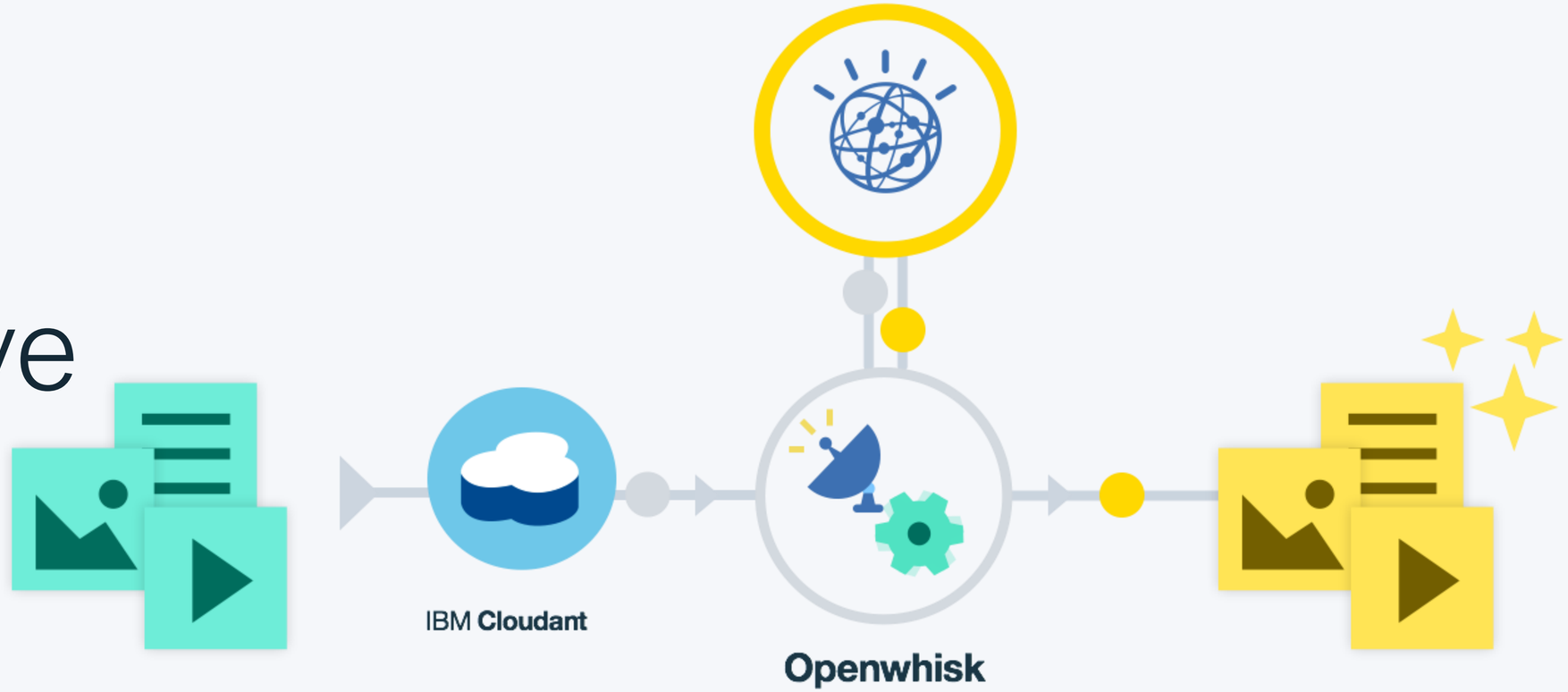
What is IBM Cloud Functions good for?

Cognitive



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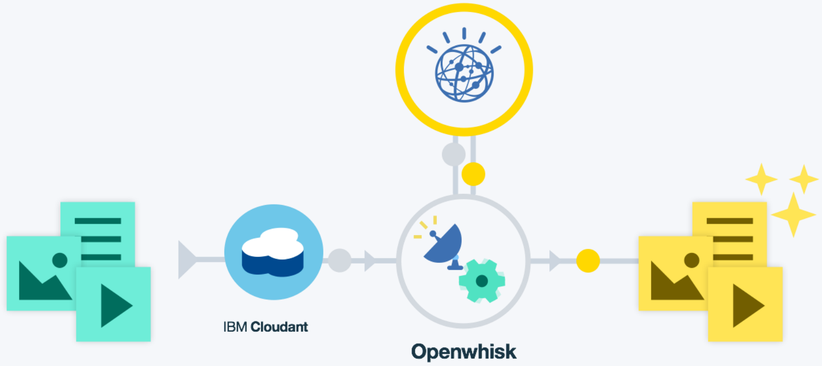
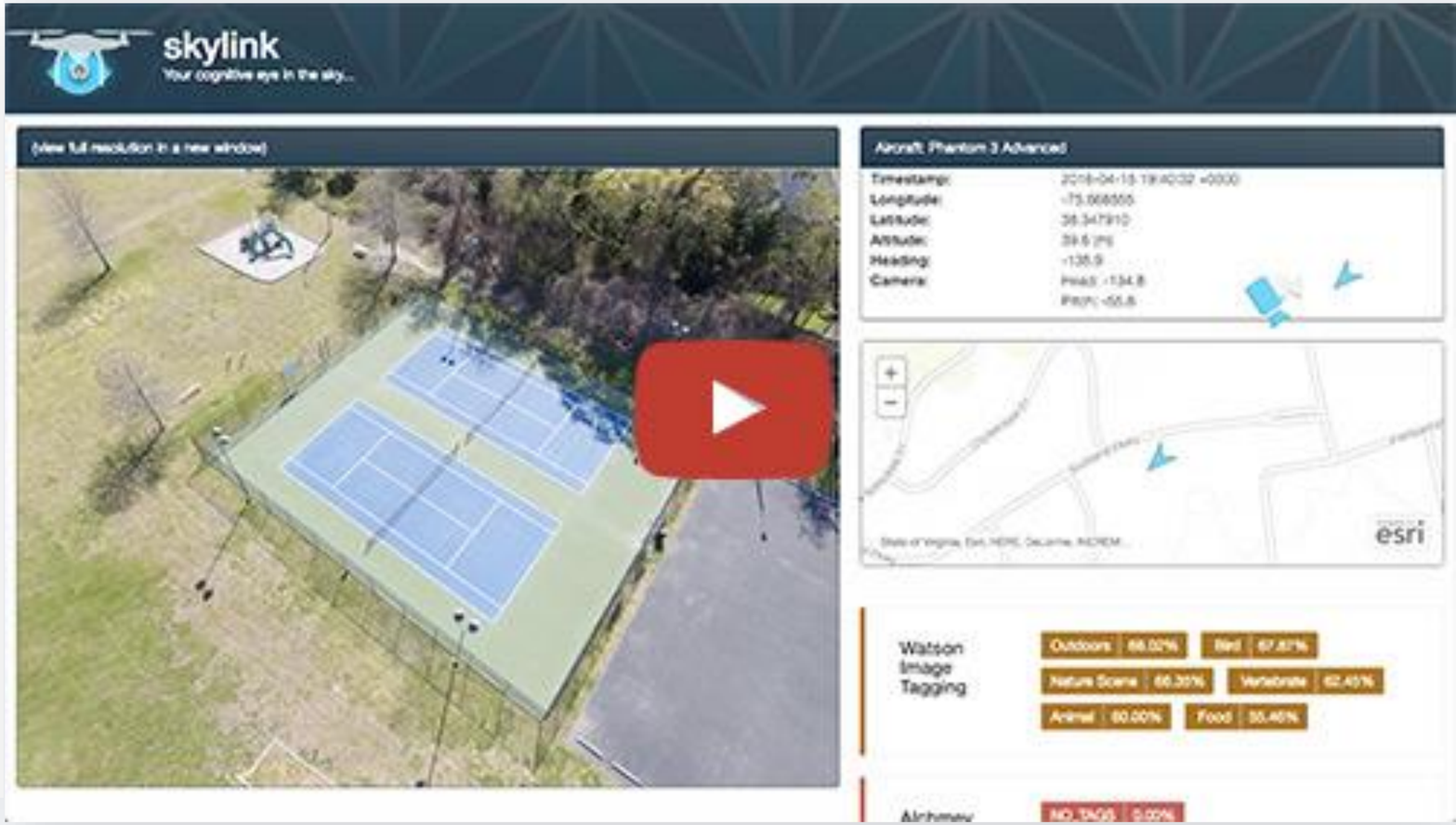
Cognitive



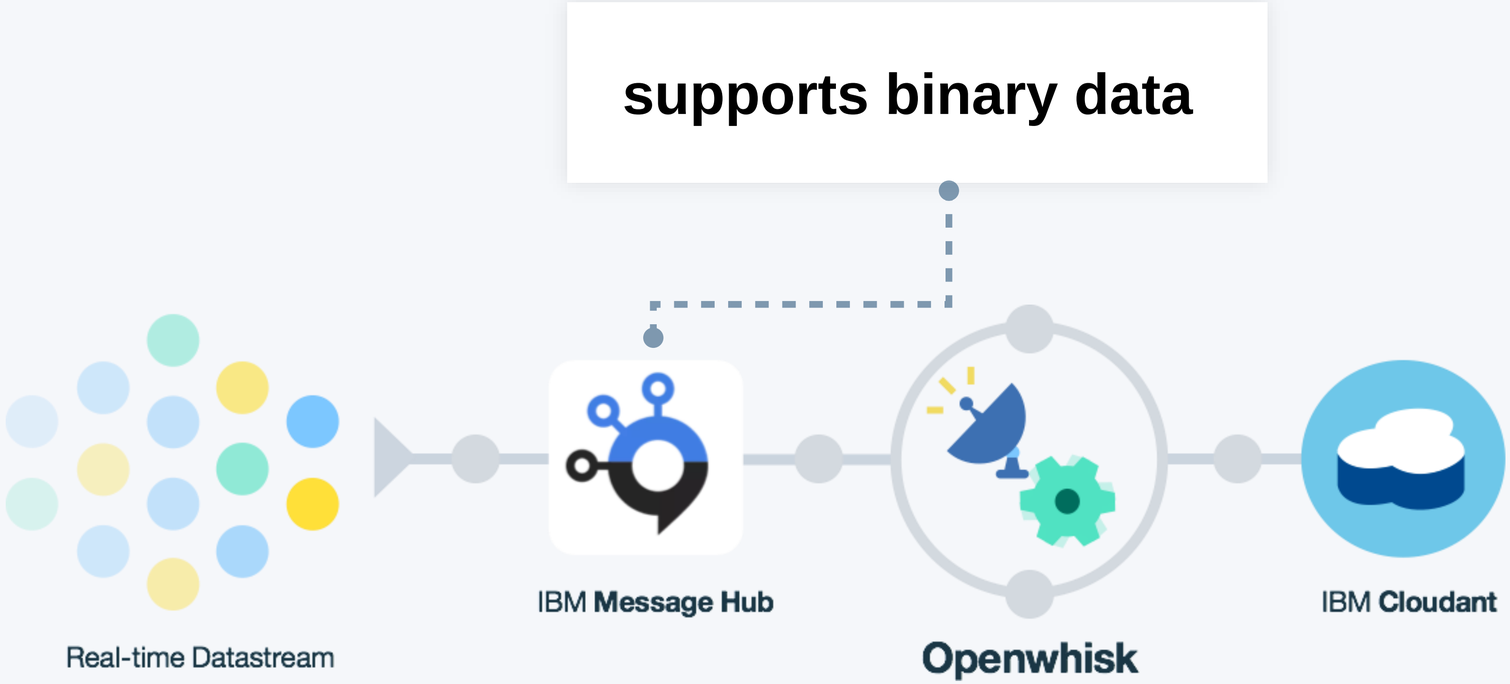
Skylink

https://github.com/IBM-Bluemix/skylink



Event processing/ Message Hub

Bluemix-managed Apache Kafka service for real-time build outs of data pipelines and streaming apps



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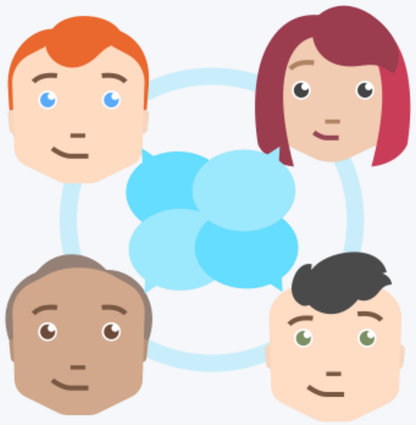
Learn more



Commercial offering home:
bluemix.net/openwhisk

Open-source offering home:
openwhisk.org

Slack:
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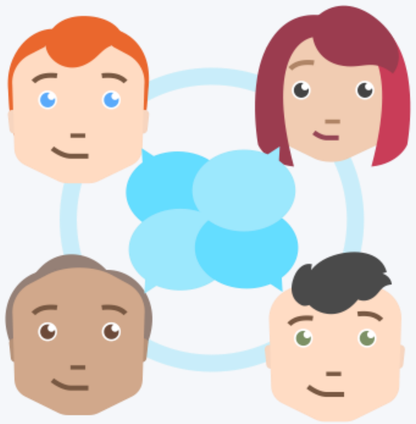

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