

IOT and Home Automation



Serverless Computing

SERVERLESS DAYS 2019

JAIPUR, INDIA

@Sonal Raj



Hi, I'm Sonal ...

- .. I do a lot of open source work
- .. graph databases, real time processing enthusiast
- .. Bachelors in CS, masters in IT and 3 quarters of an MBA
- .. Python and I share 10 years of friendship
- .. Pursue research in education technology of late
- .. Part time author and blogger
- .. Founder @ One Delta Labs

**... and here
is where you
can find me**

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www.sonalraj.com



What's the plan for this
hour?

SERVERLESS DAYS 2019

I Internet of Things

What makes up IOT?

S Serverless

General Serverless Trends

D Ideas

What lies ahead?

Z Python

How python integrates Serverless & IOT?

C Create

Create a serverless app??



Proximity to a surface

Can listen to what you say

See things in front and behind it.

Transfer Info over a wireless network



Your location

Your state of motion and direction

Orientation of the device

Ambience or light in the room



Raspberry Pi 3B+



Arduino



PLC / PAC



What does a simple IOT setup look like?











- ✖ Internet Enabled
- ✖ Support Digital Assistants
- ✖ Smart Phone Controls
- ✖ Programmable APIs

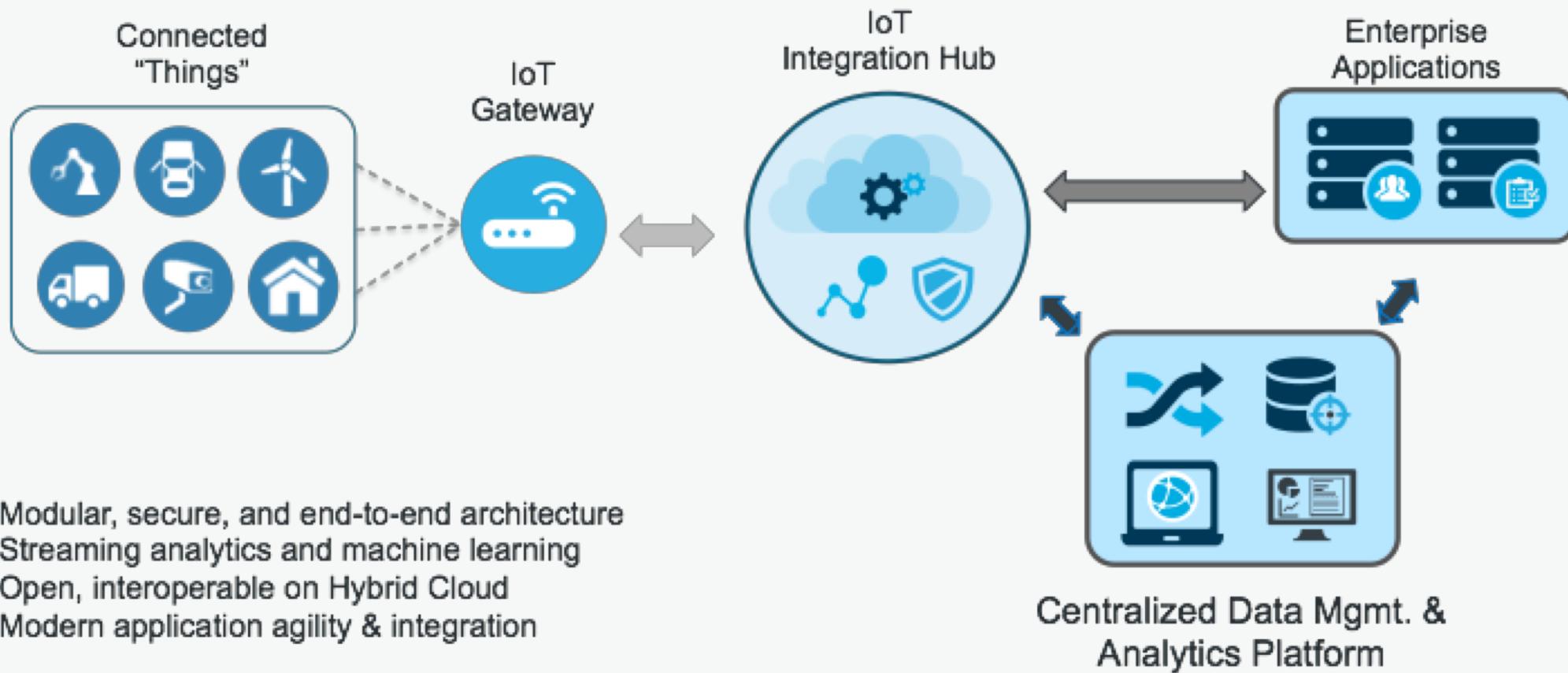


Google Drive

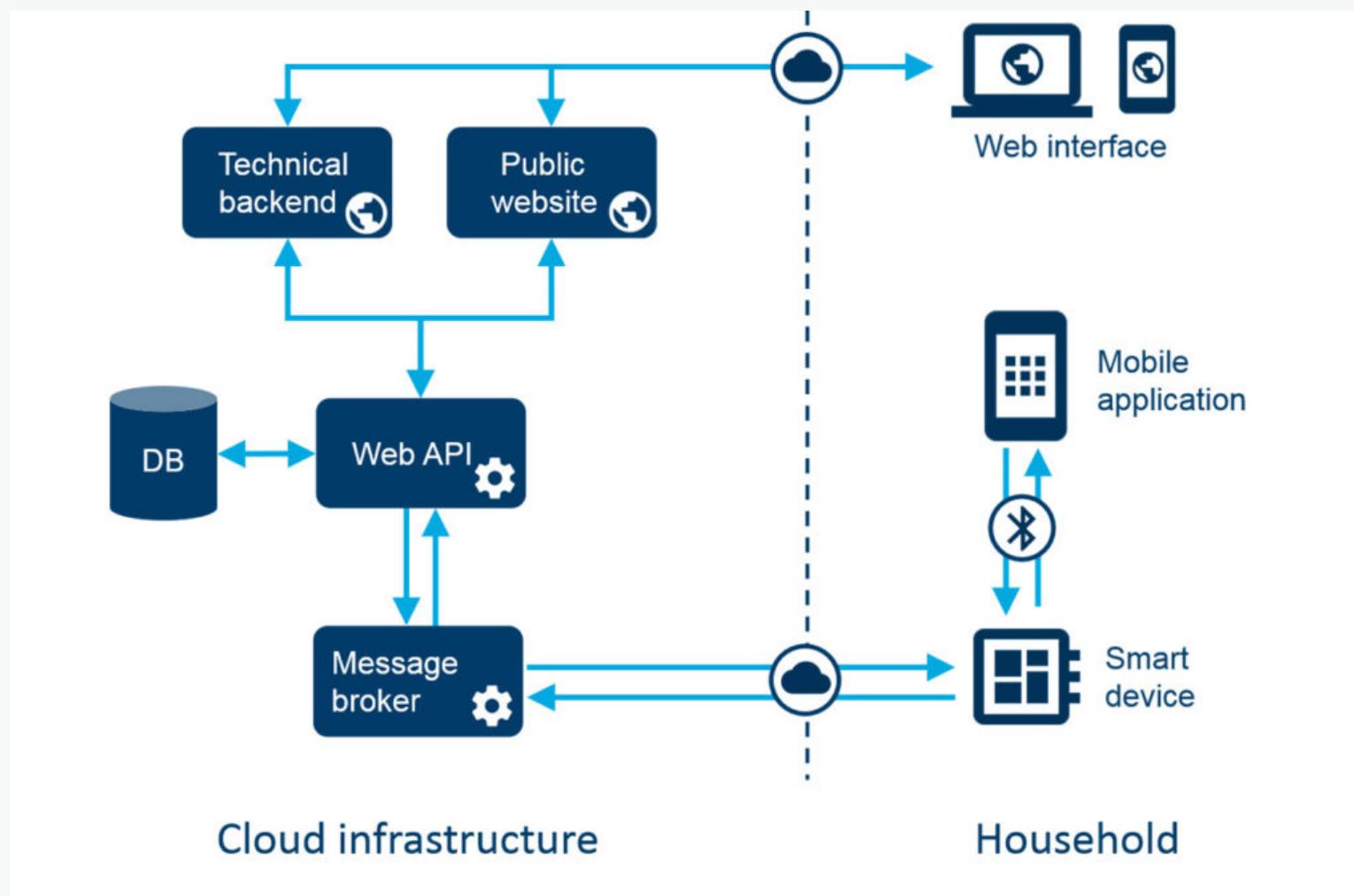


amazon alexa

Architecture



Smart Homes



Smart Cities



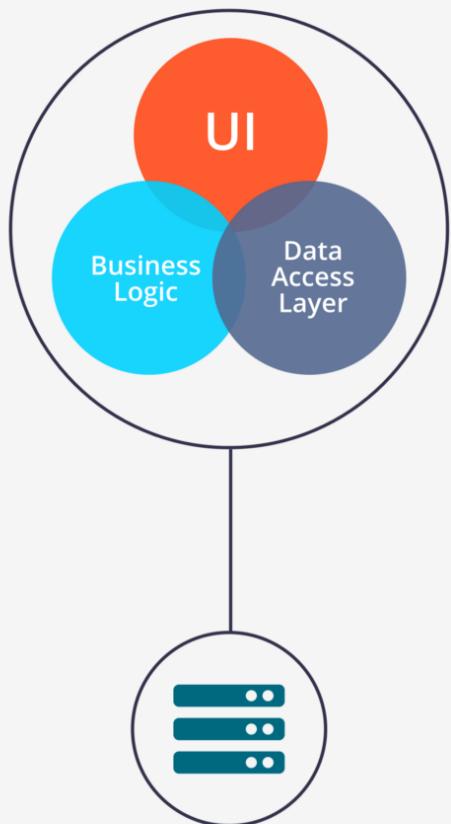
SMART CITY USE CASES

SMART
PARKINGWEATHER
SENSORSDIGITAL
SIGNAGEACOUSTIC
SENSORSWATER & GAS
METERINGTRAFFIC
LIGHTS &
CONTROLSELECTRIC
VEHICLE
CHARGINGSOLAR
INVERTERSSECURITY AND
SURVEILLANCEWASTE
MANAGEMENT

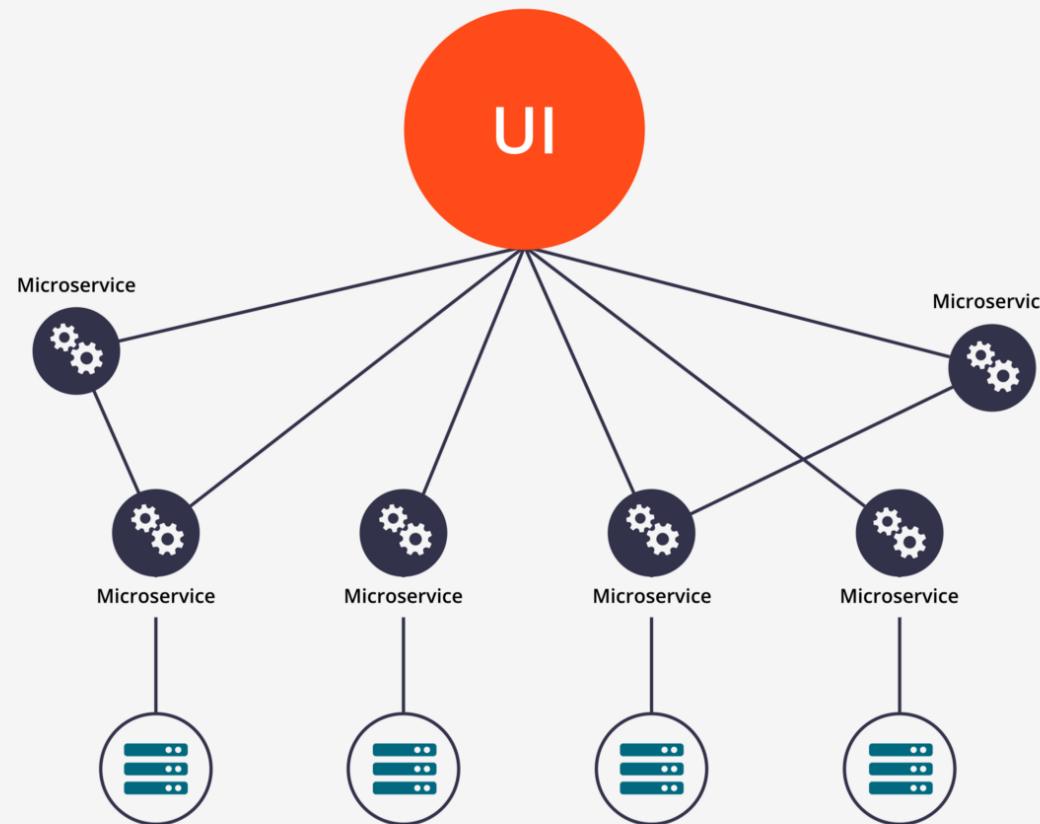


Serverless Computing



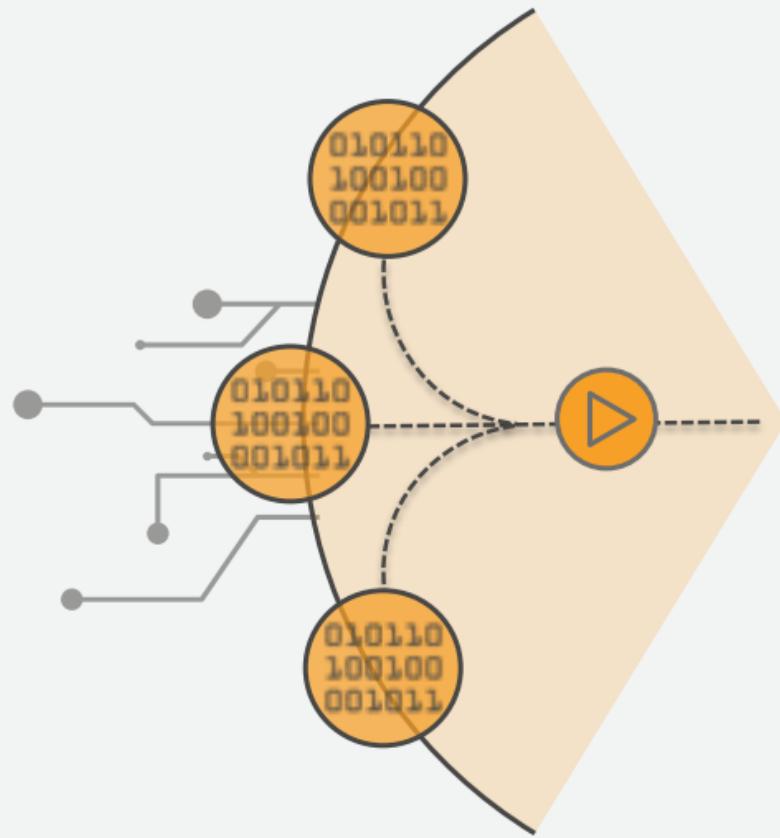


Monolithic Architecture



Microservice Architecture

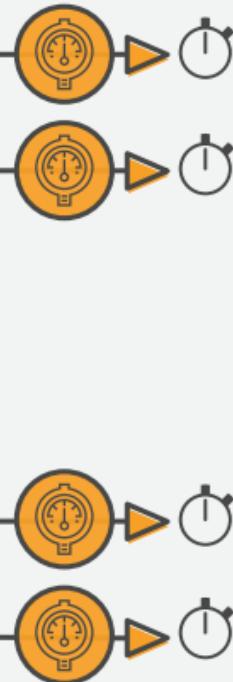
EVENT DRIVEN



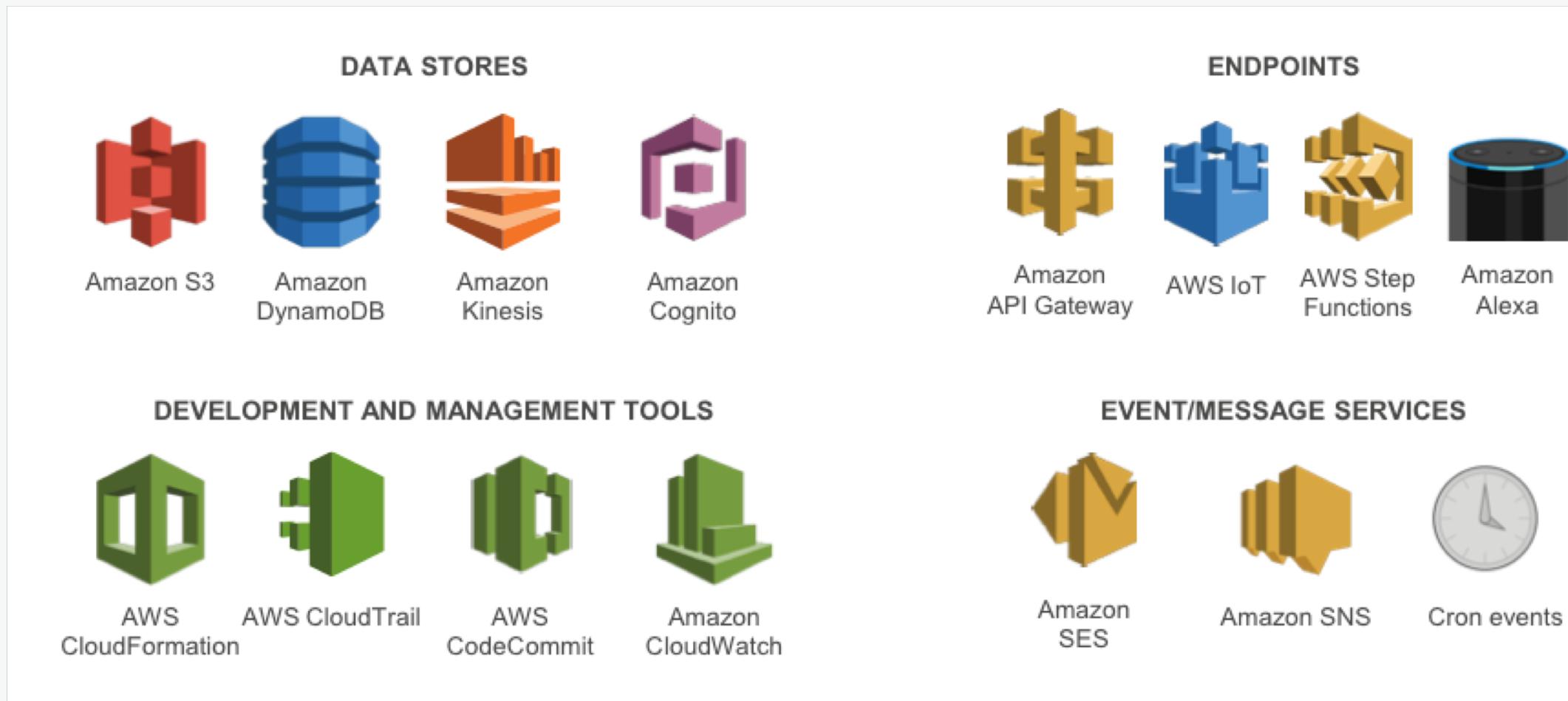
CONTINUOUS SCALING



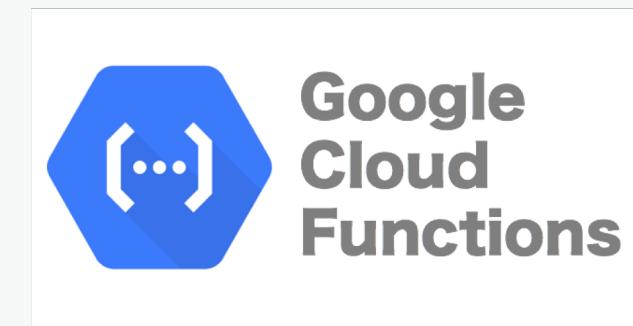
PAY BY USAGE



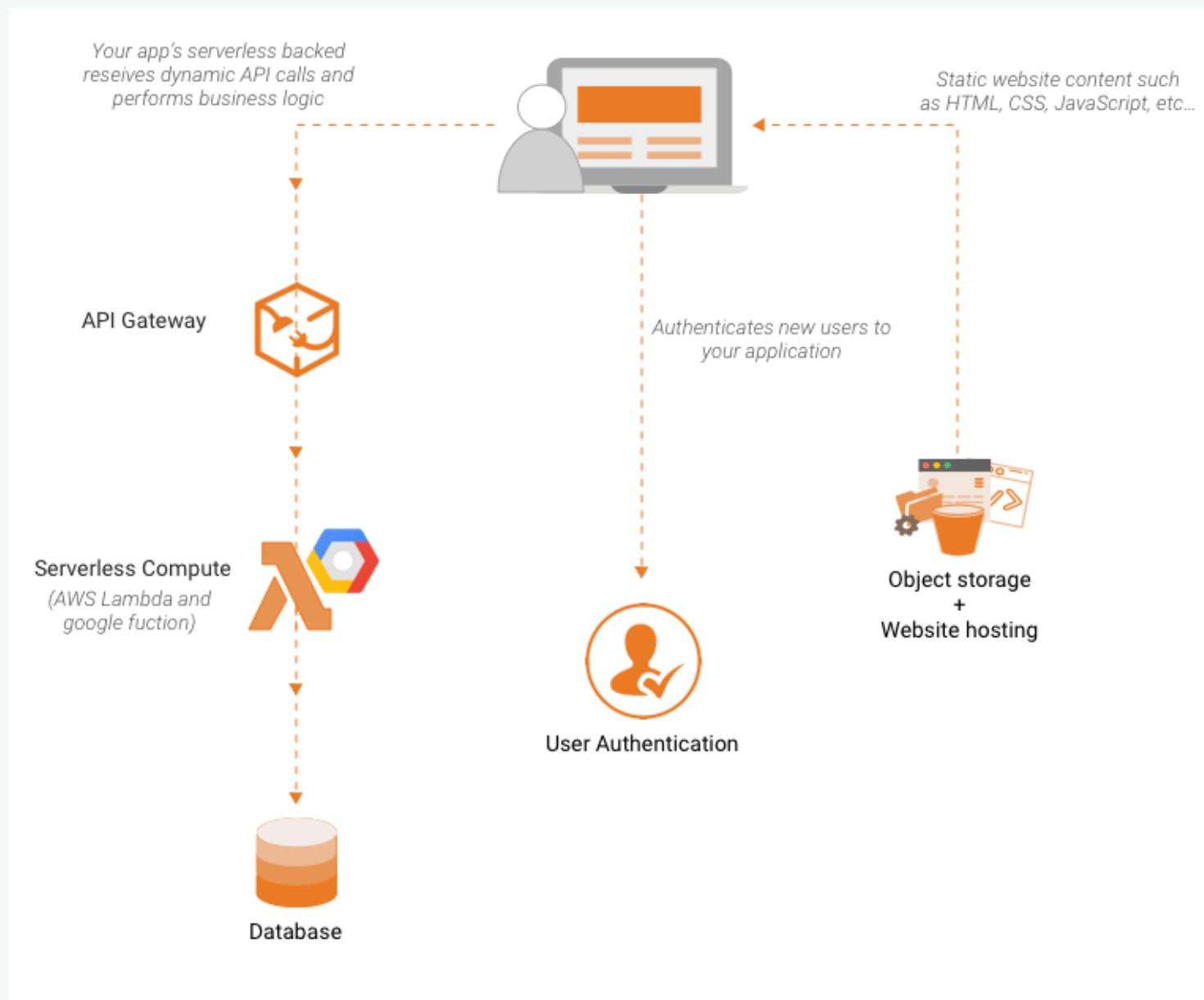
Event Triggers



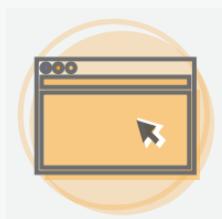
Serverless Providers



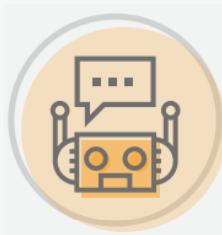
How it all works?



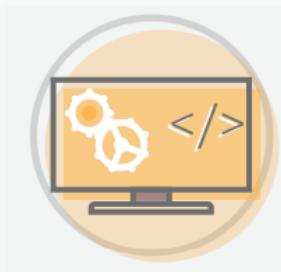
Static Websites, Web Apps,
Flask Packages



Creating logic for chatbots

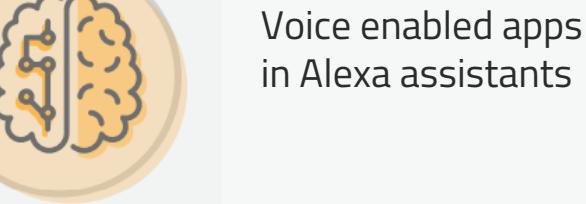
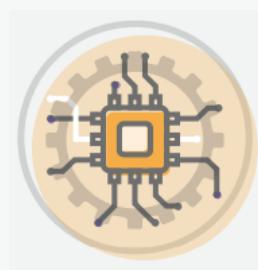


Backend Apps and Services,
Mobile and IOT

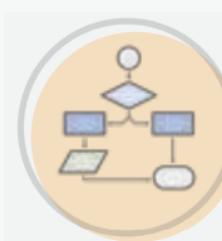


Applications

Data Processing in Real Time,
Batch or MapReduce



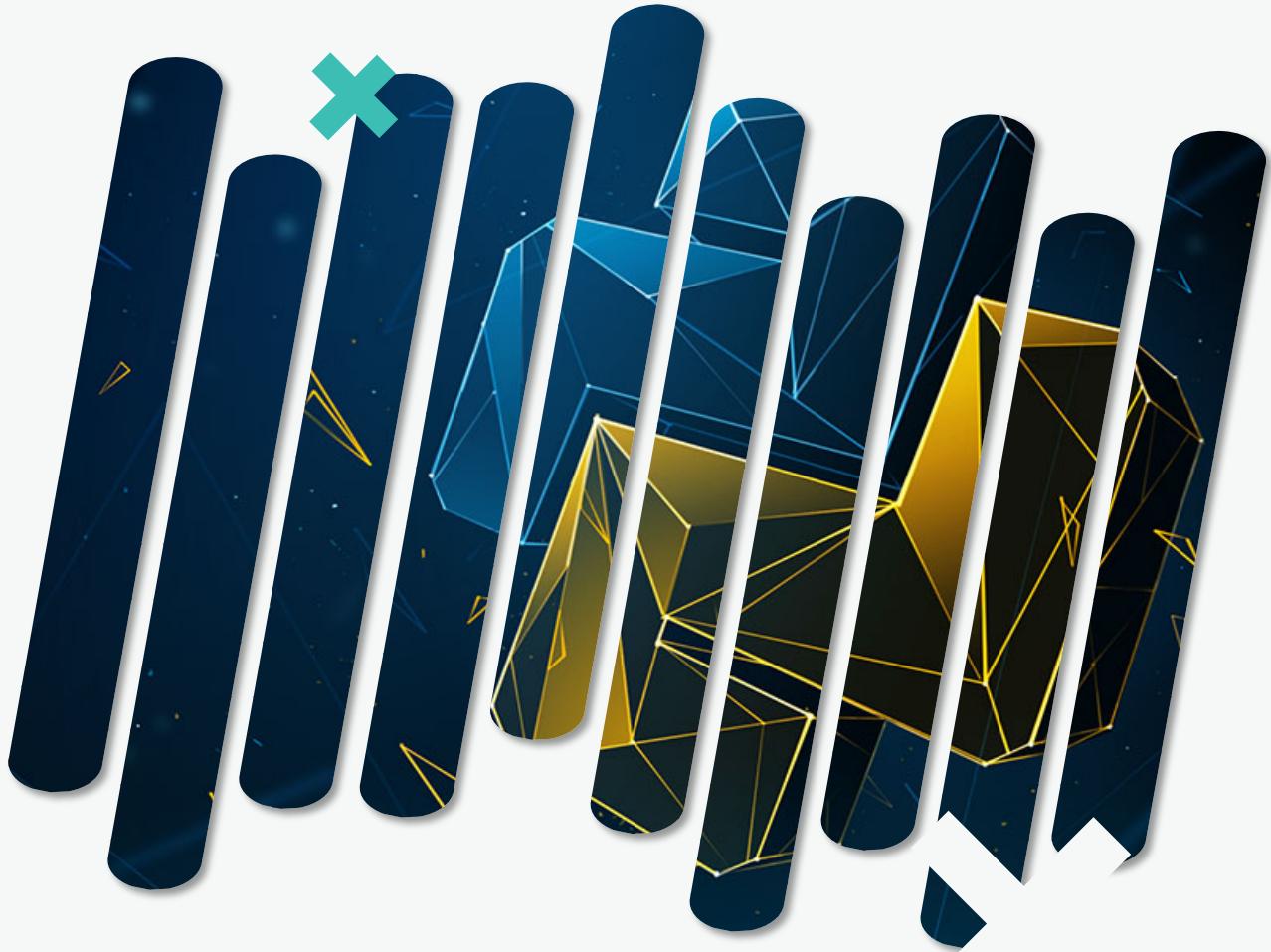
Voice enabled apps and skills
in Alexa assistants



Automation of Services and
Infrastructure management



Using Python





Can setup REST APIs on
serverless architectures



Message Queueing
Telemetry Transport



Libmraa – Low level Communication
library for linux

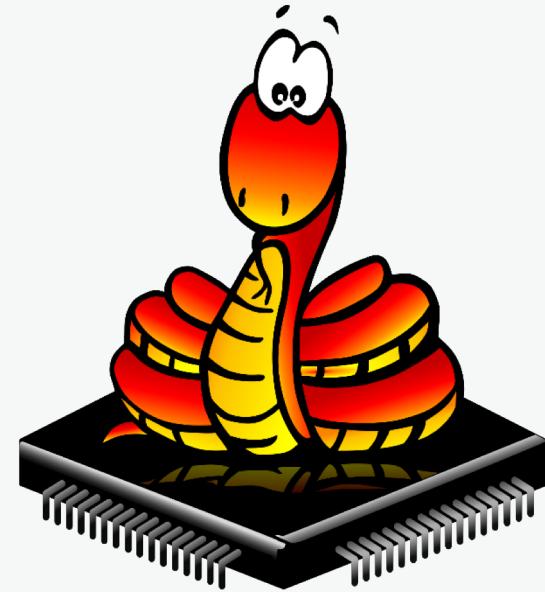




pyopencv – Image and
Video Processing
library



Audio and Sound Processing
in Python



Micropython

A Flask extension that has wrappers for the common constructs for the alexa skills API.

- Has decorators to map Alexa requests and intent slots to view functions
- Helps construct ask and tell responses, re-prompts and cards
- Makes session management easy
- Allows for the separation of code and speech through Jinja templates
- Verifies Alexa request signatures

Lambda/Function structure for IOT



Lambda Handlers



Event / Session Handlers



Response Builders

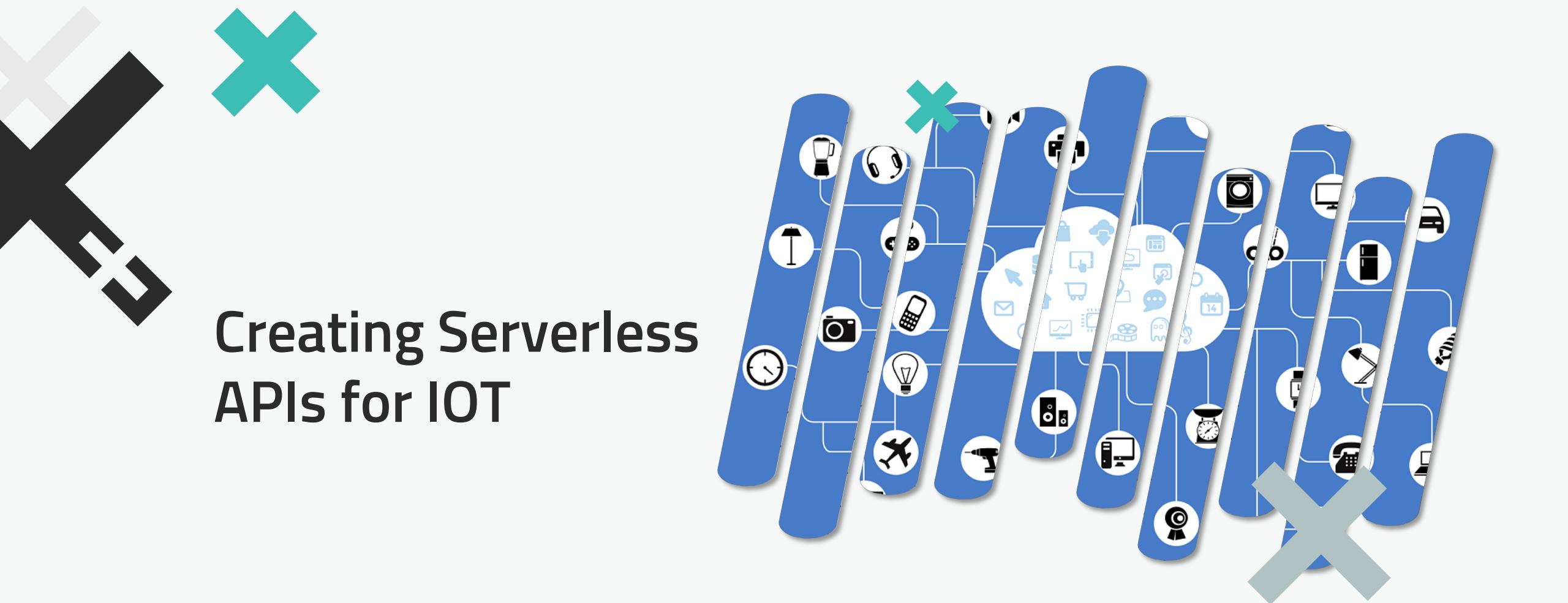
Parse incoming request message
based on type/context

Handle launch events and
session events

Custom logic and API to
generate response based on
parsed input and sends back

What can you integrate in lambdas?

- REST APIs / Http Servers
- Database querying scripts.
- Kafka Queues
- Randomized generators



Creating Serverless APIs for IOT

Code Walkthrough and Demo

“Alexa, ask Zomato for the nearest [restaurantType]”

Invocation Name

Utterance

Intent

What a user must say to “start” the skill. Each skill has a unique Invocation Name

A spoken phrase that maps to an intent. A skill can have many utterances.

The spoken message is mapped to an intent which decides what code to run within your skill.

< Return to the developer console

Test is enabled for this skill.

Skill I/O Echo Show Display Device Log

Alexa Simulator Manual JSON Voice & Tone

English (US) Type or click and hold the mic

buddhist wisdom

The four seals of Buddhism are...1...All compounded things are impermanent,... 2...All emotions are painful,... 3...All phenomena are without inherent existence...and 4..Nirvana is beyond description

Welcome to Buddhist Wisdom, you can say: Tell us a quote or Share a teaching with me

share a teaching with me

The four seals of Buddhism are...1...All compounded things are impermanent,... 2...All emotions are painful,... 3...All phenomena are without inherent existence...and 4..Nirvana is beyond description

JSON Input

```

1  {
2    "version": "1.0",
3    "session": {
4      "new": false,
5      "sessionId": "amzn1.echo-api.session.fb51b6c",
6      "application": {
7        "applicationId": "amzn1.ask.skill.6e5510"
8      },
9      "user": {
10        "userId": "amzn1.ask.account.AHALVDPFC6D"
11      }
12    },
13    "context": {
14      "AudioPlayer": {
15        "playerActivity": "IDLE"
16      },
17      "Display": {
18        "token": ""
19      },
20      "System": {
21        "application": {
22          "applicationId": "amzn1.ask.skill.6e5510"
23        },
24        "user": {
25          "userId": "amzn1.ask.account.AHALVDPFC6D"
26        }
27      }
28    }
29  }
```

JSON Output

```

1  {
2    "body": {
3      "version": "1.0",
4      "response": {
5        "outputSpeech": {
6          "type": "PlainText",
7          "text": "The four seals of Buddhism are...1...All compounded things are impermanent,... 2...All emotions are painful,... 3...All phenomena are without inherent existence...and 4..Nirvana is beyond description"
8        },
9        "card": {
10          "type": "Simple",
11          "title": "SessionSpeechlet - The four seals of Buddhism are...1...All compounded things are impermanent,... 2...All emotions are painful,... 3...All phenomena are without inherent existence...and 4..Nirvana is beyond description",
12          "content": "SessionSpeechlet - The four seals of Buddhism are...1...All compounded things are impermanent,... 2...All emotions are painful,... 3...All phenomena are without inherent existence...and 4..Nirvana is beyond description"
13        },
14        "reprompt": {
15          "outputSpeech": {
16            "type": "PlainText",
17            "text": ""
18          }
19        }
20      },
21      "shouldEndSession": false
22    },
23    "sessionAttributes": {}
24  }
```

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Simulator

Echosim.io

Log Out Resources Help Language EN-US Console OFF

Echosim.io provided by iQuarius Media. Special thanks to Sam Machin for his Alexa in the Browser project.

Alexa Skill Testing Tool

Click and hold the microphone button or hold down the space bar on your keyboard to activate the microphone.

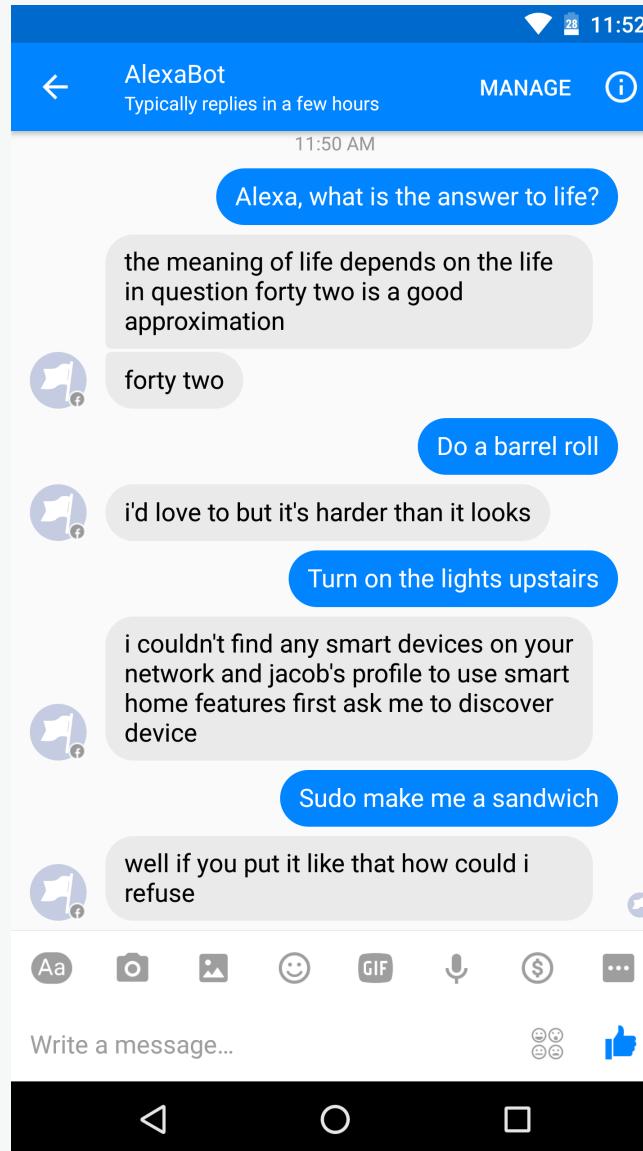
Input Not Available...



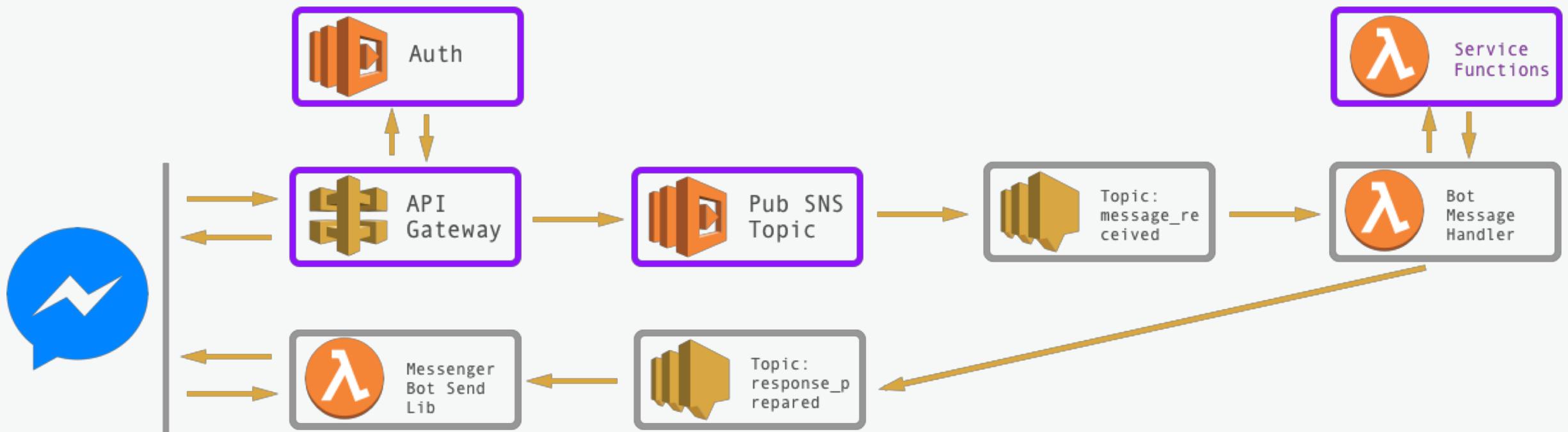
How the future
looks like?

AlexaBot

<https://github.com/jacobajit/AlexaBot>



Event driven, serverless chatbots architecture



Google Assistant on Your Amazon Echo

<https://goo.gl/UEzRGo>





Using data from fitness trackers . . .

- Continuous HR data – detect spikes, stroke patterns, anxiety
- Calorie estimation from step count, and alert when you need to eat.
- Alerting triggers based on thresholds
- Create APIs to connect other devices like glucometers, and Blood Pressure monitors.
- Publish data to a central store, with web visualization support.

The Future

Interactive Social Networks

Interactive Idea boards

Voice Gaming

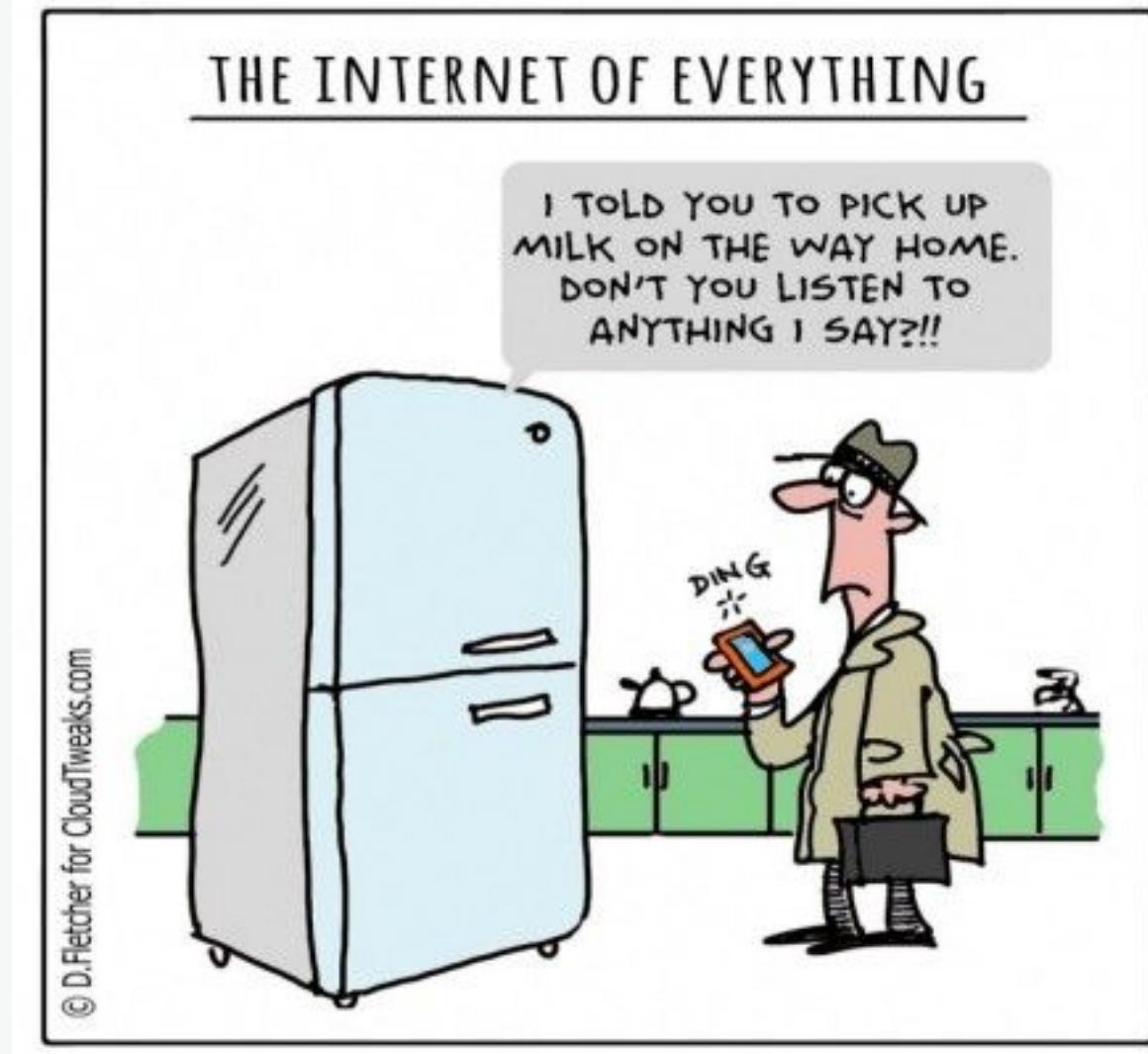
Crisis Alerting

Office Integration – Meeting room bookings, etc.

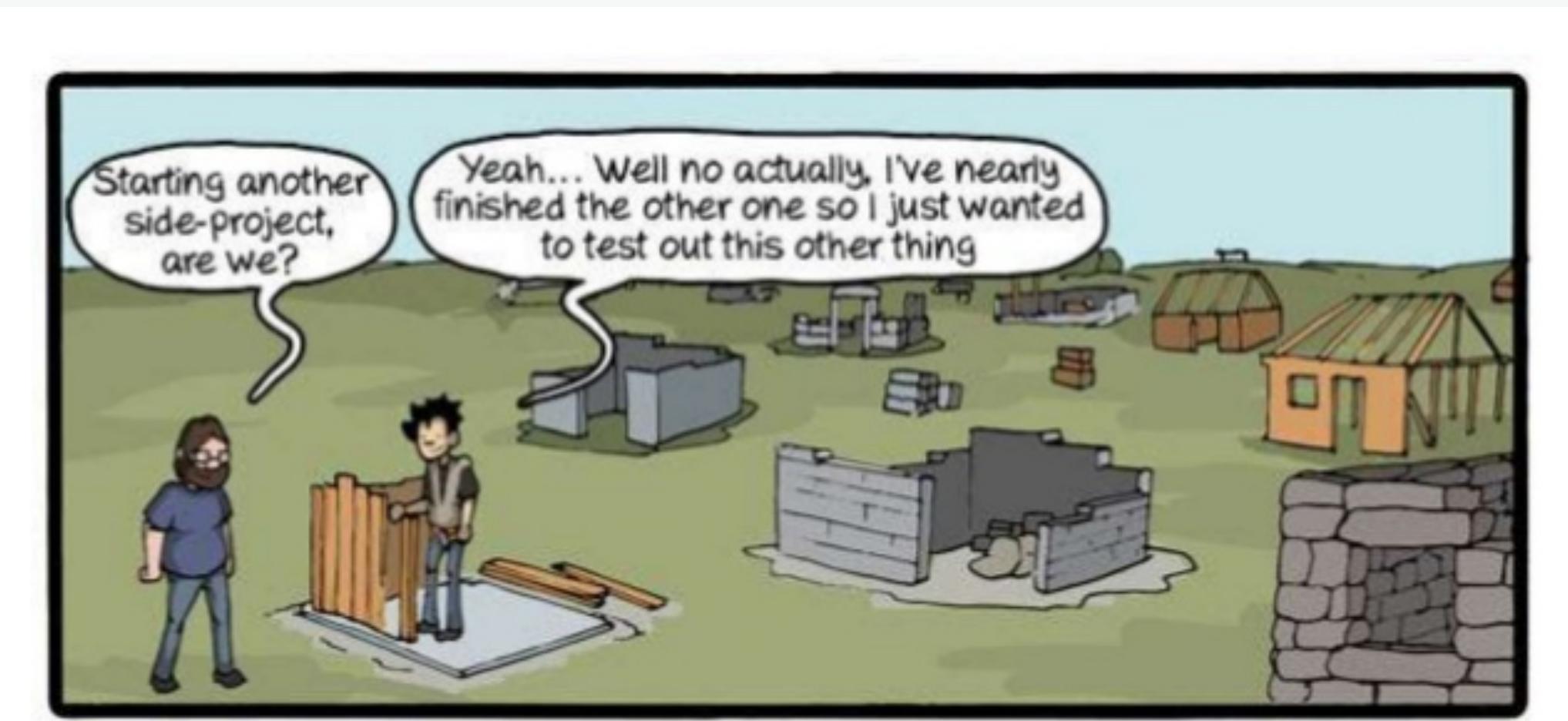
Always aware state.



Smart Problems!









Questions

github.com/sonal-raj/serverlessdays2019