Things you need to know to become a Serverless API Ninja

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API Days Singapore 2020

Allan Chua

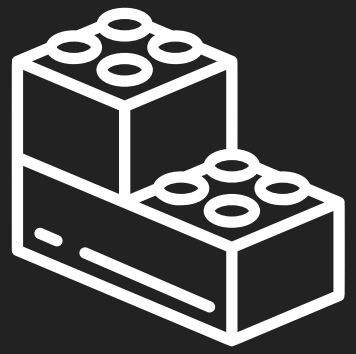
Solutions & Integrations
Architect @ FWD

AWS Certified
Solution Architect

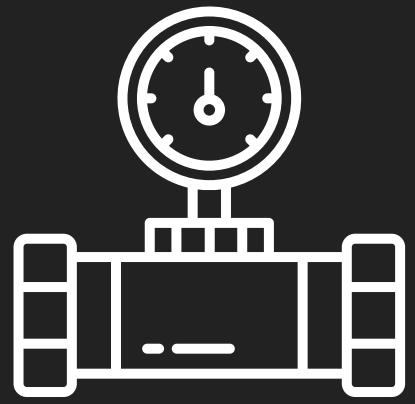
1.5

Years of Experience
with Serverless

Writing a Book
about Serverless



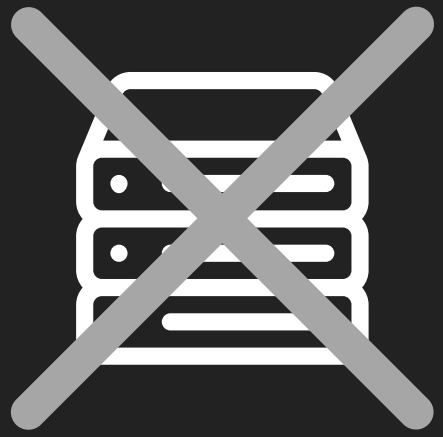
BASICS



INTEGRATIONS

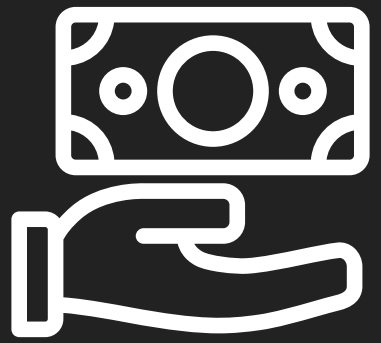
CAUTION

Serverless Means Efficiency

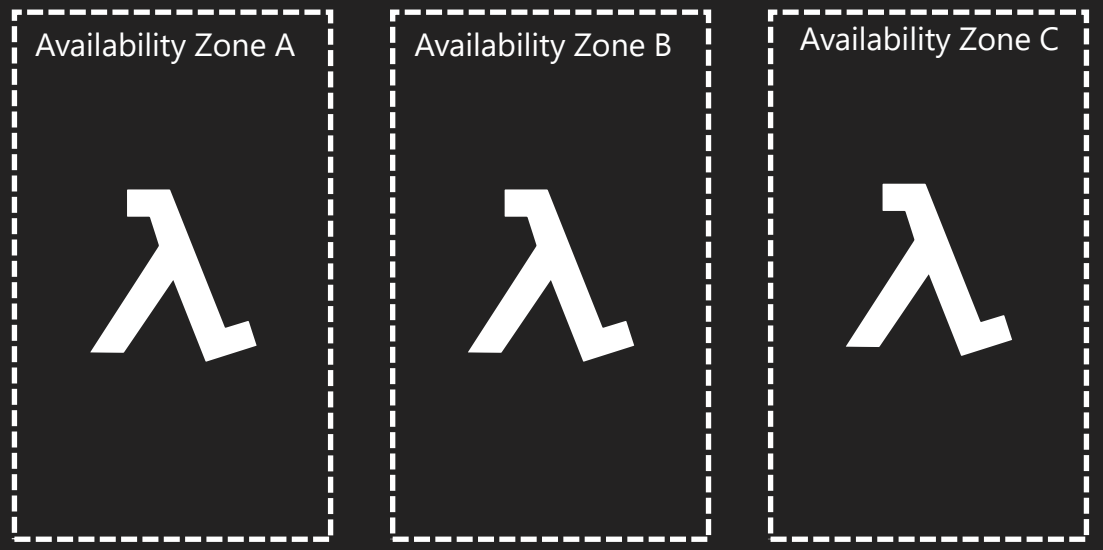


No Servers to Manage

Reduced Security Risk & Cost



Pay only for what is used



Built-in High Availability & Disaster Recovery

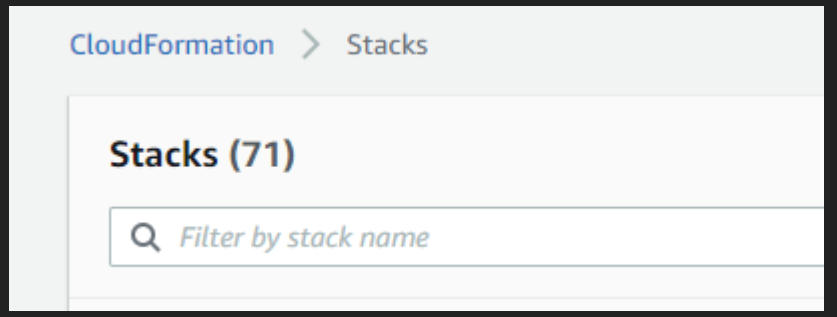
$135.05

1 EC2 t2.xlarge
$0.185 / Hour

$ 270.10

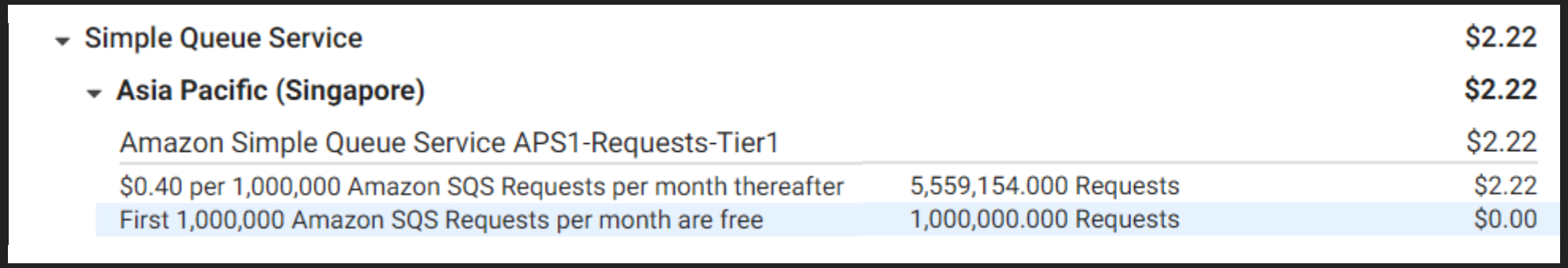
2 EC2 t2.xlarge
$0.370 / Hour
High Availability

What traditional architectures will cost you per API Cluster



Lambda		$0.00
Asia Pacific (Singapore)		**$0.00**
AWS Lambda APS1-Lambda-GB-Second		$0.00
AWS Lambda - Compute Free Tier - 400,000 GB-Seconds - Asia Pacific (Singapore)	330,762.525 Lambda-GB-Second	$0.00
AWS Lambda APS1-Request		$0.00
AWS Lambda - Requests Free Tier - 1,000,000 Requests - Asia Pacific (Singapore)	92,060.000 Request	$0.00
Asia Pacific (Tokyo)		**$0.00**
AWS Lambda APN1-Lambda-GB-Second		$0.00
AWS Lambda - Compute Free Tier - 400,000 GB-Seconds - Asia Pacific (Tokyo)	1,868.013 seconds	$0.00
AWS Lambda APN1-Request		$0.00
AWS Lambda - Requests Free Tier - 1,000,000 Requests - Asia Pacific (Tokyo)	4,136.000 Requests	$0.00

96K API calls worth 91 Hours of actual runtime for 71 CF Stacks in DEV environment for FREE



Simple Queue Service		$2.22
Asia Pacific (Singapore)		**$2.22**
Amazon Simple Queue Service APS1-Requests-Tier1		$2.22
$0.40 per 1,000,000 Amazon SQS Requests per month thereafter	5,559,154.000 Requests	$2.22
First 1,000,000 Amazon SQS Requests per month are free	1,000,000.000 Requests	$0.00

6.6 Million Queue Messages for 2$ In DEV Environment

$ 19,710

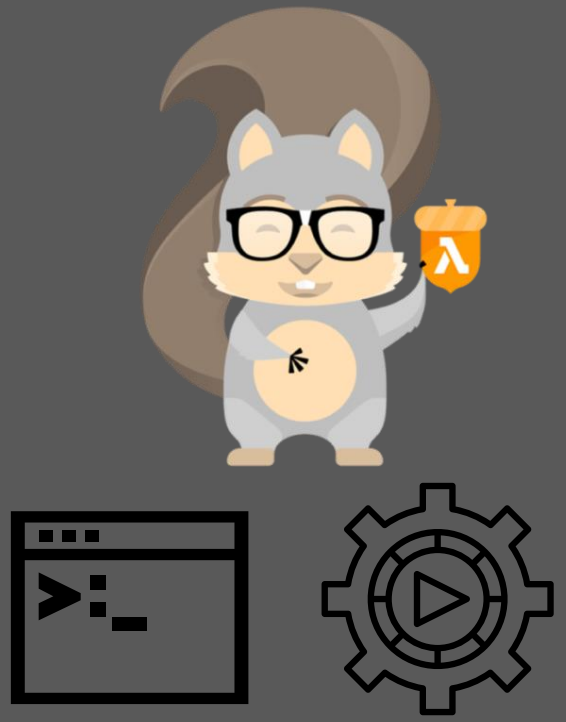
$270.10 per cluster x 71

Traditional Architecture

$ 0

Lambda based architecture

We drove the cost of dev environments

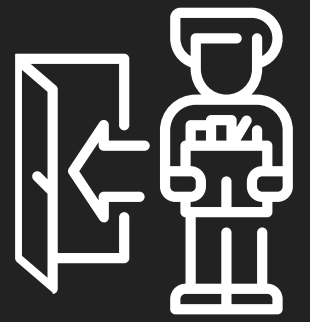


Working with AWS Lambda
is way more convenient with
AUTOMATION

Reliable & Repeatable Builds

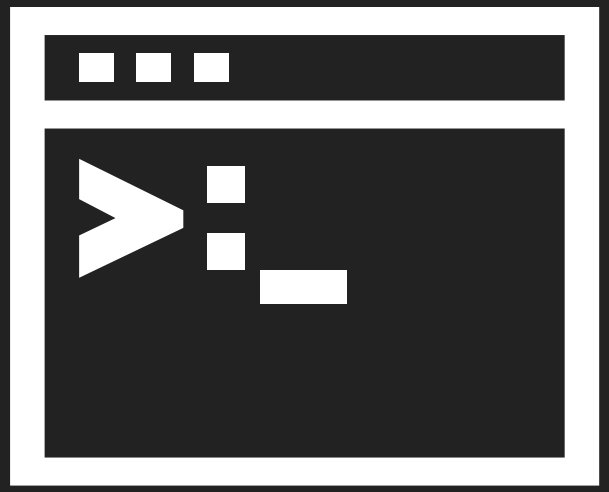
Reduced Human Errors

Maintainability



Protects businesses from developer turnover

Benefits of Automation in API Development

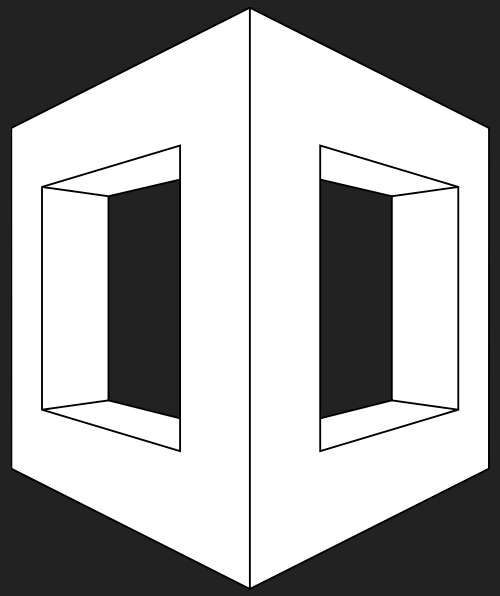


Shell Scripting

- Deployment Automation (CI/CD)
- Dependency Management
- Decommissioning
- Validation Tasks

AWS SAM

- ✓ Definition of Serverless Resources
- ✓ Local testing of functions
- ✓ Shorthand Syntax for Cloud Formation



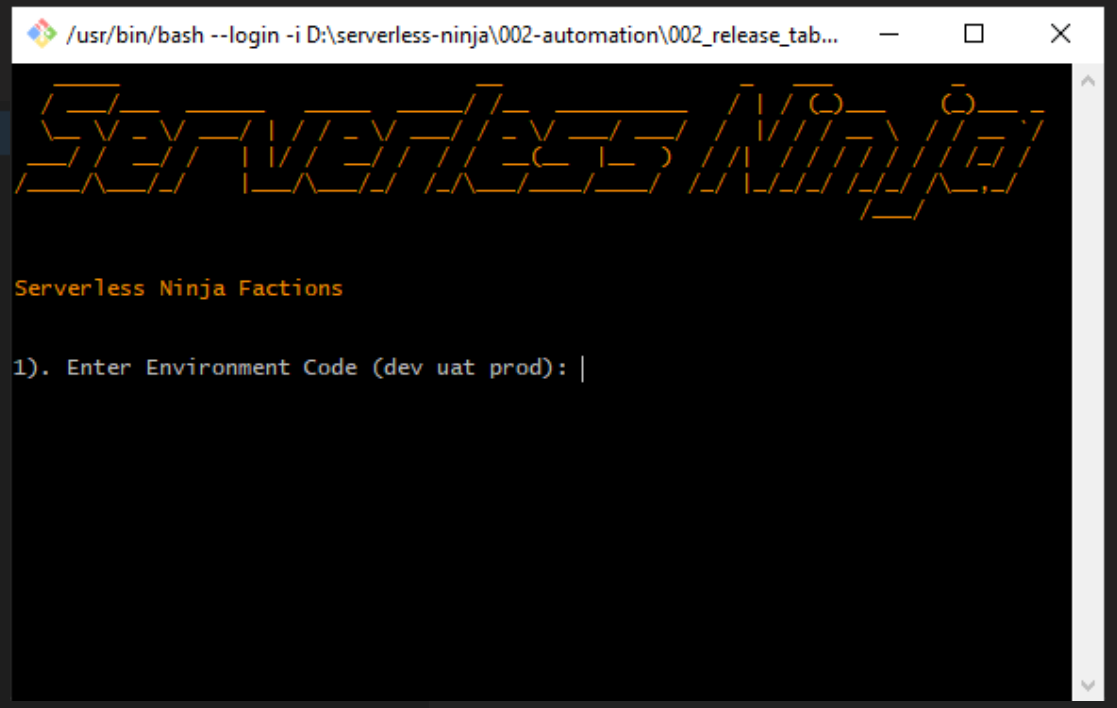
Cloud Formation

- ✓ Definition of AWS resources
- ✓ Grouping of AWS resources
- ✓ Base syntax used by SAM and other frameworks

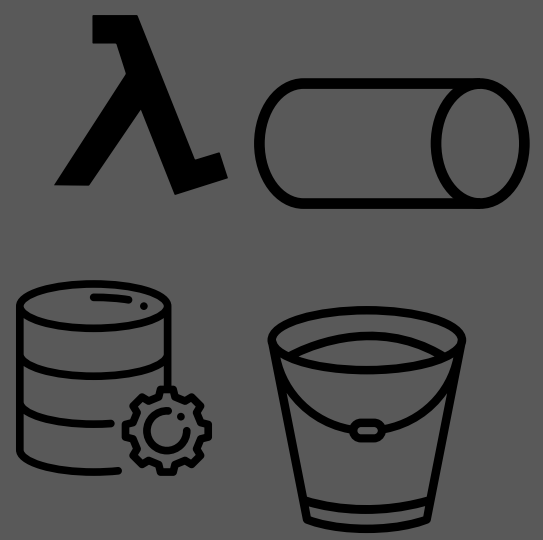
Automation
Sample Code

- Shell Scripts
  - Install Dependencies
  - Release API + Tables
  - Decommissioning
- SAM Template
  - API Gateway
  - API Key
  - Usage Plan
  - Lambda APIs
- Cloud Formation
  - Dynamo DBs

```
AppName: ...
#  ____
# |  _ \ ___   ___   ___   _   _ _ __ ___ ___   __
# | |_) / _ \ / __| / _ \ | | | | '__/ __/ _ \ / __|
# |  _ <  __/ \__ \ (_) | |_| | | | (_| (_) | \__ \
# |_| \_\___||___/\___/ \__,_|_|  \___\___/|___/
#

Resources:
  #    ___       _
  #   / _ \__ _| |_ _____      ___ _ _  _
  #  / /_\/ _` | __/ _ \ \ /\ / / _` | | | |
  # / /_\\ (_| | ||  __/\ V  V / (_| | |_| |
  # \____/\__,_|\__\___| \_/\_/ \__,_|\__, |
  #                                   |___/
  FactionsApiGateway: ...

  FactionsApiKey: ...

  FactionsUsagePlan: ...

  FactionsApiUsagePlanKey:      You, 30 minutes ago • SAM and CF IAC samples
```



Have fun playing with the IAC trainers.



Serverless
is not limited
to Lambdas

The most common misconception about serverless is:

Serverless = AWS Lambda

Database

Queues

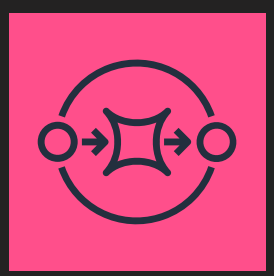
File Buckets

CI / CD Tools

Any AWS service that you don't manage at the OS level is serverless

DynamoDB

Lambda

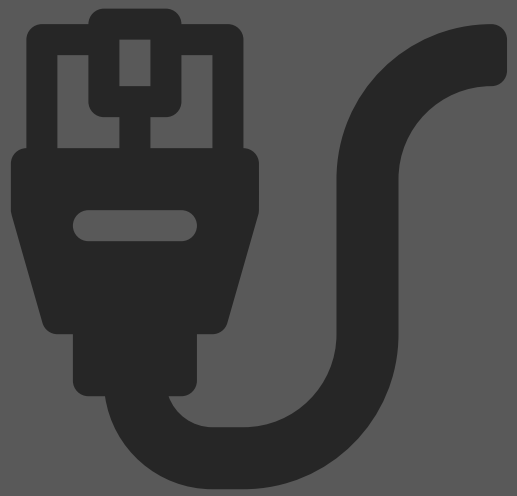


SQS

X Ray

API Gateway

The most popular AWS serverless services for building APIs



AWS Lambda have a good amount of Integration Points

Tons of people are skeptical about Lambda's integration capabilities.

[redacted]
Principal Engineer

3 Reasons AWS Lambda Is Not Ready for Prime Time

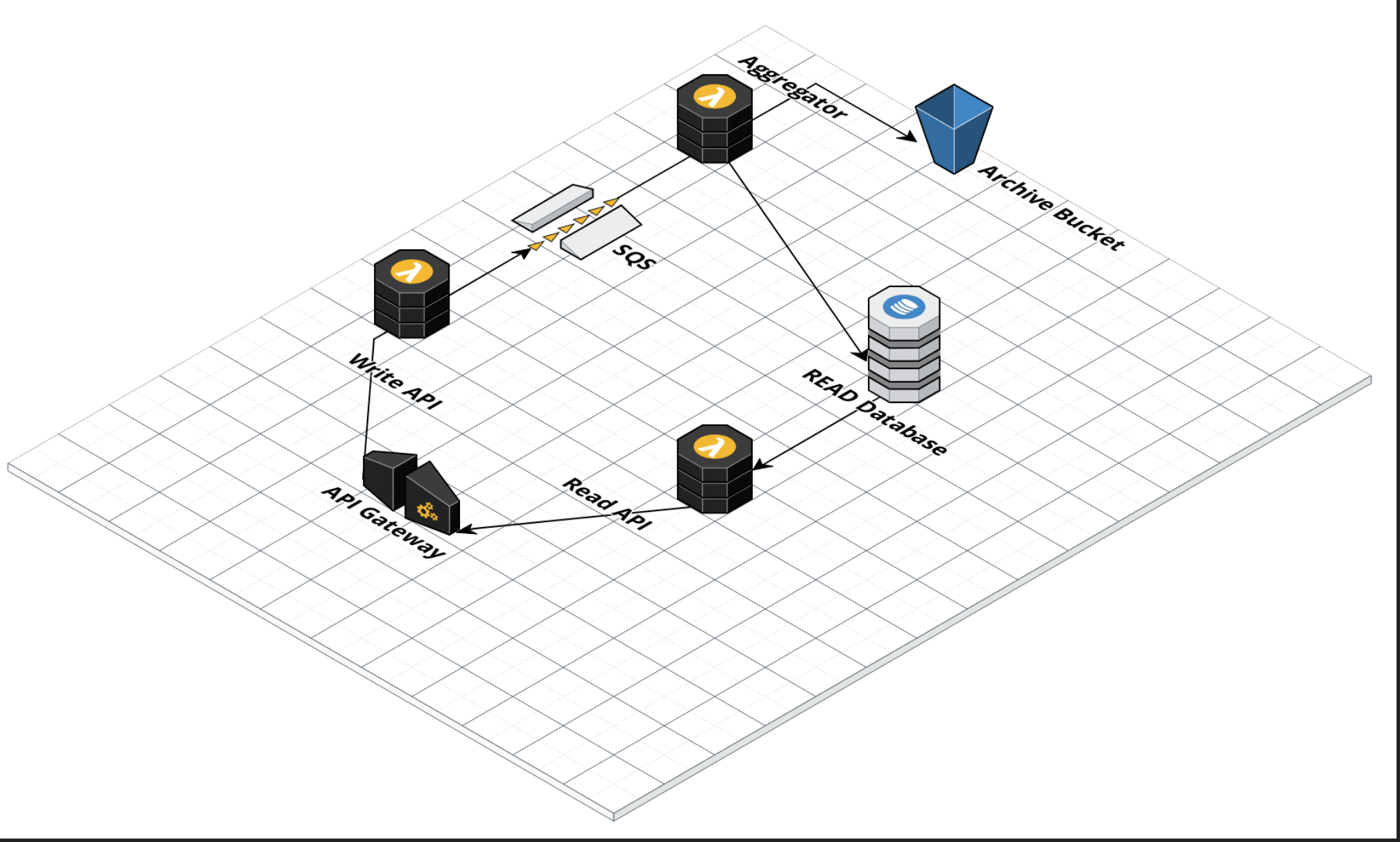
Does AWS Lambda keep its serverless marketing promise of continuous scaling?

Back in 2016 people are bashing lambda big time

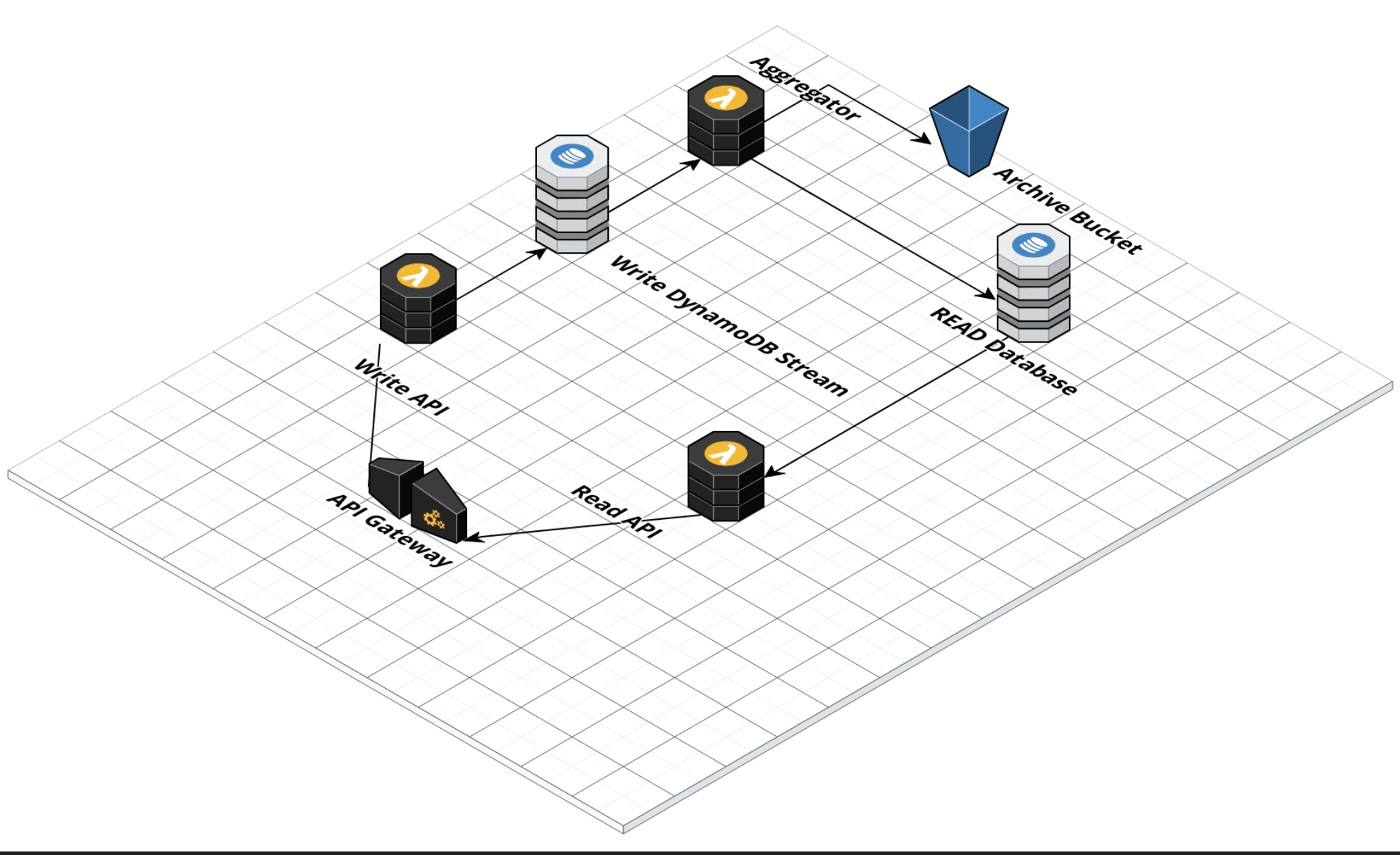
But hey, it has been almost

5 years since 2016.

AWS Introduced cool integrations since



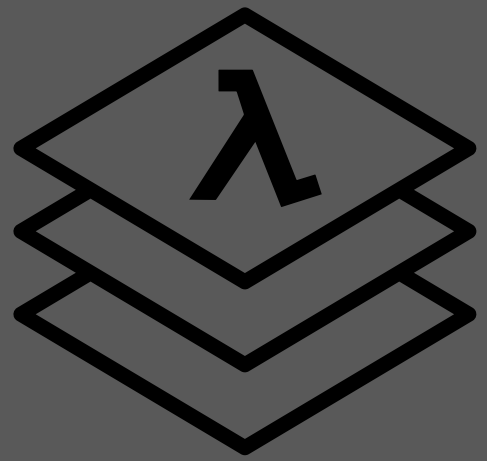
Basic CQRS using Lambda



CQRS & DynamoDB Streaming

Lambda Integrations

https://docs.aws.amazon.com/lambda/latest/dg/lambda-services.html



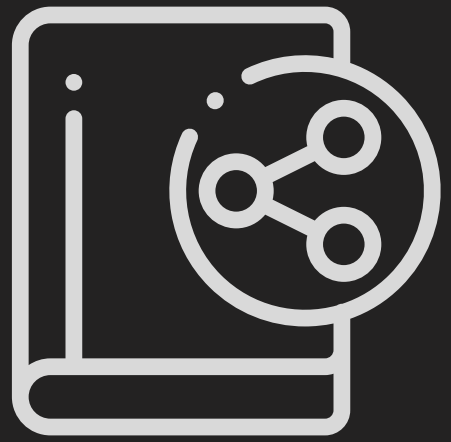
Run shared code using Lambda Layers

Lambda-based APIs require each endpoint to be packaged in isolation

Which often leads to

CODE DUPLICATION

Shared Code



Dependencies

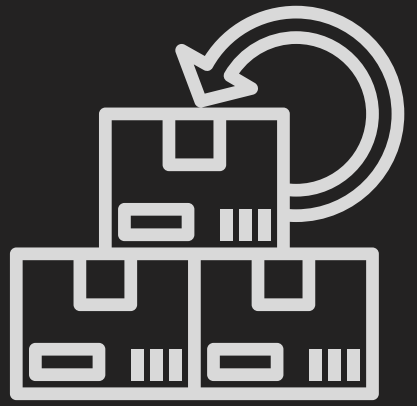
Notorious Duplicates

To solve duplication issue:

Use Lambda Layers

Centralized Dependencies

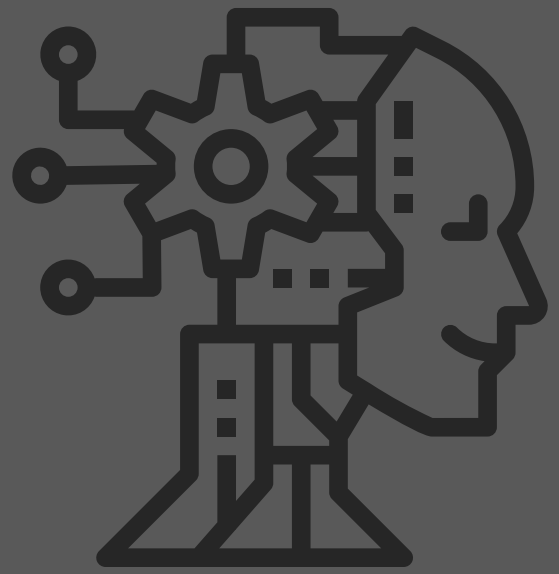
Easier Code Updates



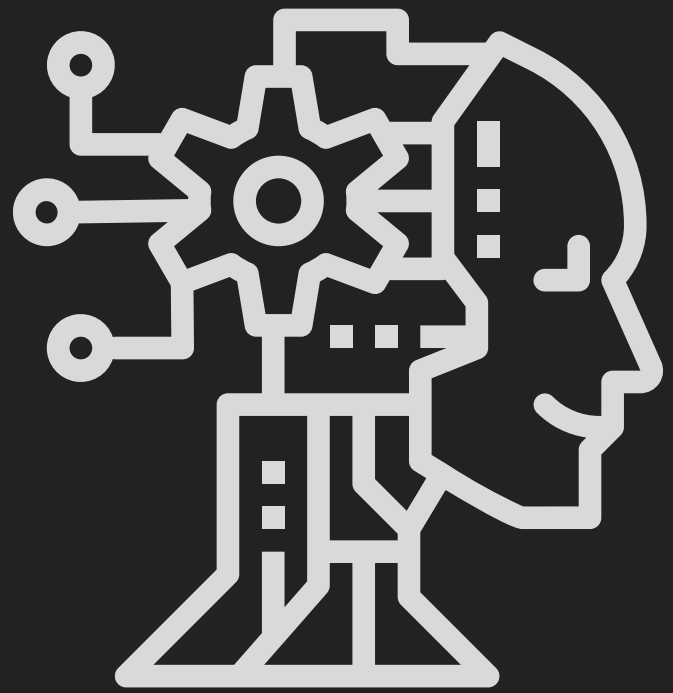
Smaller Deployments

Benefits

Sample API
Implementation using
Lambda Layers

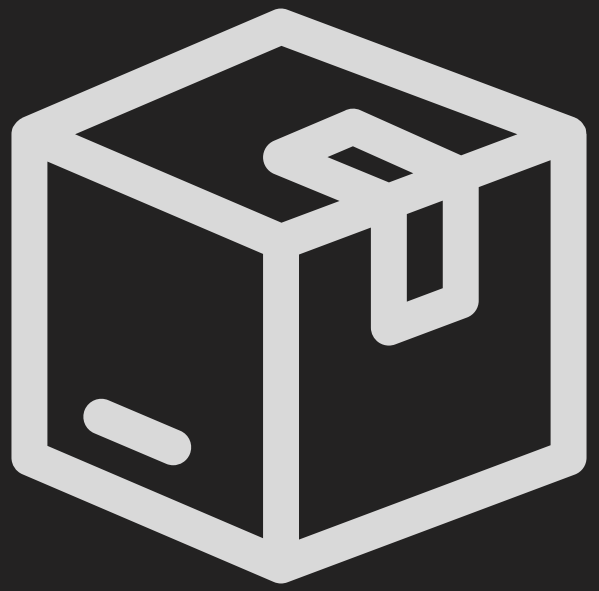


Integrating vs Infusing Artificial Intelligence in your APIS



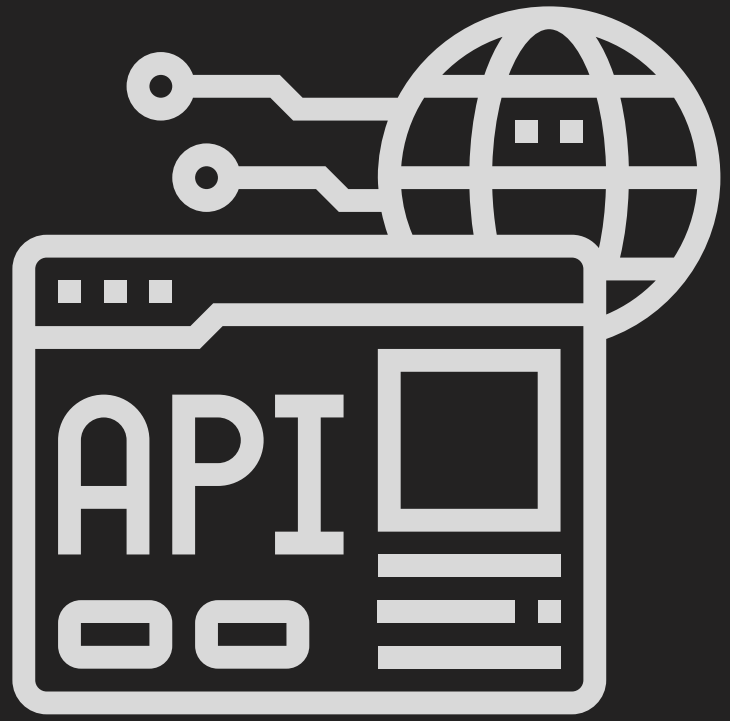
Digital Transformation have recently gained tons of traction and AI is riding this wave

Integrating with
AI APIs



Infusing AI to
your APIs

Lucky for us, we can either infuse or integrate AI Models to Lambda APIs



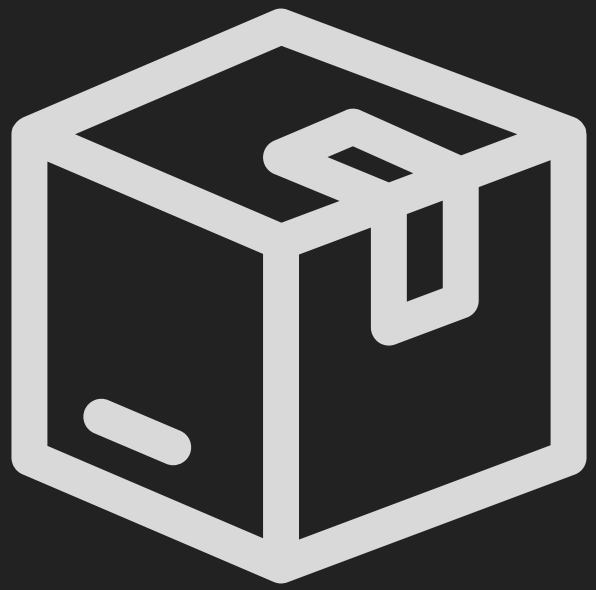
Integration with a base API powered by AI

amazon Rekognition

Cloud Vision API

Blog used for integrating Google Cloud Vision using NodeJS and Lambda by Alex DeBrie

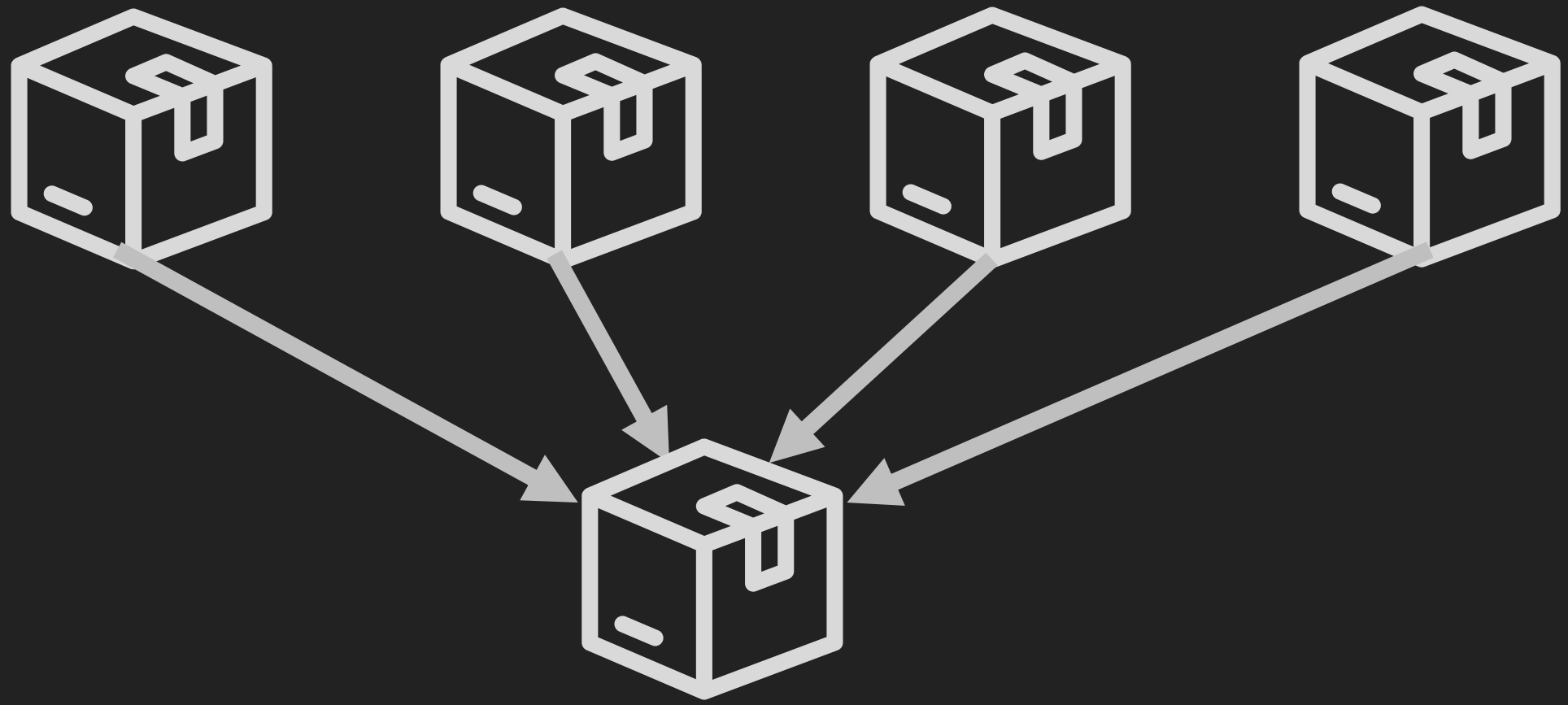
https://www.serverless.com/blog/google-cloud-functions-application



Infusing / Packaging Custom Built AI Models to your APIs

scikits learn

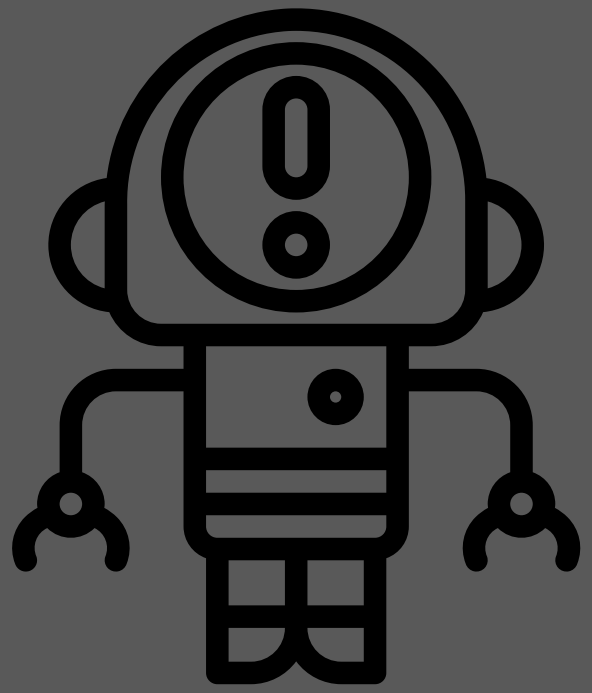
TensorFlow.js



An unorthodox approach on how can you achieve high accuracy ML is by combining multiple models in an election system inside the API

How to embed Scikit Learn Models inside Lambda Functions by Will High

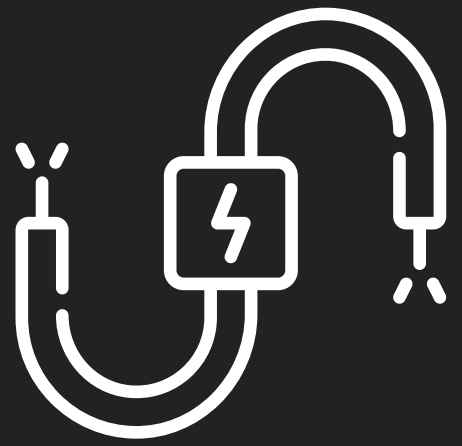
https://www.highonscience.com/blog/2017/09/29/ml-scoring-service-on-aws-lambda/



Integrating RPA
in your Serverless APIS

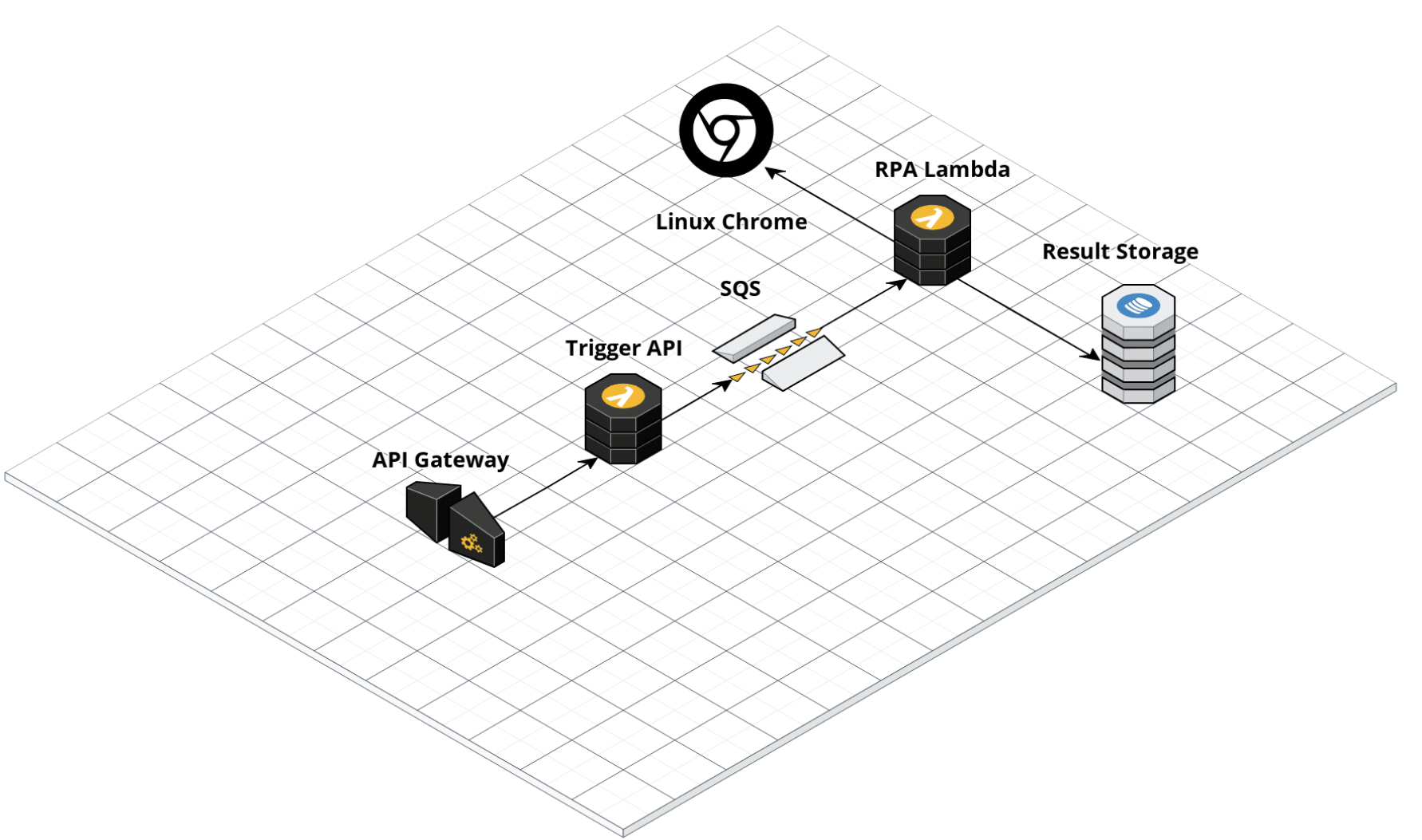
Manual Process Automation

Data Scraping & Market Intelligence



Integration with Legacy Systems

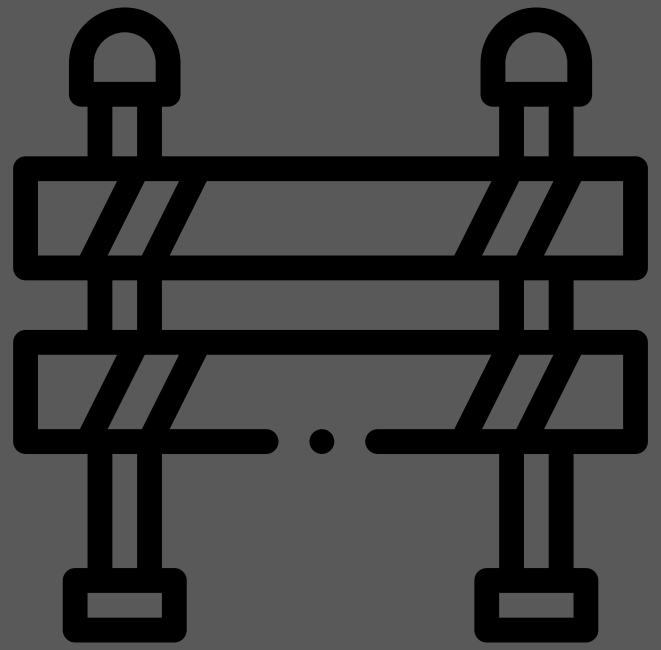
RPA is a huge advantage in the Insurtech World.



Typical Severless RPA Integration

Asynchronous API triggering RPA worker using AWS Lambda

https://bit.ly/3kW9sTM



Serverless have

Limitations

Its rewarding to be mindful about serverless limitations when proposing to your boss

3 GB

Memory Limitation

6 MB

Invocation Payload

15 Mins

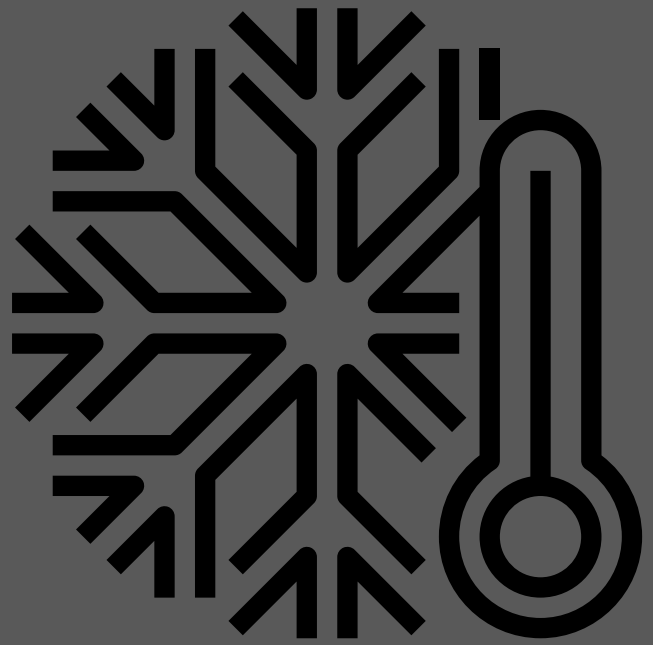
Max Execution Time

200

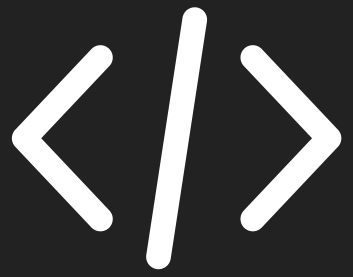
Max Resource per Cloud Formation Stack

30 Secs

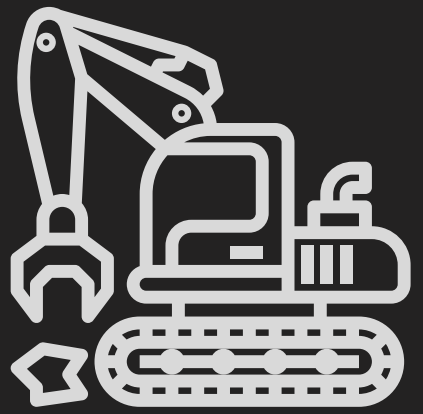
API Gateway Max REST Timeout



Wrestling with Coldstart



Poor Choice of Language



Heavy Dependencies

Too much code

VPC

VPC Integration

Common Causes of Coldstart

Pick GO, JS and Python

Use Lamba Layers

VPC

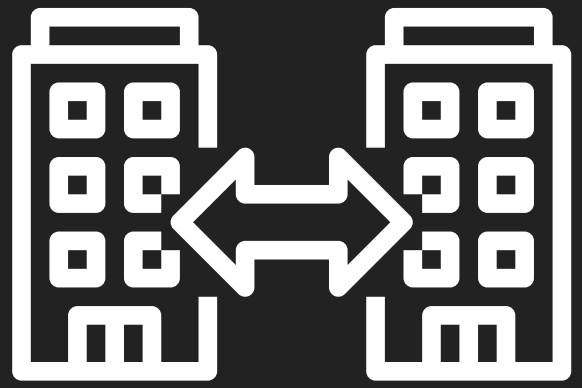
Minimize VPC

Keep Warm

Coldstart Busters

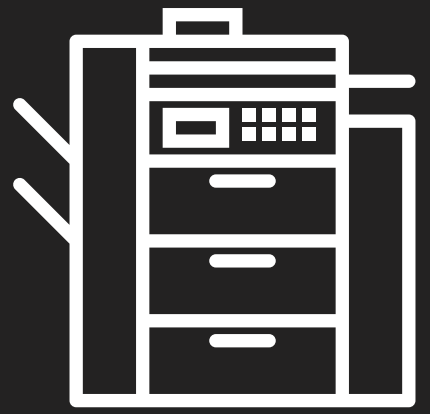
Serverless is

NOT for everything



B2B Services

State Law vs Foreign Data Storage



On-Premise

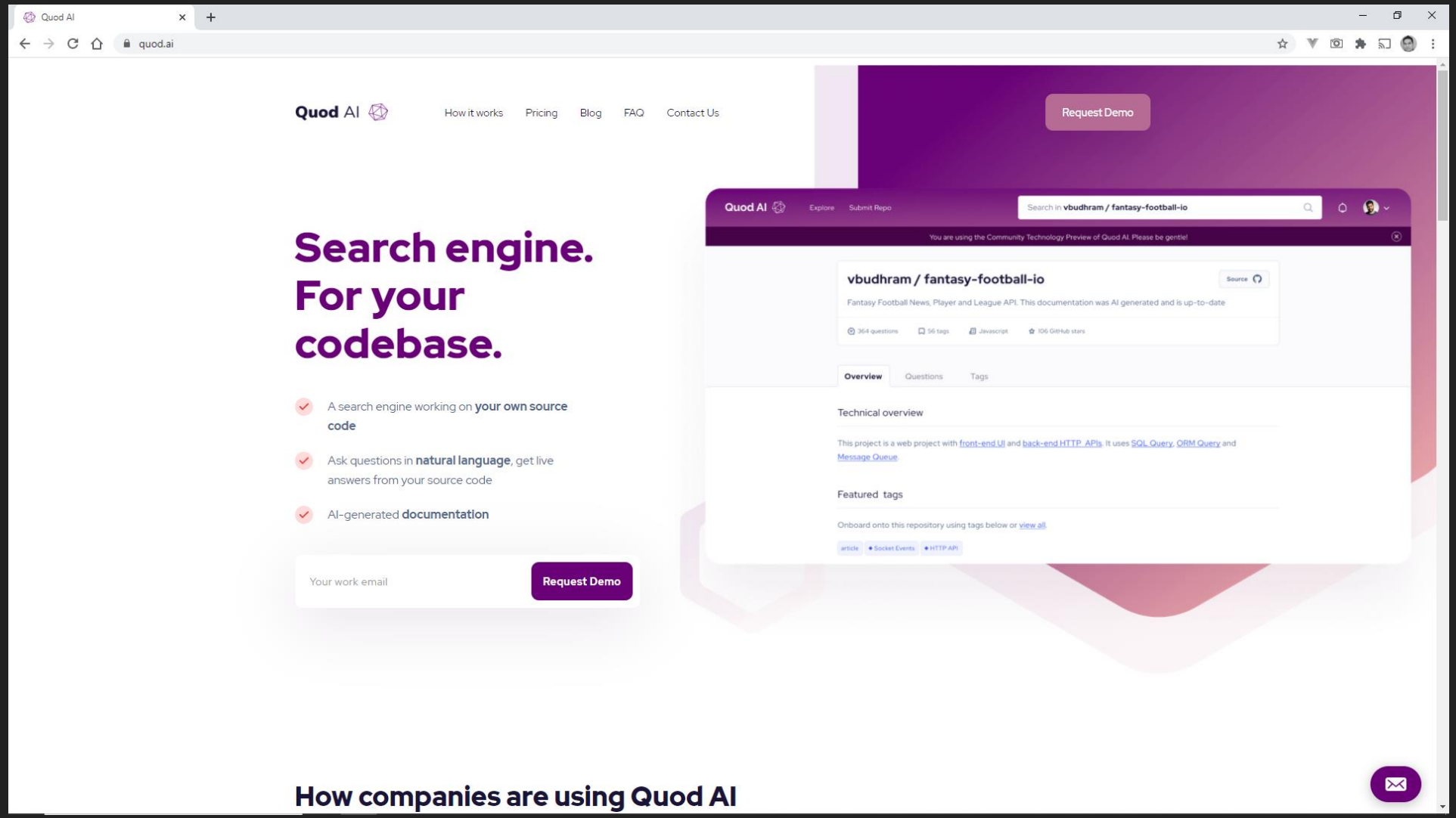
It can be rewarding to utilize Docker and K8s on certain cases

Questions & Answers Section

Credits to the following:

- Joel Khoo (Ninja Captain)
- Michel Do (Chatbot Master)
- Nattavit Kamoltham (CI/CD & AI)
- Jon Scheele for the invite

Searching Serverless Codebase is easier with Quod AI



Thanks for listening to my propositions