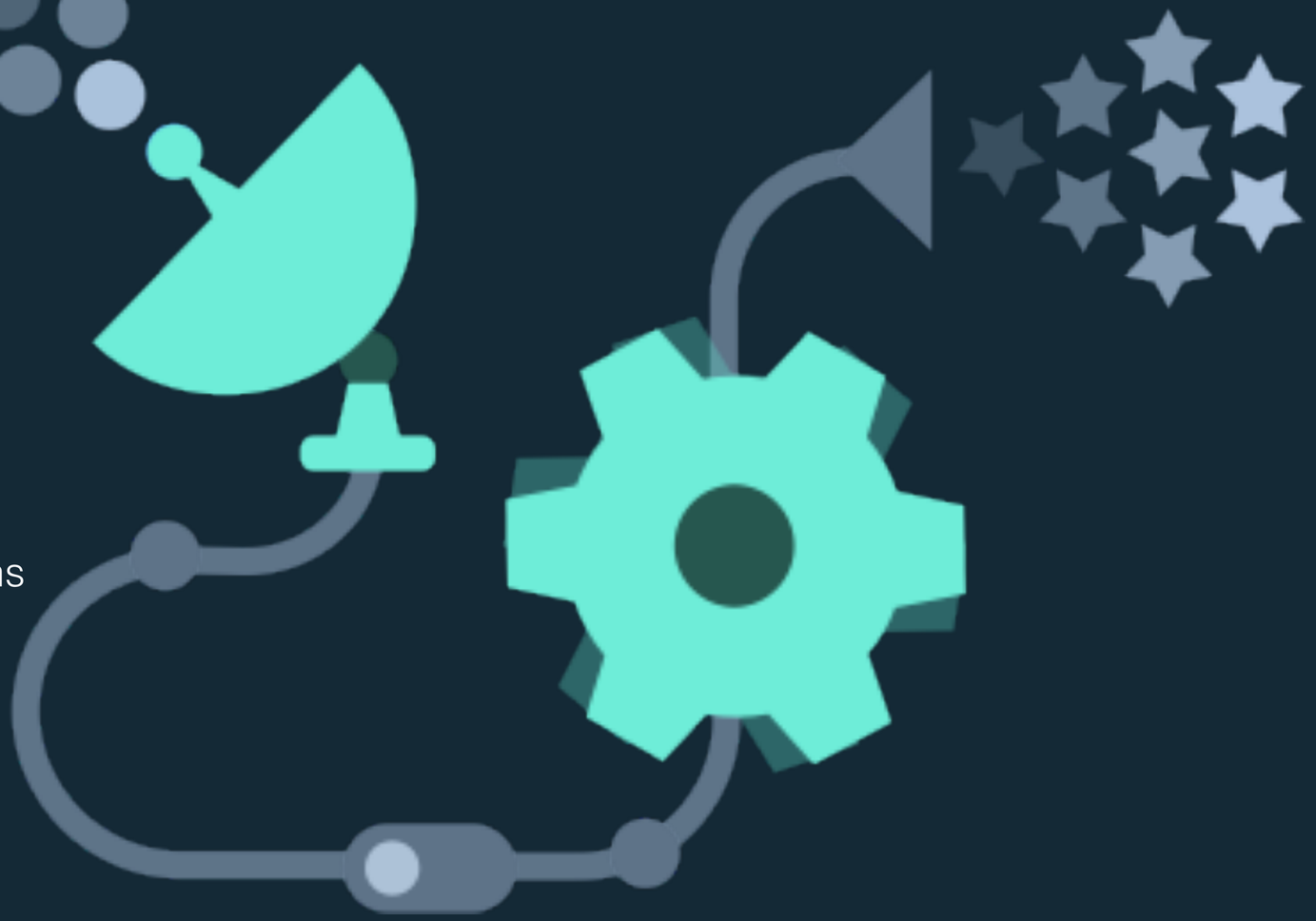
Serverless Computing: Customer Adoption Insights & Patterns

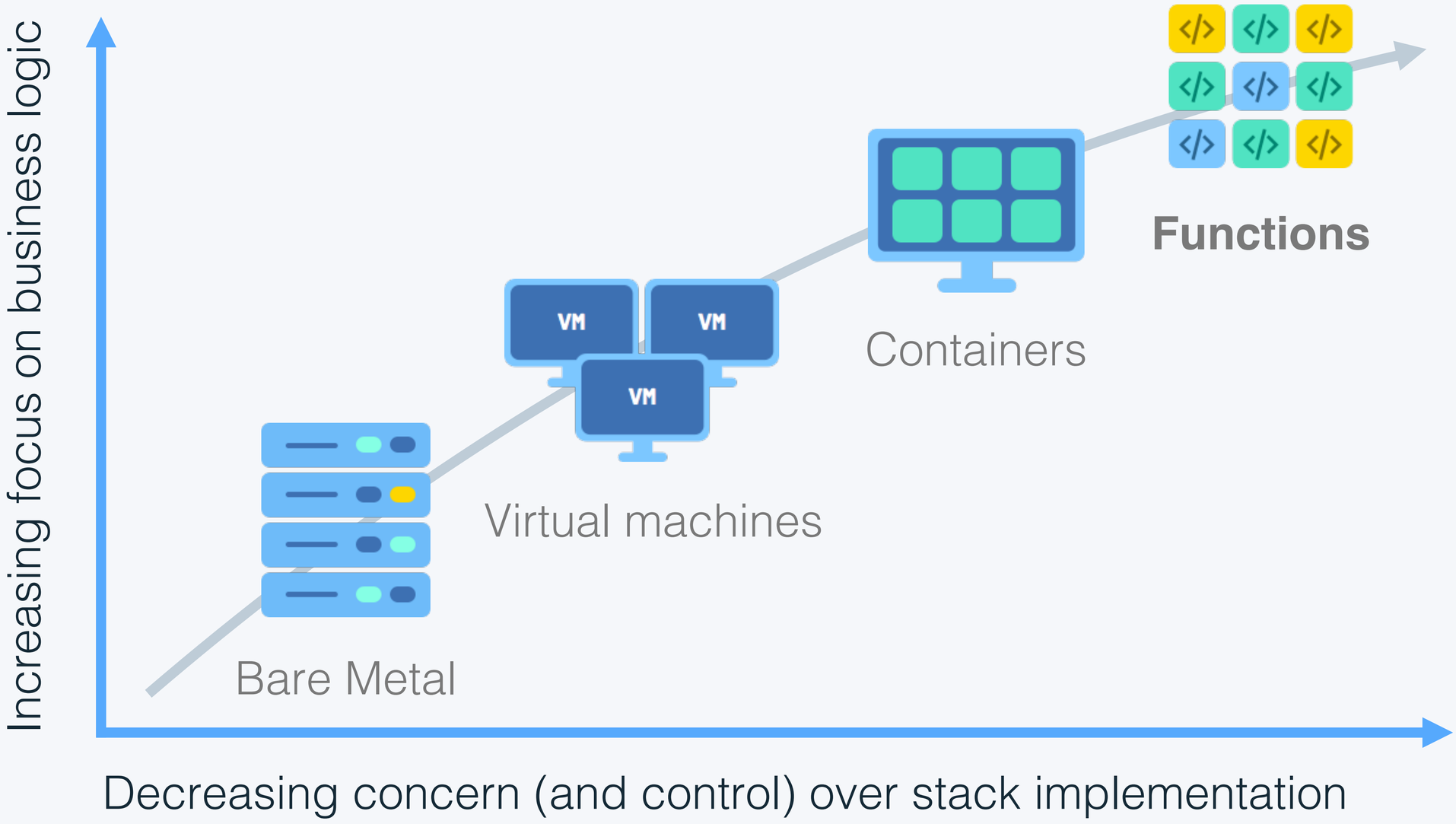


Michael Behrendt

IBM Distinguished Engineer
Chief Architect, Serverless/FaaS & IBM Cloud Functions

@Michael_beh

Evolution of serverless



Traditional model

Worry about scaling

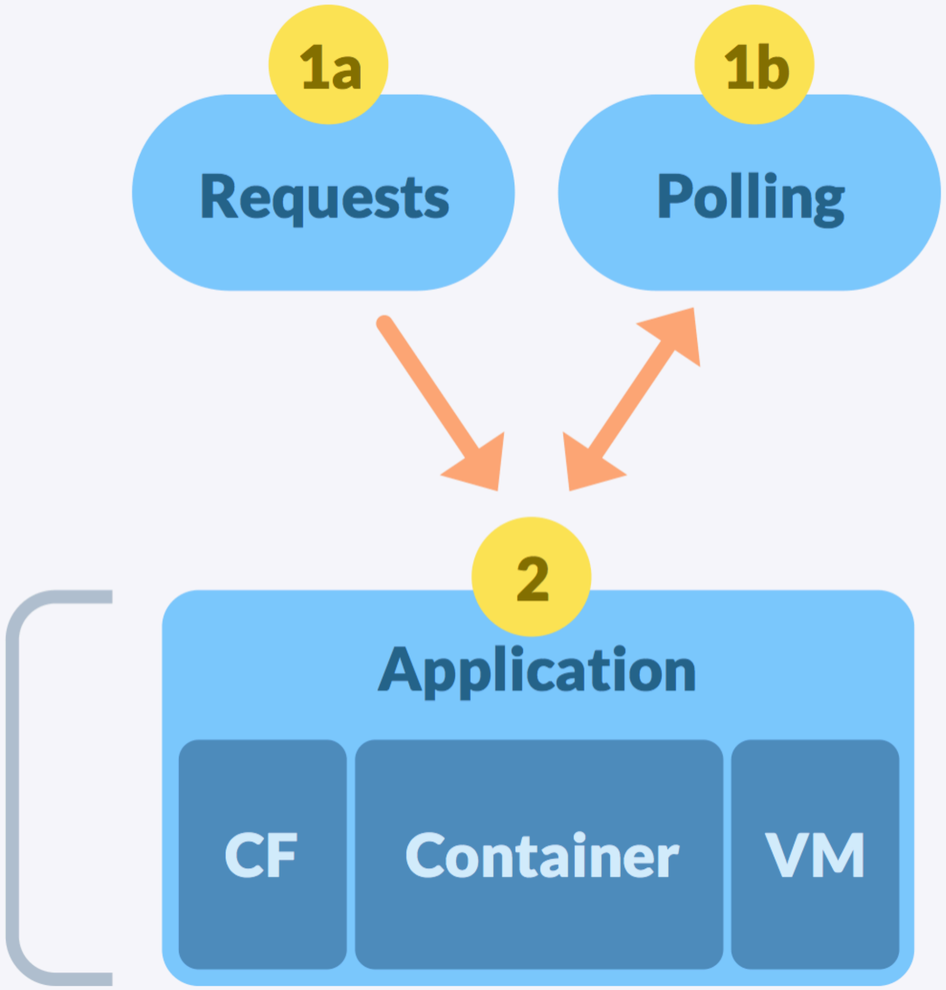
- When to scale? (mem-, cpu-, response time-, etc. driven?)
- How fast can you scale?

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



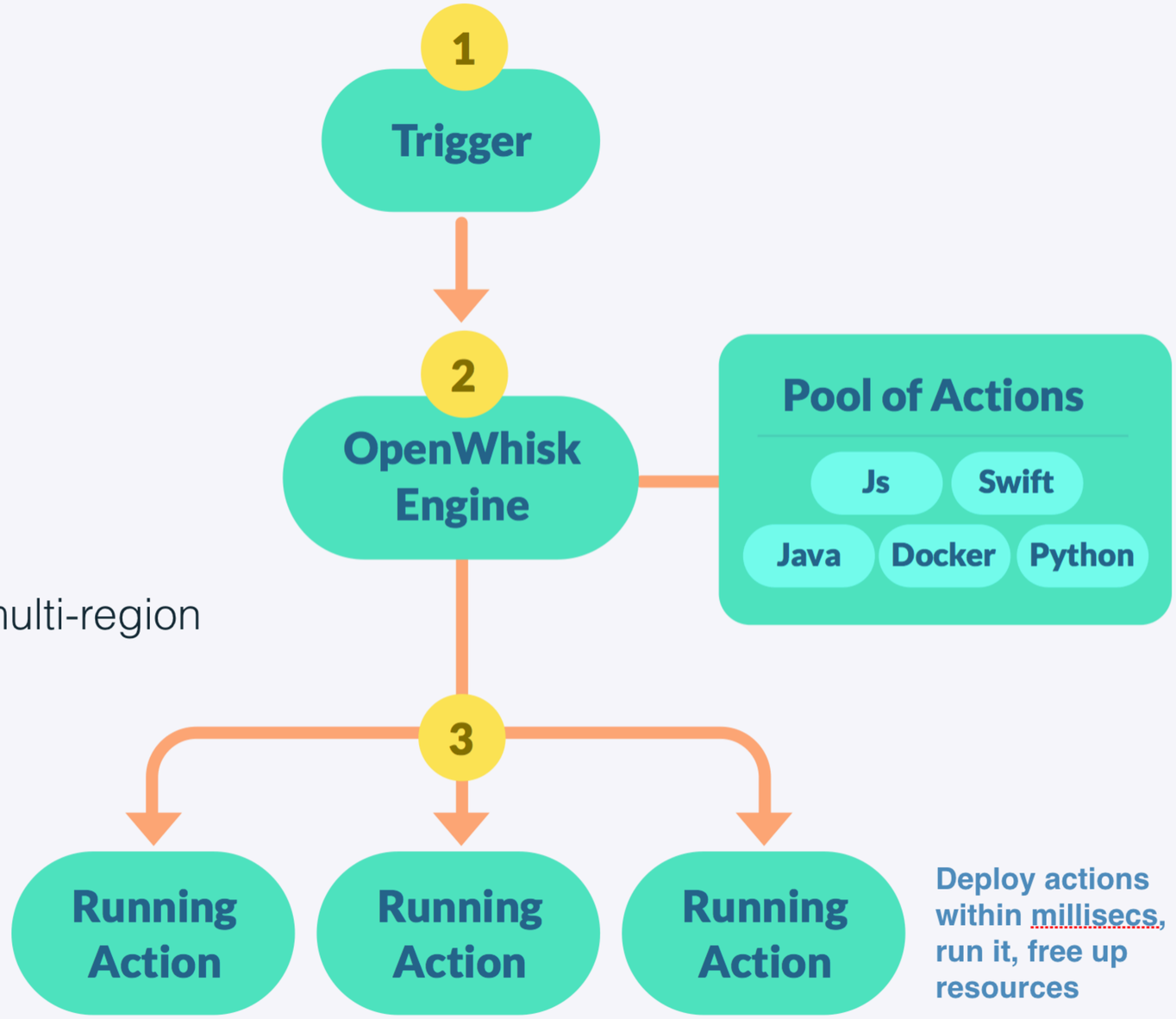
Serverless model

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

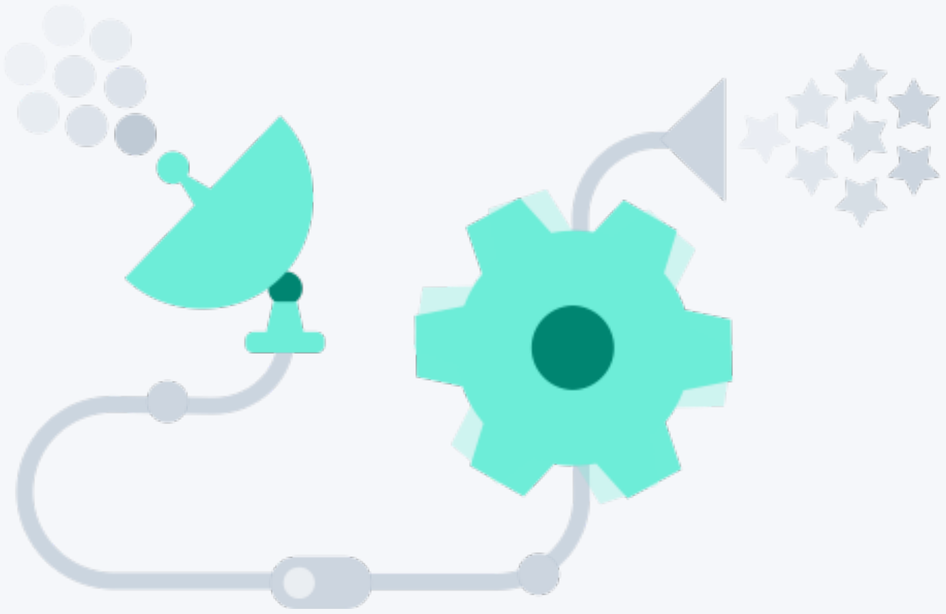
Charges only for what is used
- Only worry about code
  higher dev velocity, lower operational costs



FaaS platform to execute code
in response to events

Apache open source project:

openwhisk.org



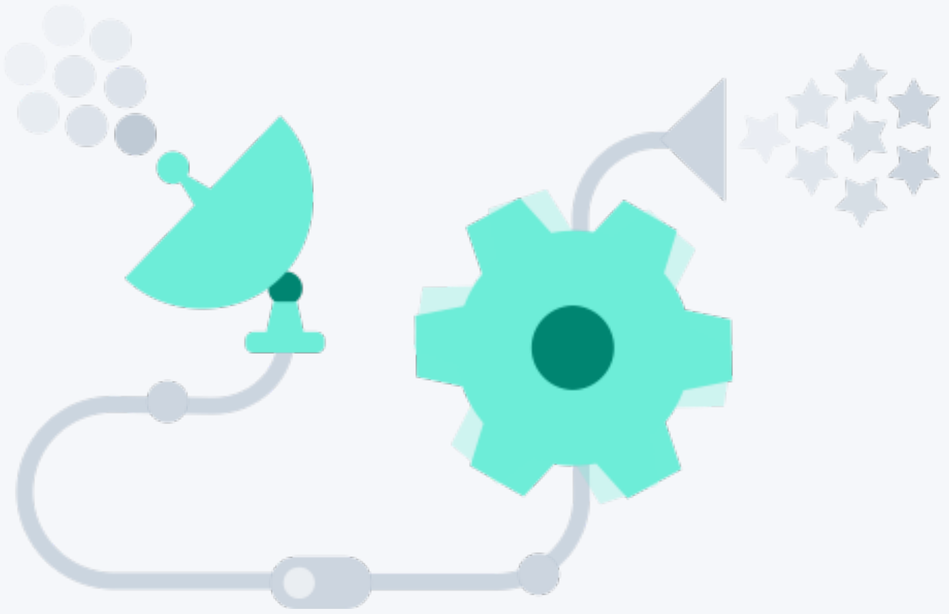
IBM Cloud **Functions**

FaaS platform to execute code
in response to events

IBM Cloud Functions:

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

bluemix.net/openwhisk



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

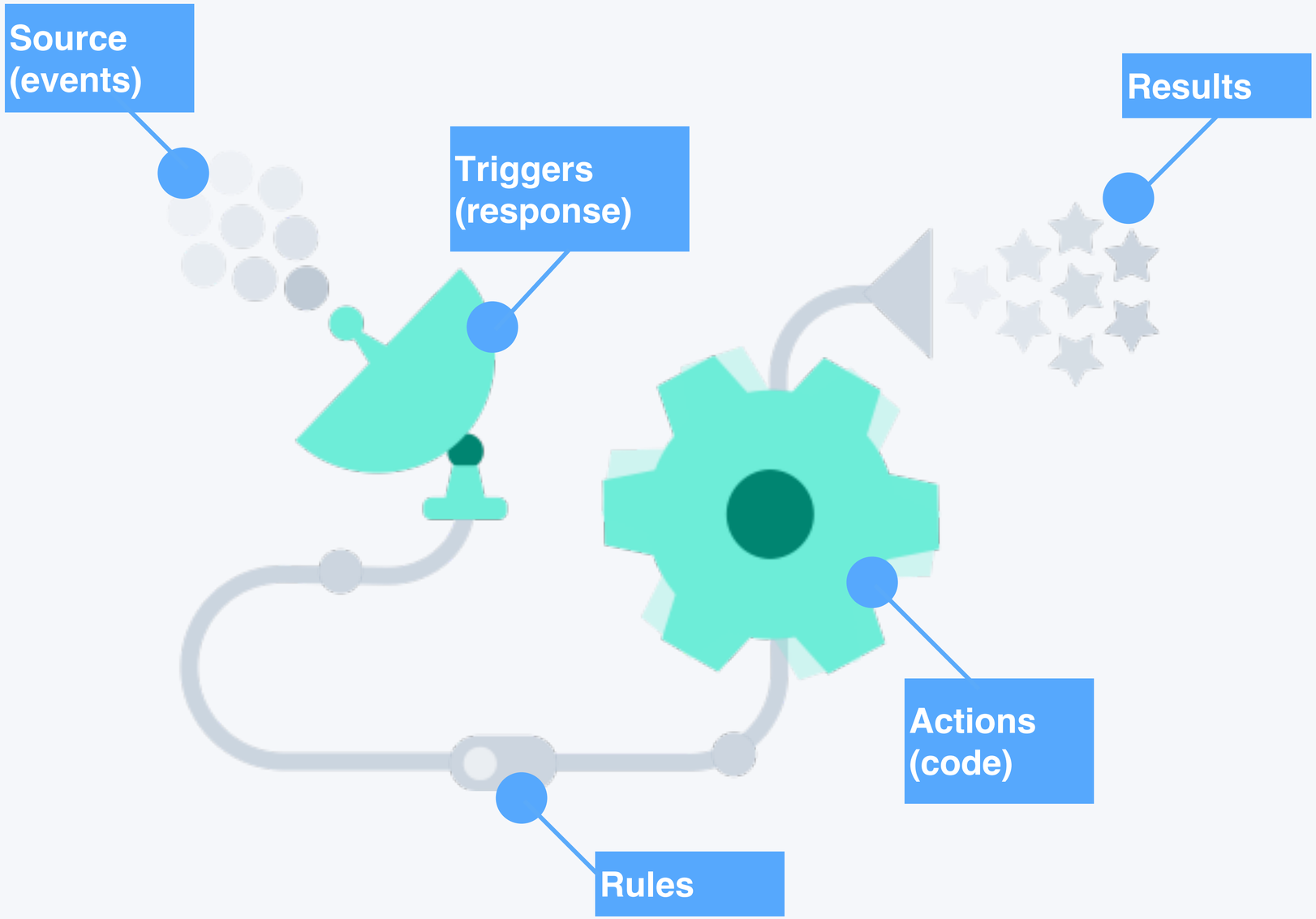
The Watson Data Platform

Cloud

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

IBM Cloud **Functions**

Concepts



IBM Cloud **Functions**

Supported Languages

Multi-language Support

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

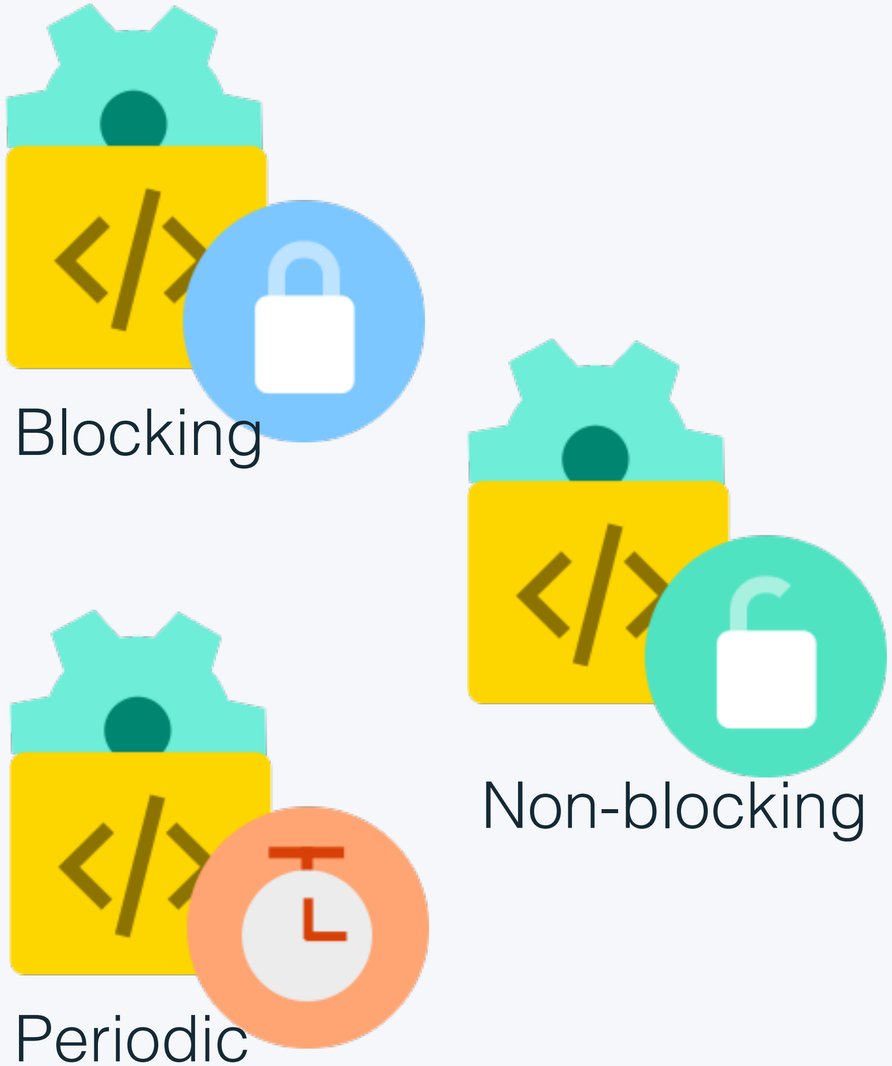
Community Efforts

- Haskell
- Scala
- ...

… and more to come

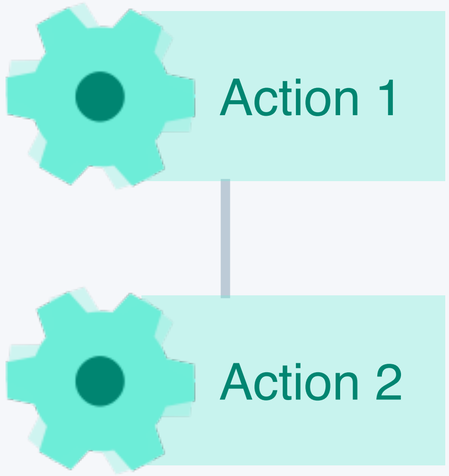
IBM Cloud **Functions**

Support for different invocation models

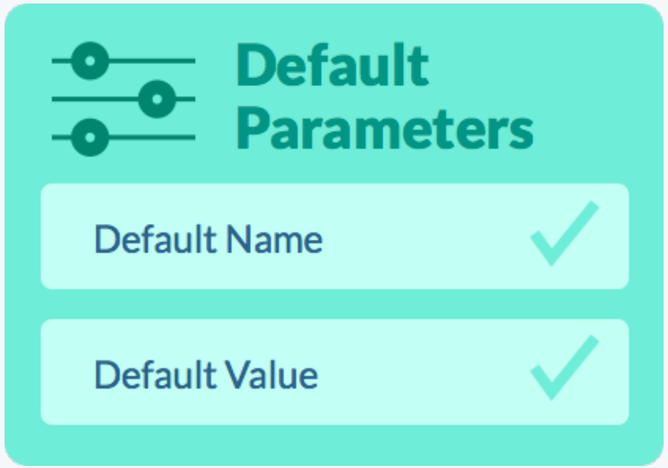


IBM Cloud **Functions**

Supports higher-level programming constructs



Chaining/
Sequencing



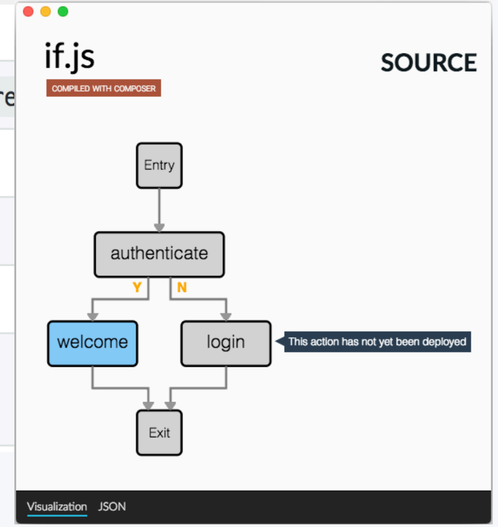
Parameter
Binding

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')`



IBM Cloud **Functions**

Event Provider

Periodic

IBM **Cloudant**

Message Hub

Mobile Push

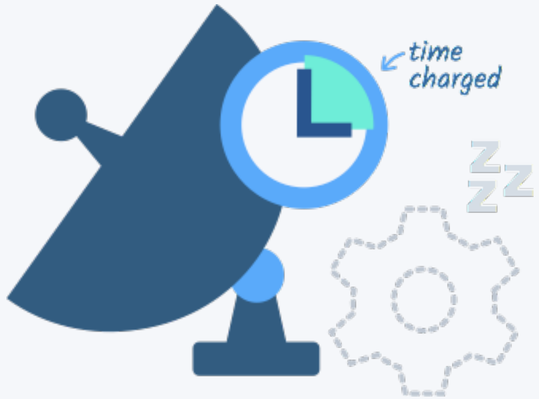
Github

IBM App Connect

IBM Cloud **Functions**

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.



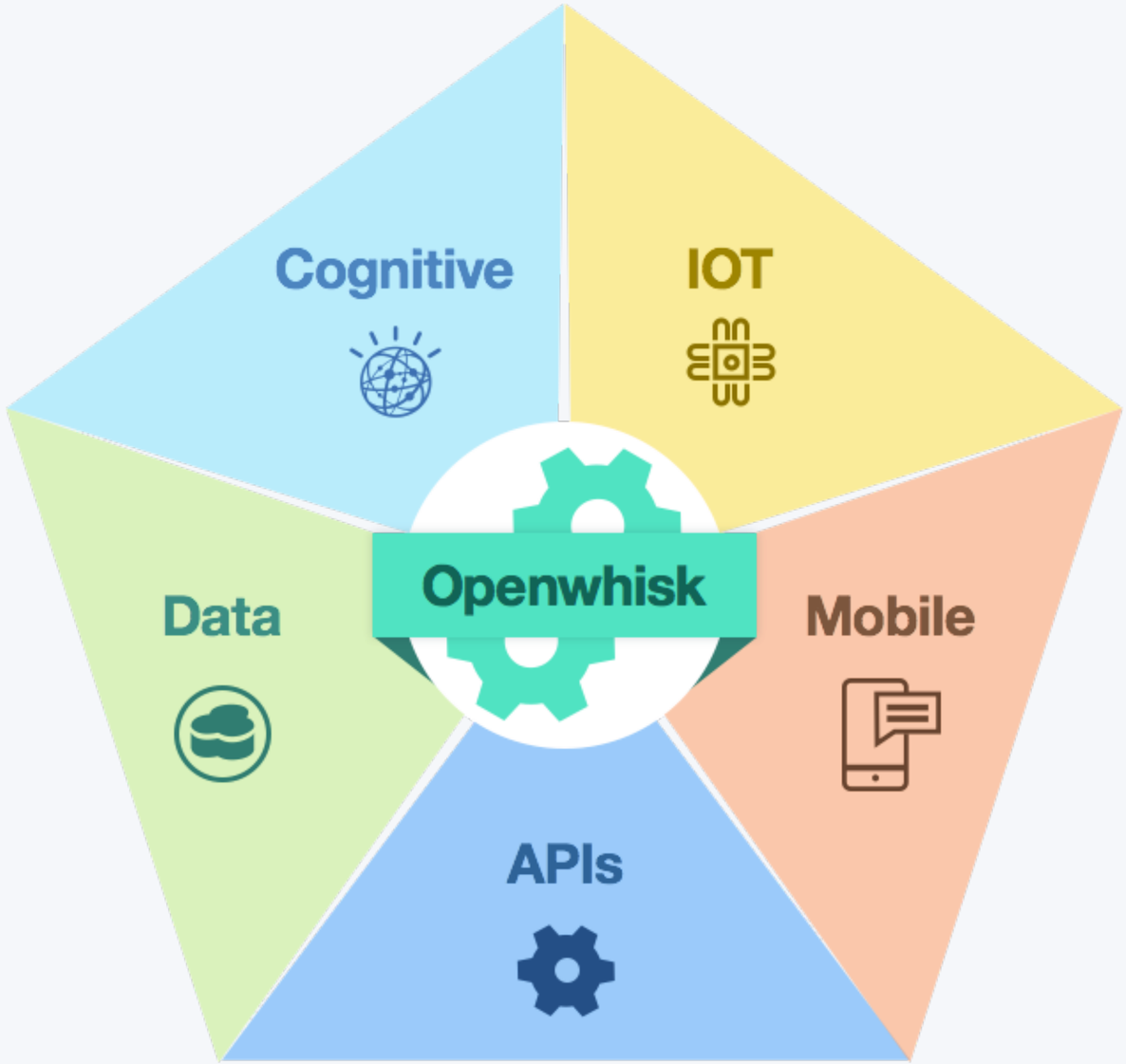
IBM Cloud **Functions**

Reduce Costs

Time an action was running
* memory allocated to action

$ 0.000017 per GBs
Free tier: 400000 GBs

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



Customers and Partners

Clients

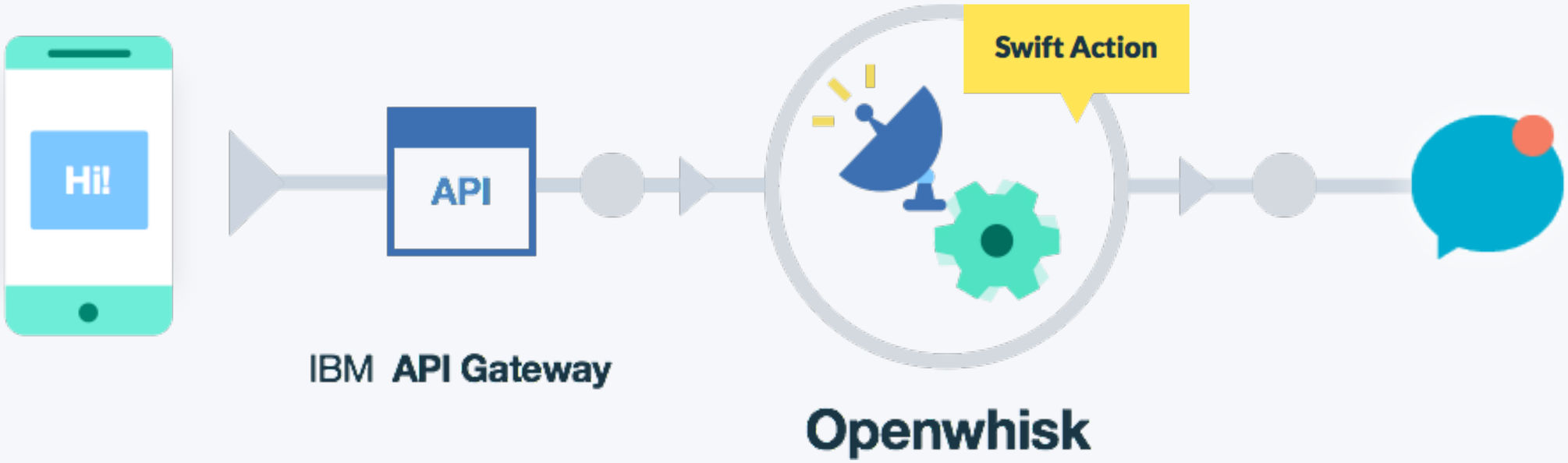
SiteSpirit
Santander
articoolo
AbiliSense
BIGVU
POCKET TV STUDIO
GreenQ
Making Garbage Trucks Smarter
MAGENTIQ
SEE BEYOND THE VISIBLE
The Weather Company
ADVISOR CONNECT

Partners

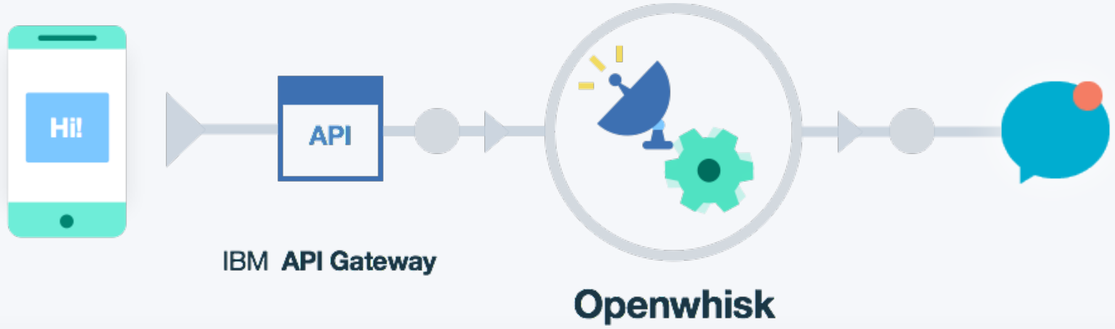
Adobe
THE APACHE SOFTWARE FOUNDATION
ALTOROS™
nepente
ARTESANATO DE SOFTWARE
Miracle Systems
SWAGGERhub
PubNub
redhat

Mobile backend

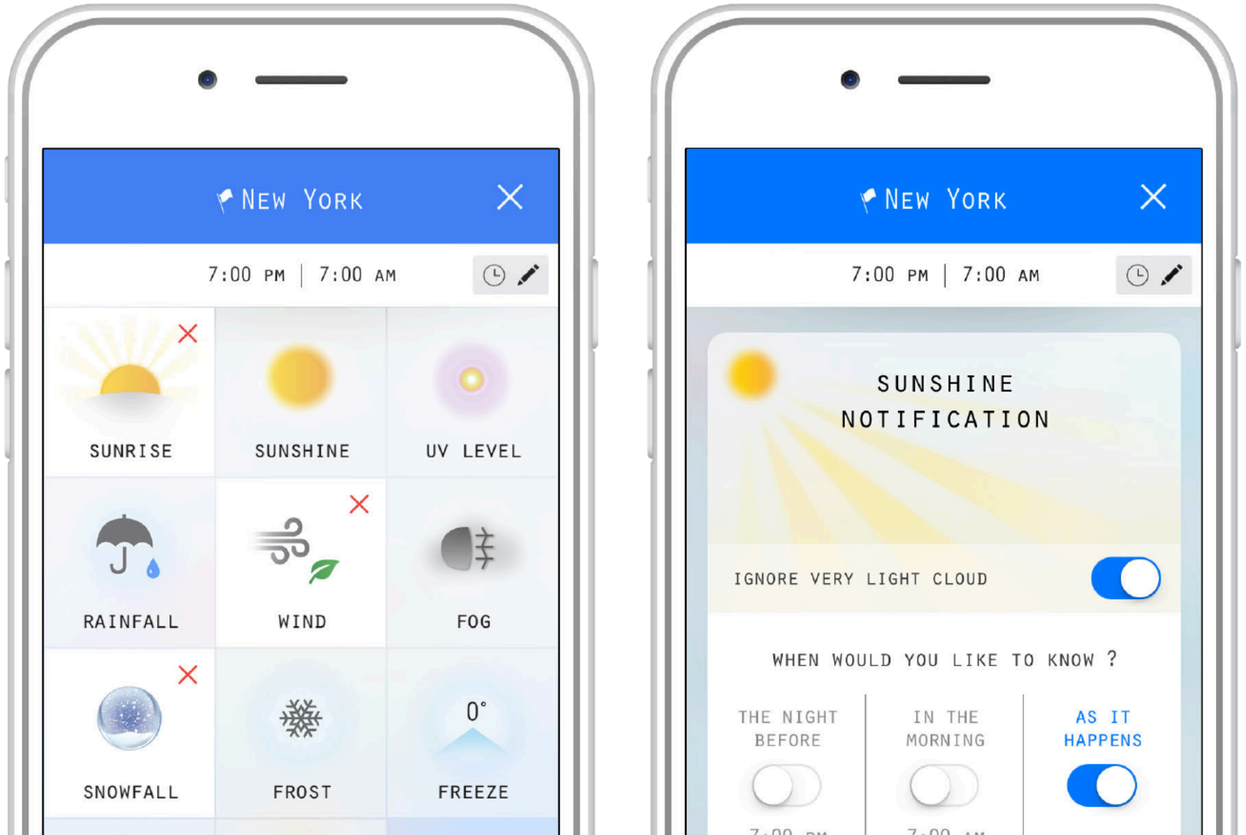
Outsource compute-intensive tasks to a powerful & scalable serverless platform and implement your actions even without changing the programming language.



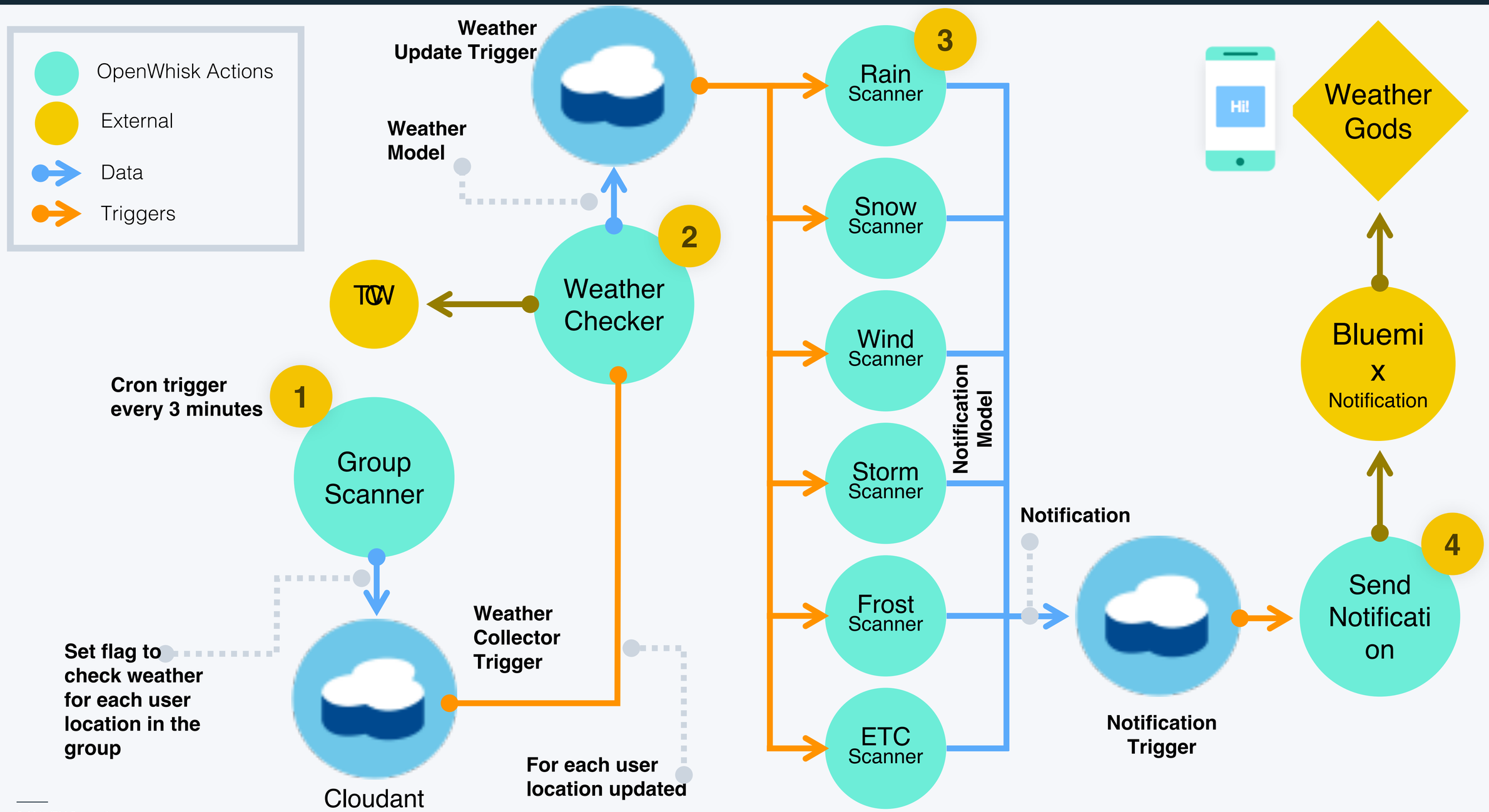
Mobile backend



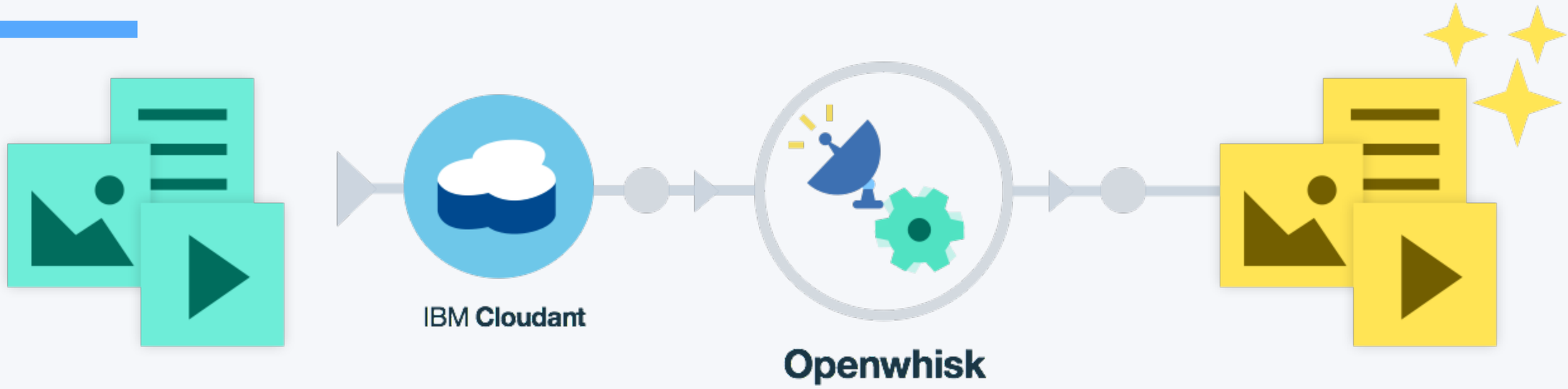
The Weather Gods
https://itunes.apple.com/us/app/weather-gods/id1041512978?mt=8



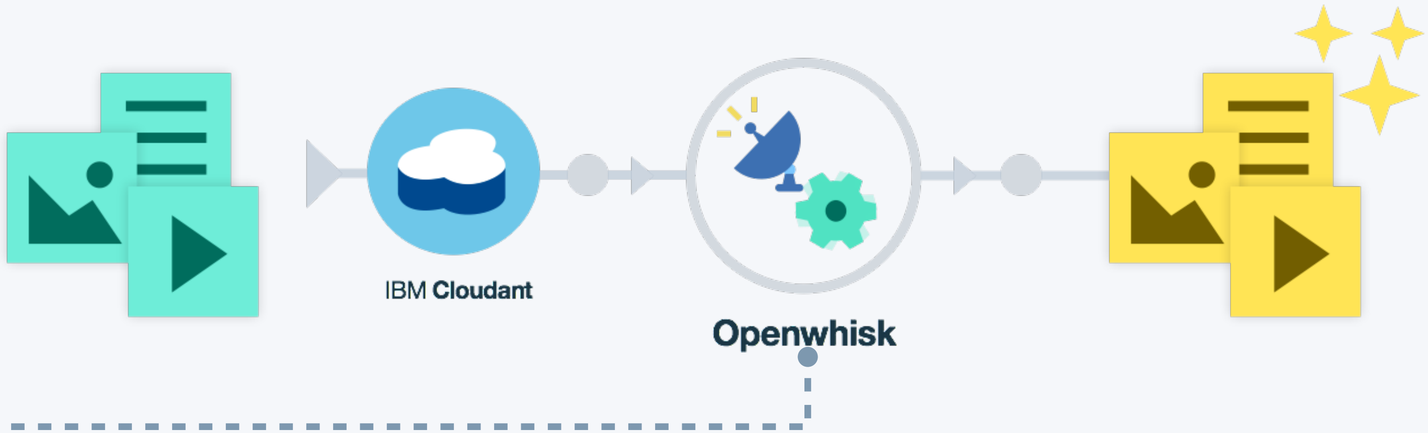
The Weather Gods High Level Architecture



Data processing



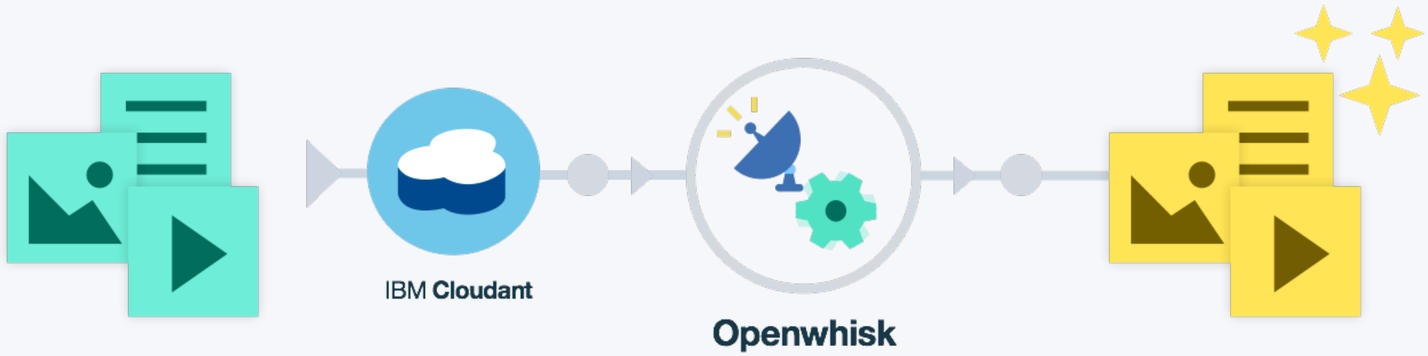
Data processing



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
…

Data processing

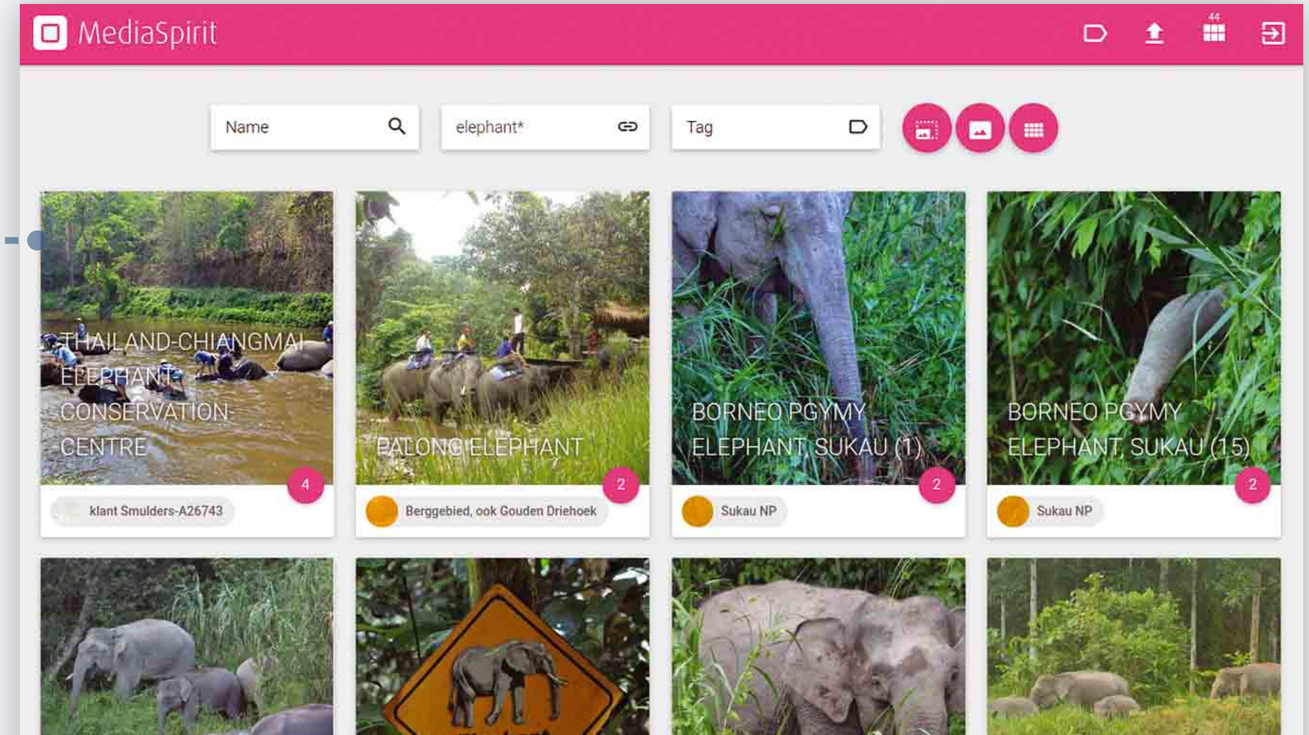


SiteSpirit

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

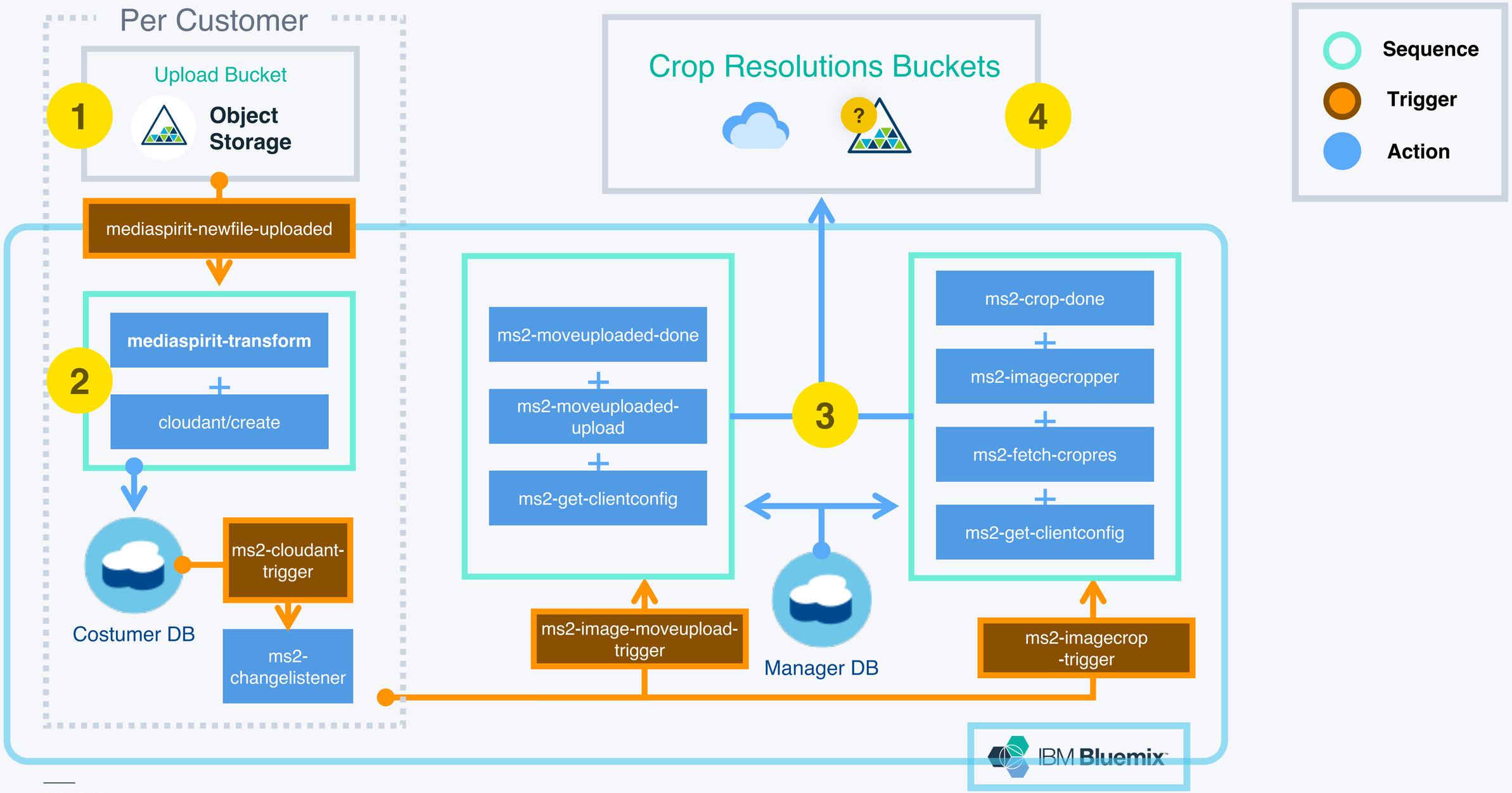
10x faster

90% less cost

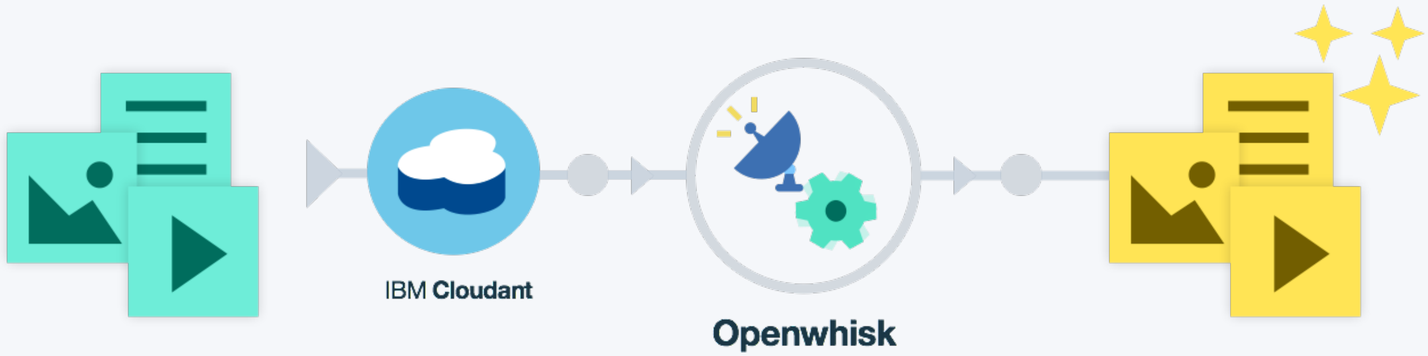


SiteSpirit High Level Architecture

IBM Cloud **Functions**

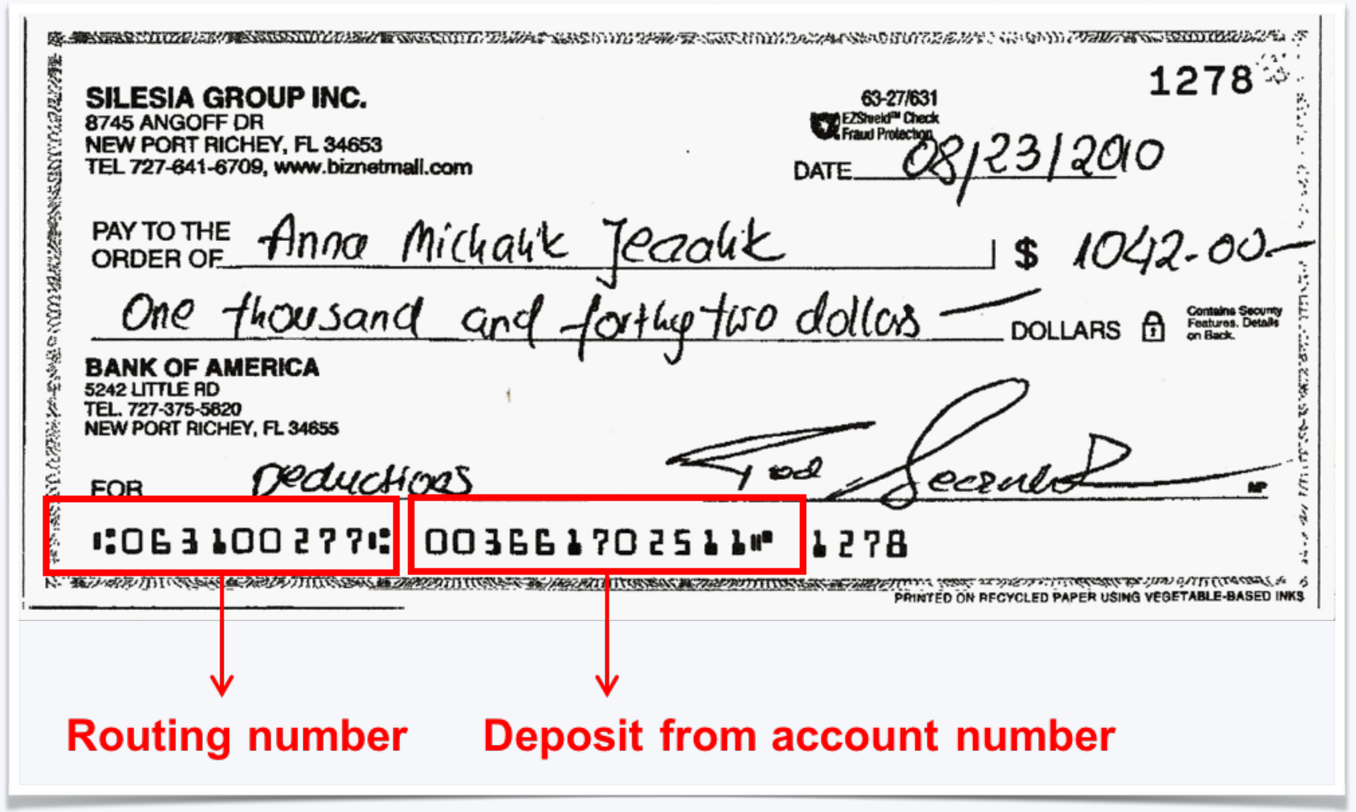


Data processing



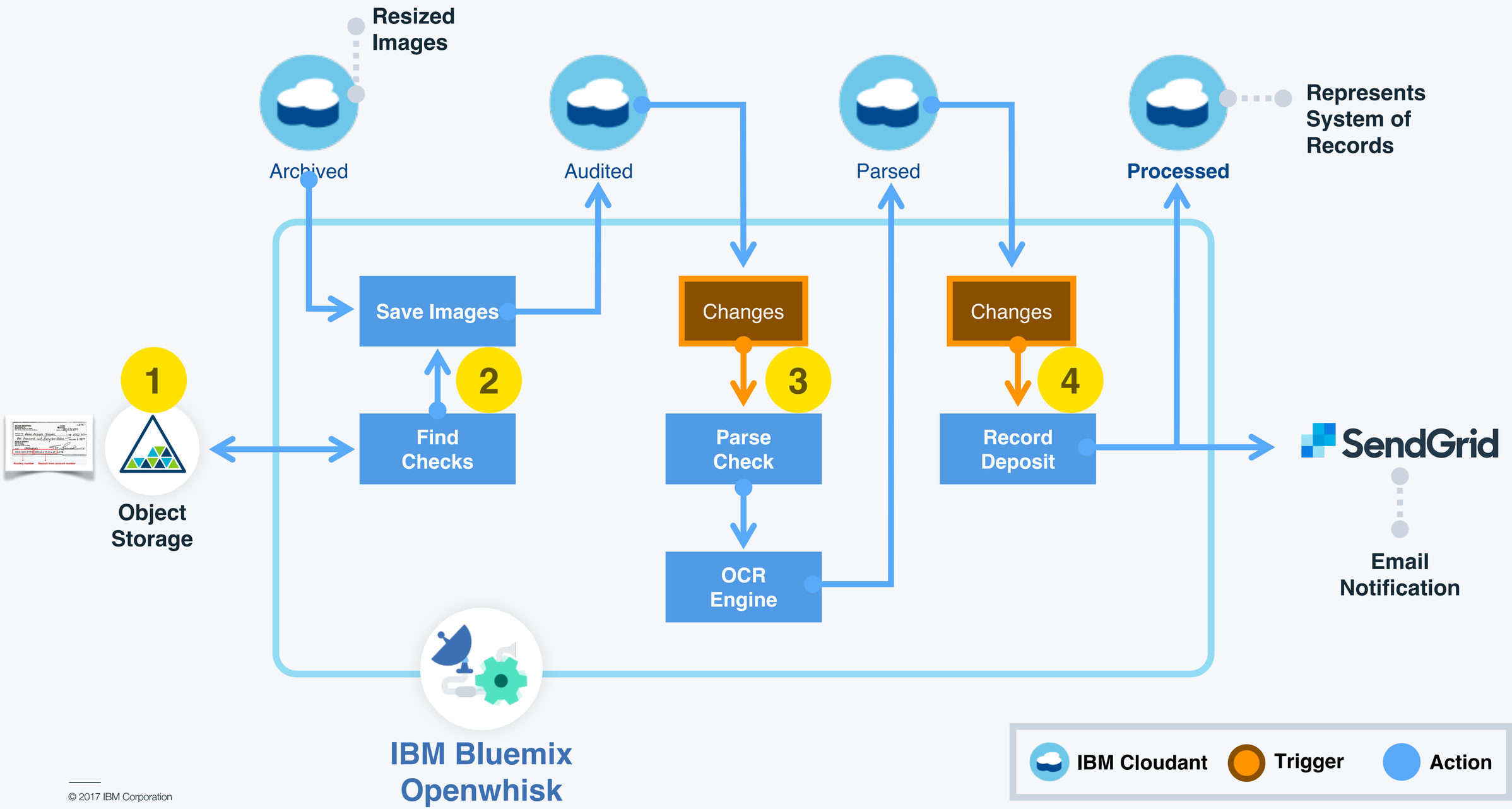
Santander

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



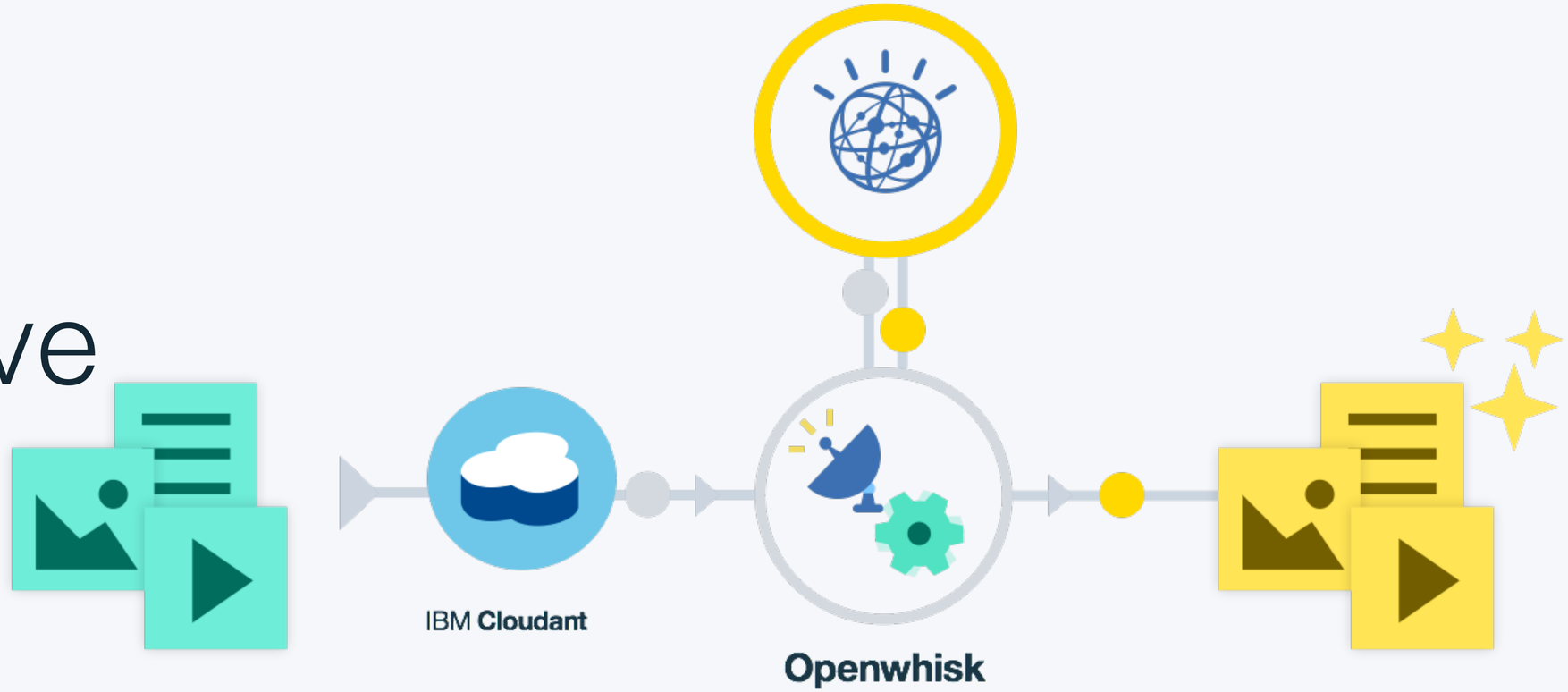
Santander High Level Architecture

IBM Cloud **Functions**

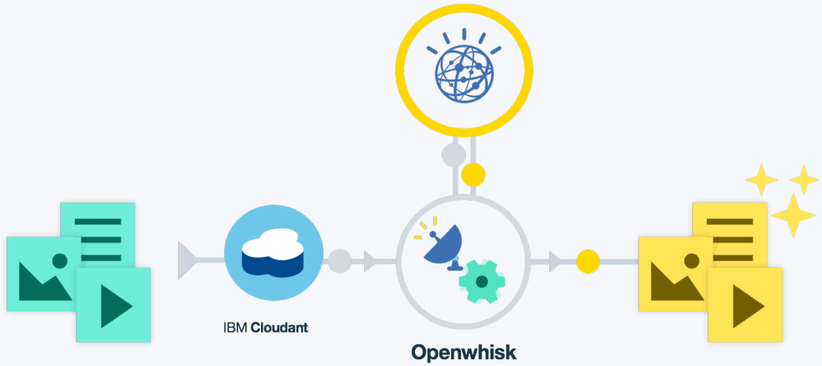


What is IBM Cloud Functions good for?

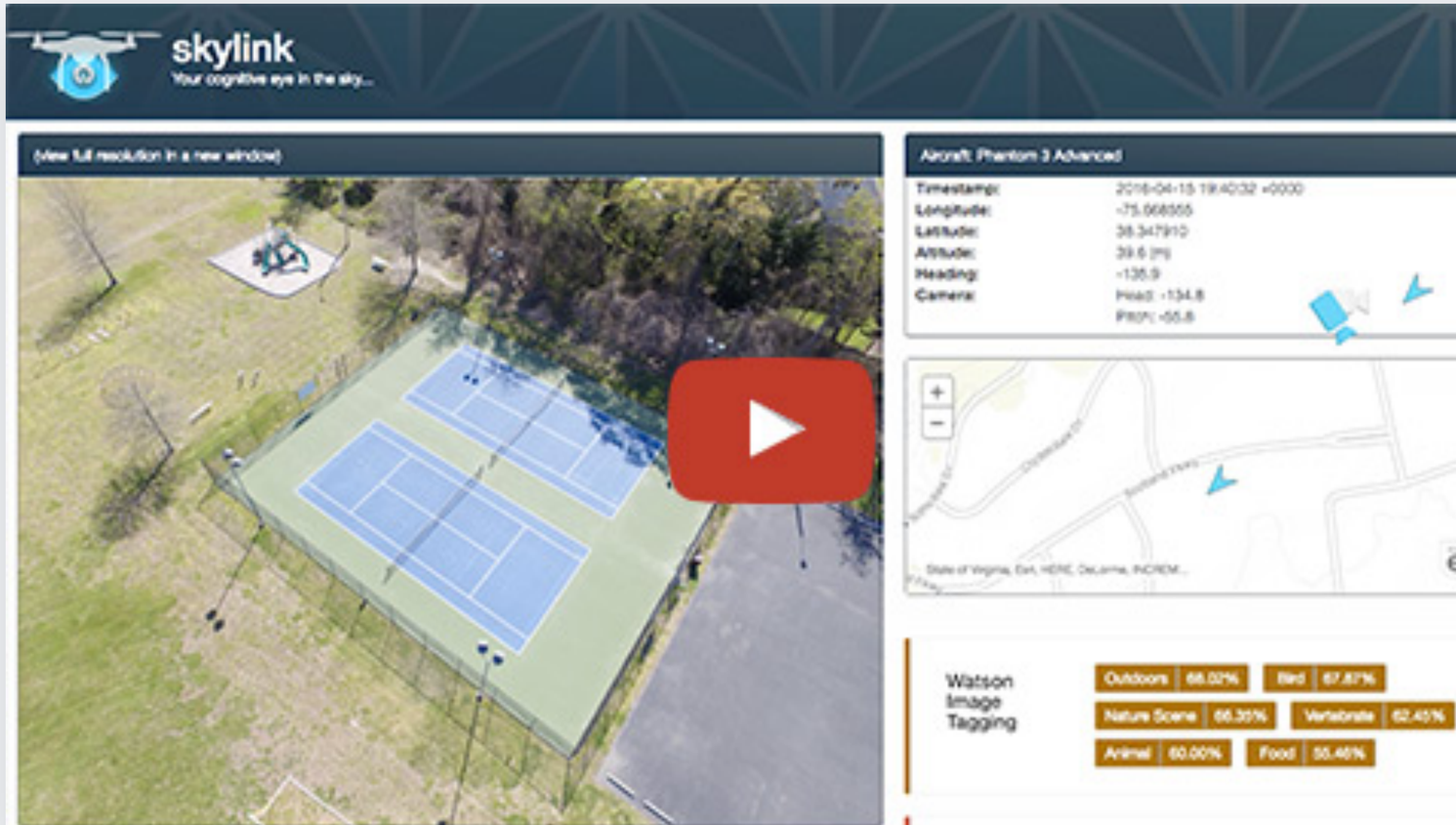
Cognitive



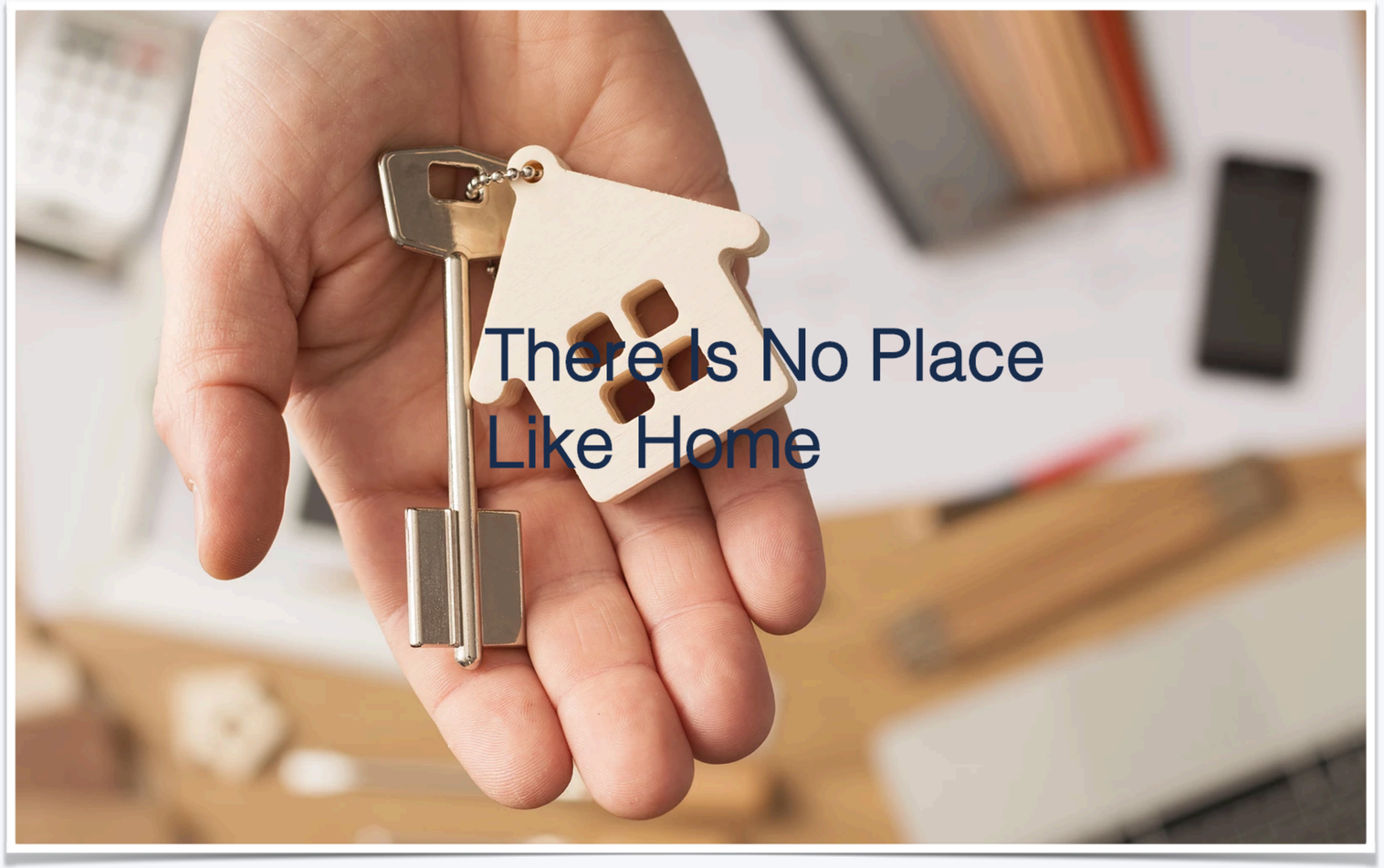
Cognitive



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

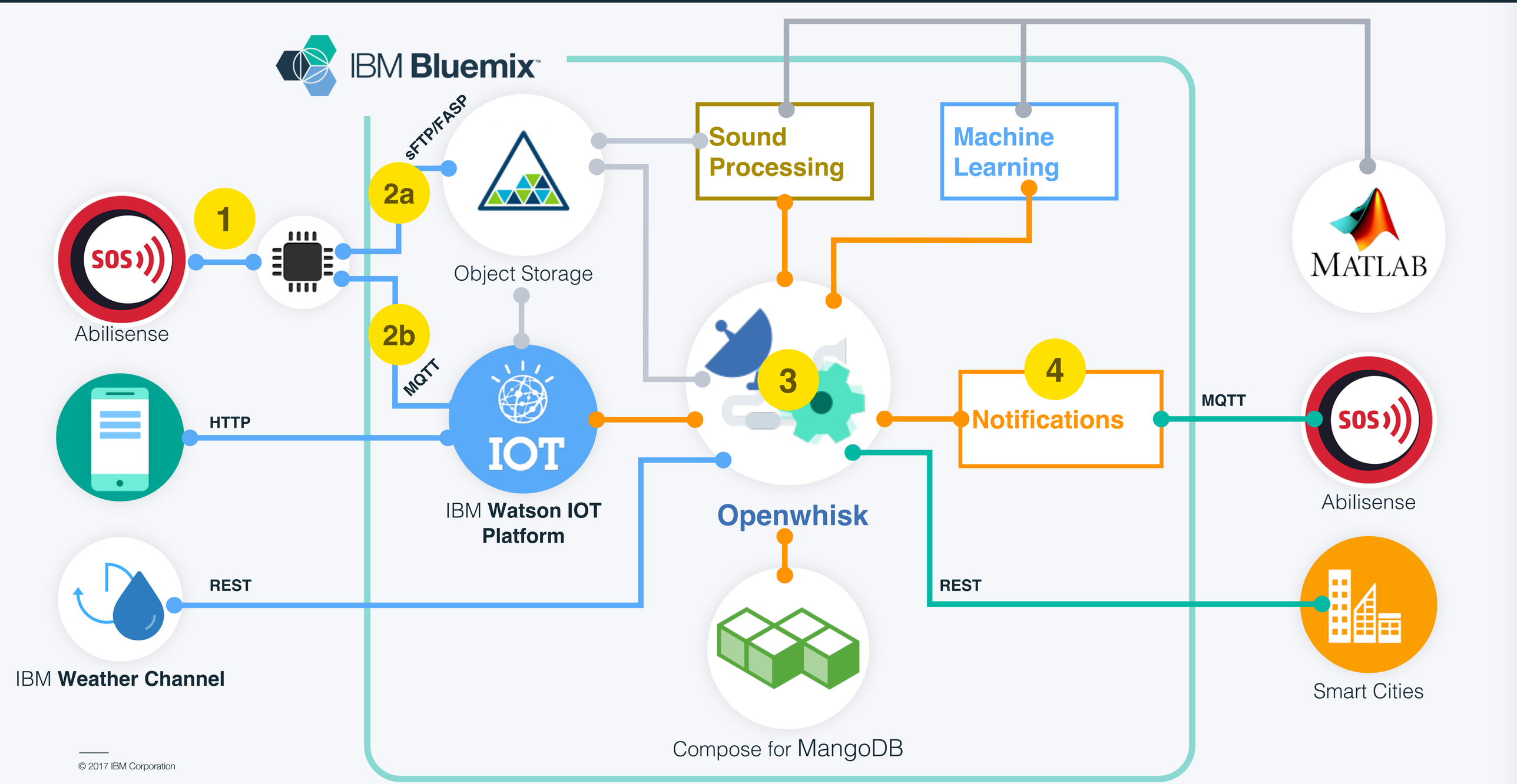


Abilisense
https://www.abilisense.com/



Abilisense High Level Architecture

IBM Cloud **Functions**



Abilisense

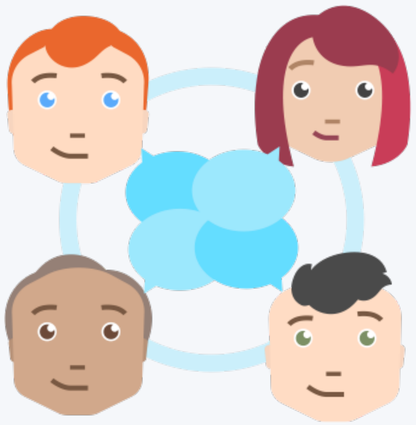
Assumptions		
Home Devices	**1.000**	**Un.**
Avg. Sound File Size	**1**	**MB**
Avg. Number of Sound Readings	**10**	**Monthly**
IoT Reading Frequency	**1**	**Hourly**
IoT Recording Data Size	**2**	**KB**
Weather Data Reading Frequency	**1**	**Hourly**
Weather Data Reading Size	**2**	**KB**
Weather Data Total Capability	**1.41**	**MB**

Assumptions	
Runtime Action per Millisecond	**5**
Memory MB	**512**
Number of Executions	**5,000,000.00**
Monthly Cost	**$14.45**

Potential research areas

- Problem determination for apps with a large number of actions
- Latency reduction
- Density increase
- State handling
- Building complex apps
- …

Learn more

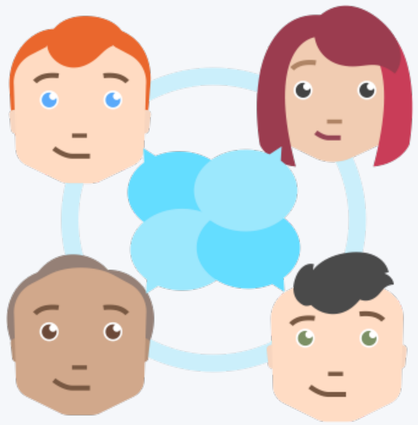


Commercial offering home:
bluemix.net/openwhisk

Open-source offering home:
openwhisk.org

Slack:
slack.openwhisk.org

Learn more



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Medium **medium.com/openwhisk**

Slideshare **slideshare.net/OpenWhisk**

Youtube **youtube.com/channel/UCbzgShnQk8F43NKsvEYA1SA**

Thank you