USE CASES FOR SERVERLESS TECHNOLOGIES

NICE TO MEET YOU

https://bit.ly/2Ul3L33

Ruslan Tolstov
Ruby Developer at MLSDev

AGENDA

- What is serverless?
- How serverless works?
- Providers
- AWS Lambda
- AWS API Gateway
- Serverless Frameworks
- Cons
- Prices
- Use cases

WHAT IS SERVERLESS?

Serverless architecture replaces long-running virtual machines with ephemeral compute power that comes into existence on request and disappears immediately after use

TRADITIONAL ARCHITECTURE

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- Set up server

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- Set up server
- OS

TRADITIONAL ARCHITECTURE

- Set up server
- OS
- DB

TRADITIONAL ARCHITECTURE

- Set up server
- OS
- DB
- Hardware updates

TRADITIONAL ARCHITECTURE

- Set up server
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- Hardware updates
- Soft updates

TRADITIONAL ARCHITECTURE

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MICROSERVICE ARCHITECTURE

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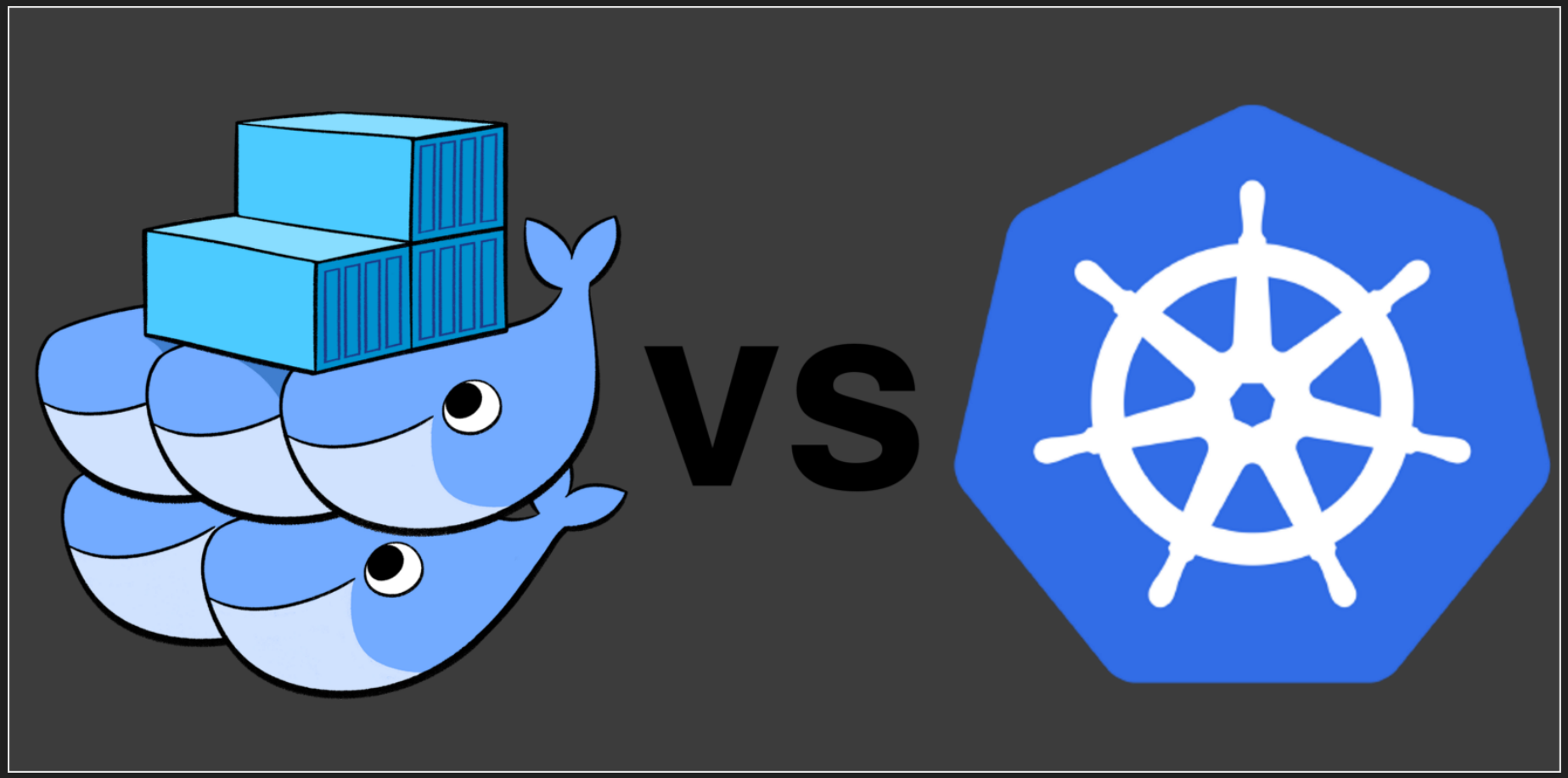


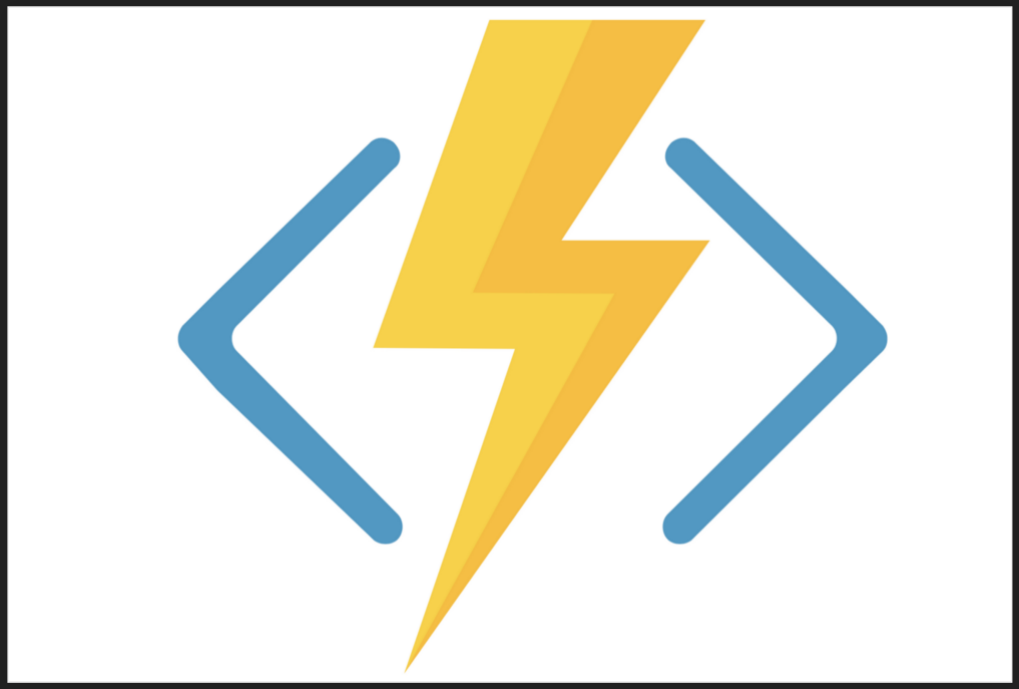
We need DevOps

SERVERLESS ARCHITECTURE

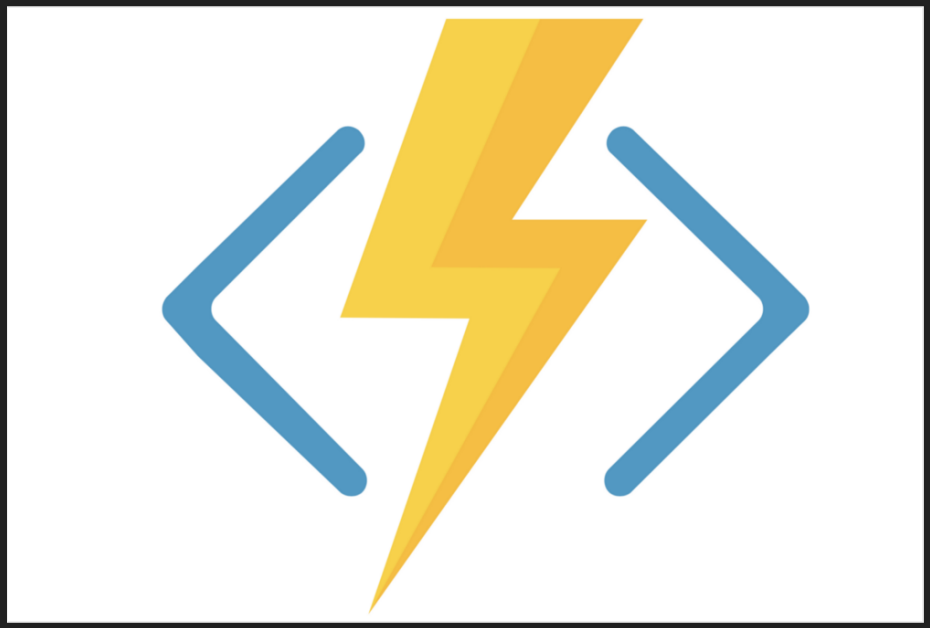
Function-as-a-Service(FaaS)

SERVERLESS ARCHITECTURE

Function-as-a-Service(FaaS)

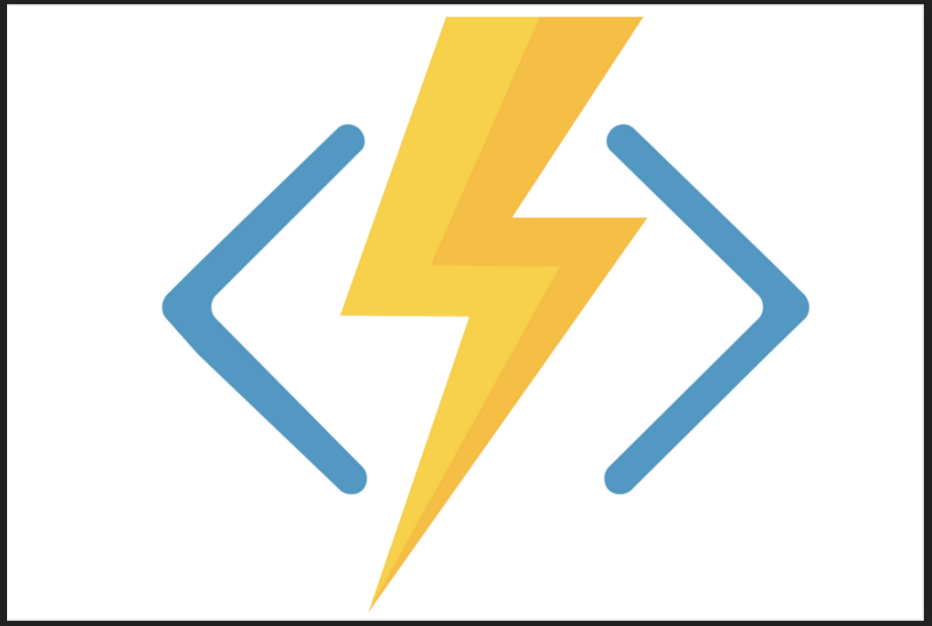


FUNCTION AS A SERVICE (FAAS)



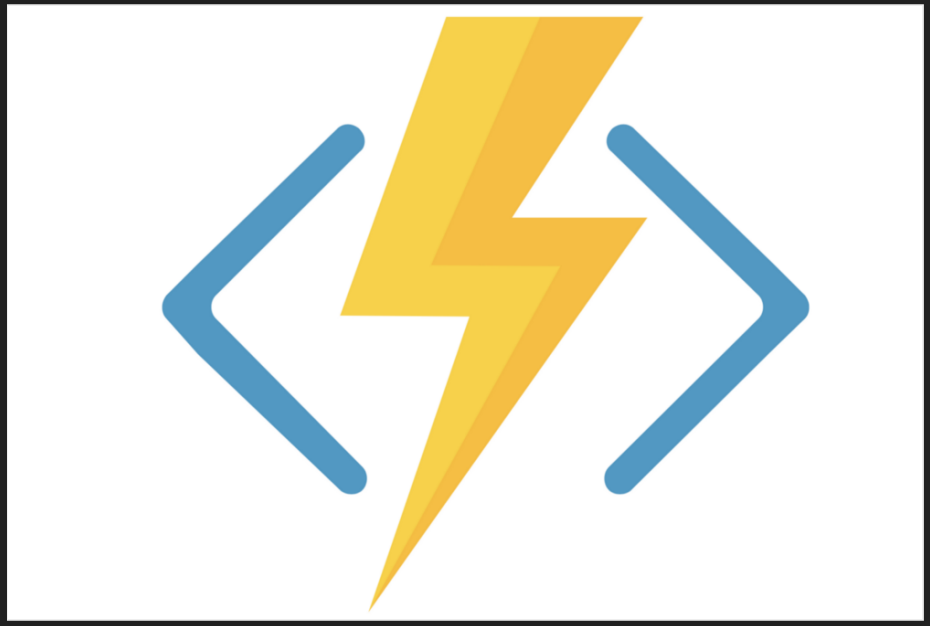
FUNCTION AS A SERVICE (FAAS)

- Function as the unit of deployment and scaling



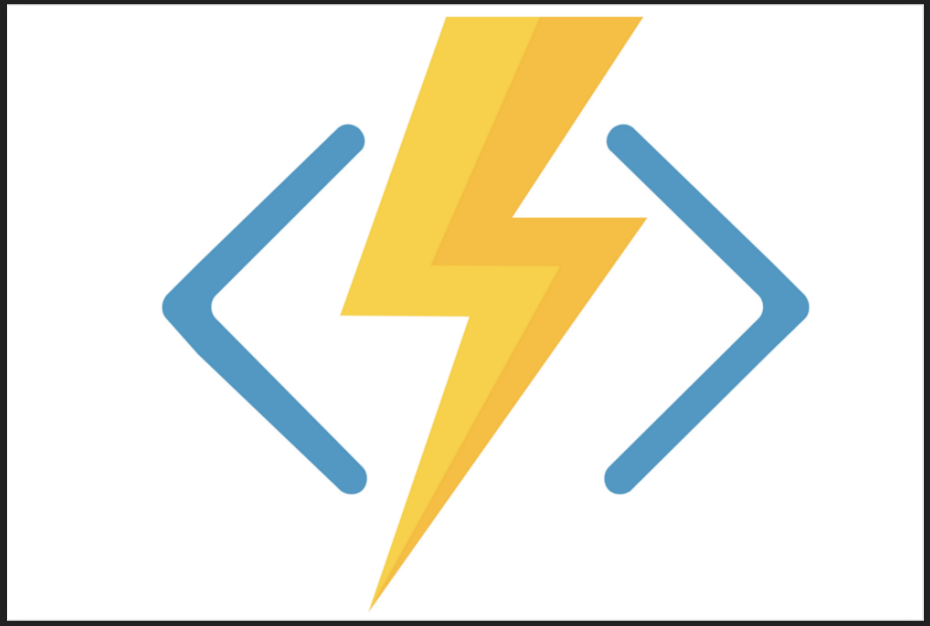
FUNCTION AS A SERVICE (FAAS)

- Function as the unit of deployment and scaling
- Metrics



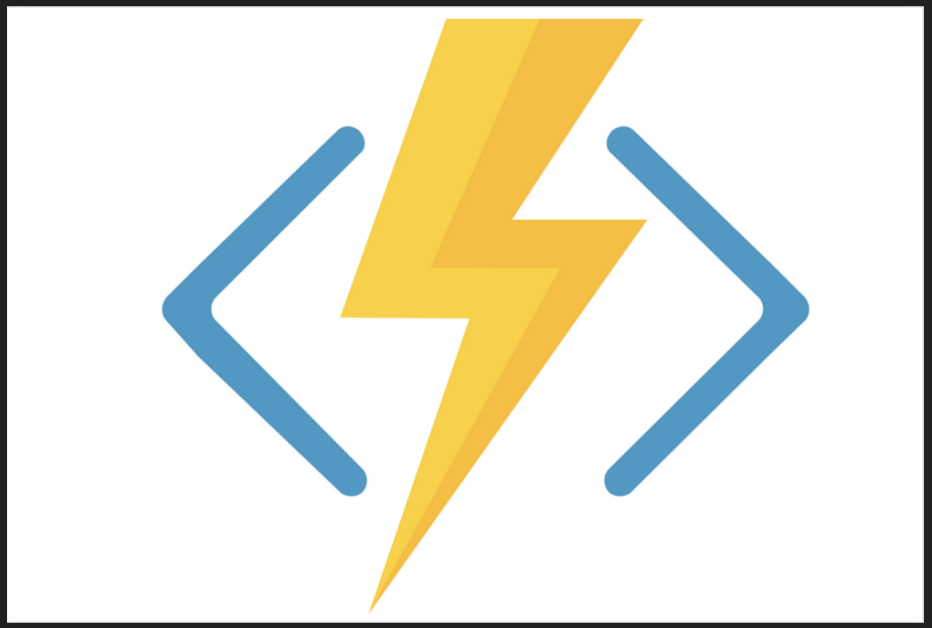
FUNCTION AS A SERVICE (FAAS)

- Function as the unit of deployment and scaling
- Metrics
- No machines, VMs, or containers



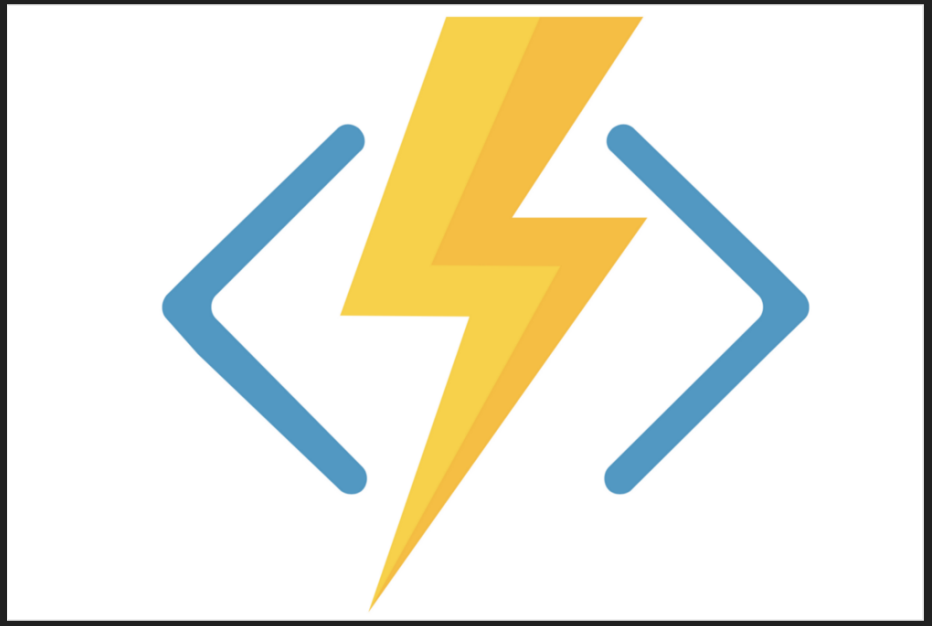
FUNCTION AS A SERVICE (FAAS)

- Function as the unit of deployment and scaling
- Metrics
- No machines, VMs, or containers
- Stateless

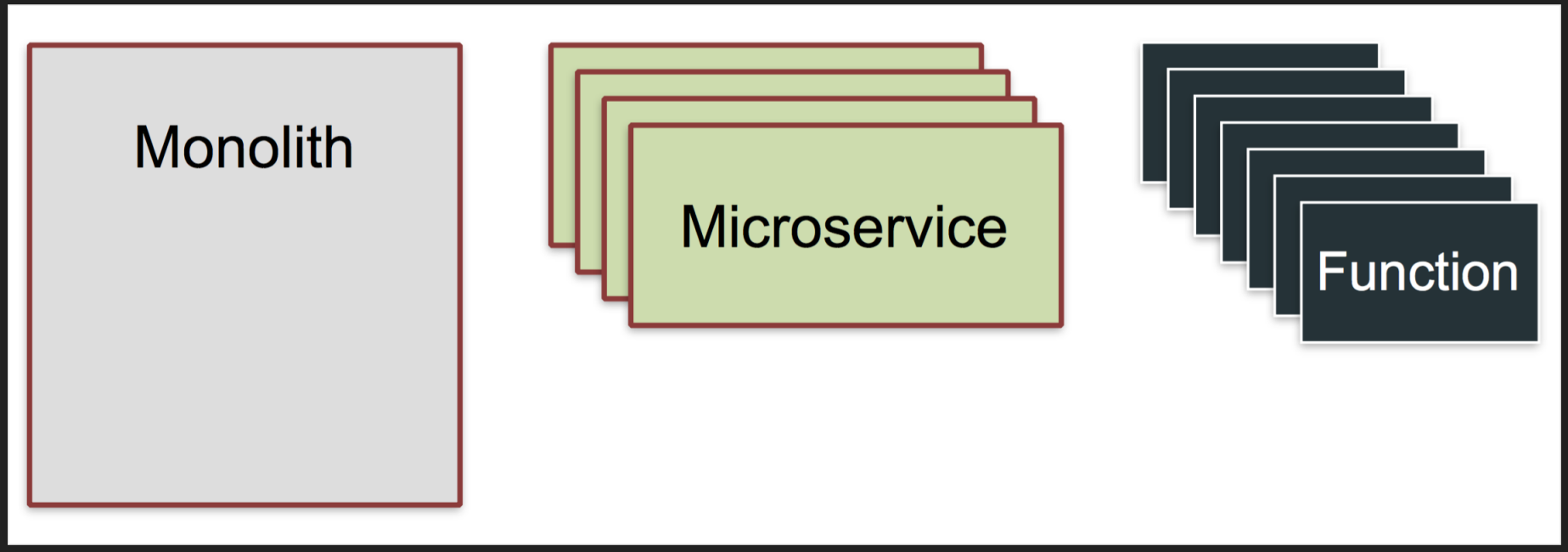


FUNCTION AS A SERVICE (FAAS)

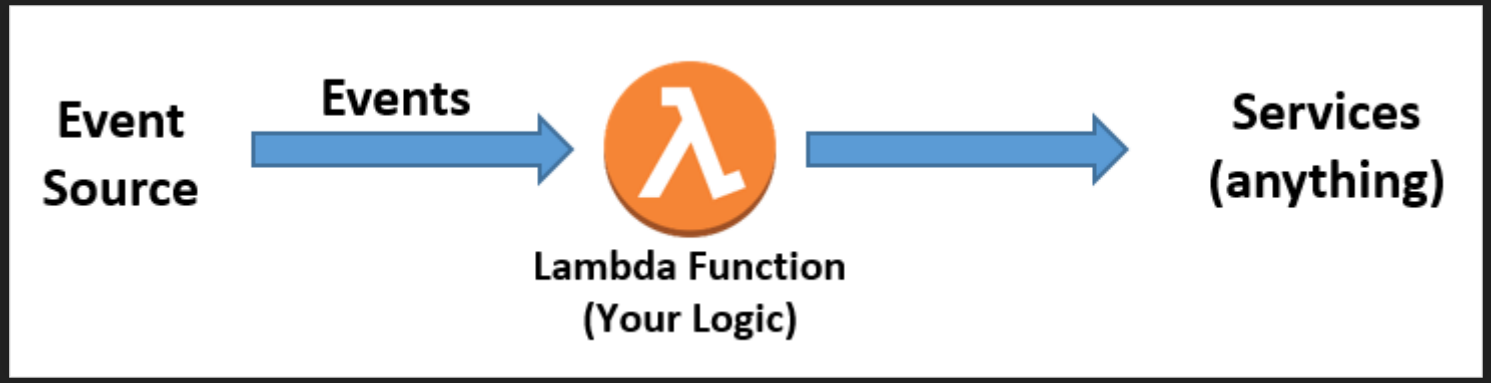
- Function as the unit of deployment and scaling
- Metrics
- No machines, VMs, or containers
- Stateless
- Never pay for idle



SERVERLESS EVOLUTION



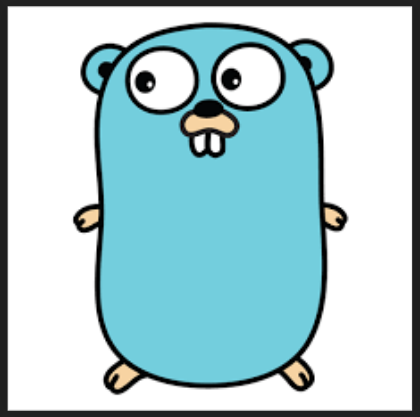
HOW SERVERLESS WORKS?



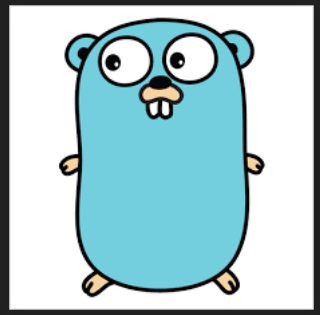
Functions are stateless

VENDORS

GCP SUPPORTED LANGUAGES



AWS SUPPORTED LANGUAGES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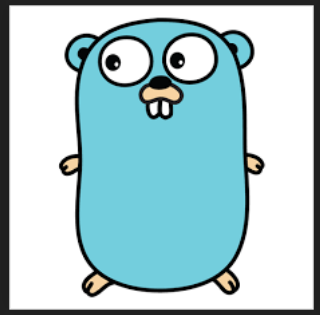


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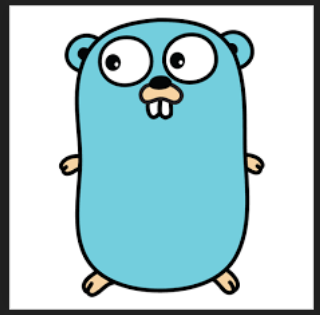


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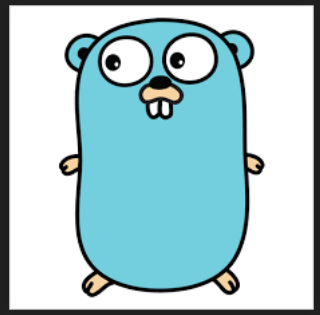
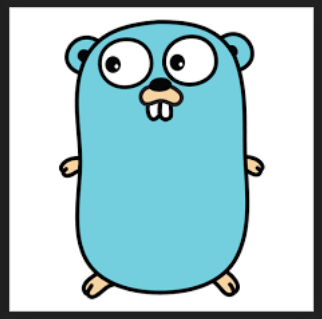
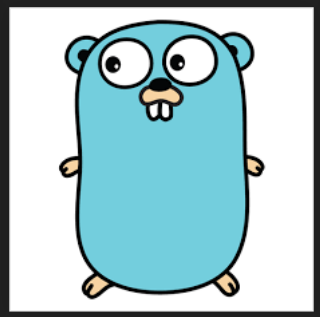



MS AZURE SUPPORTED LANGUAGES


MS AZURE SUPPORTED LANGUAGES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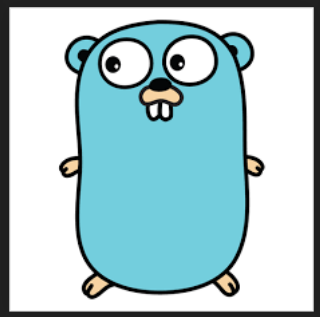


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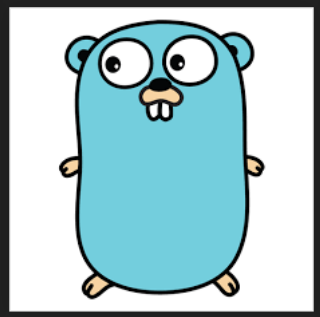



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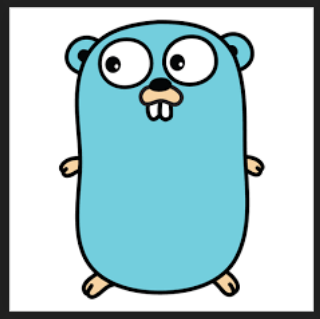



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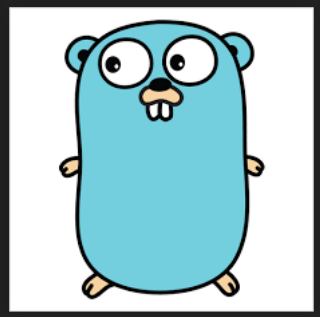
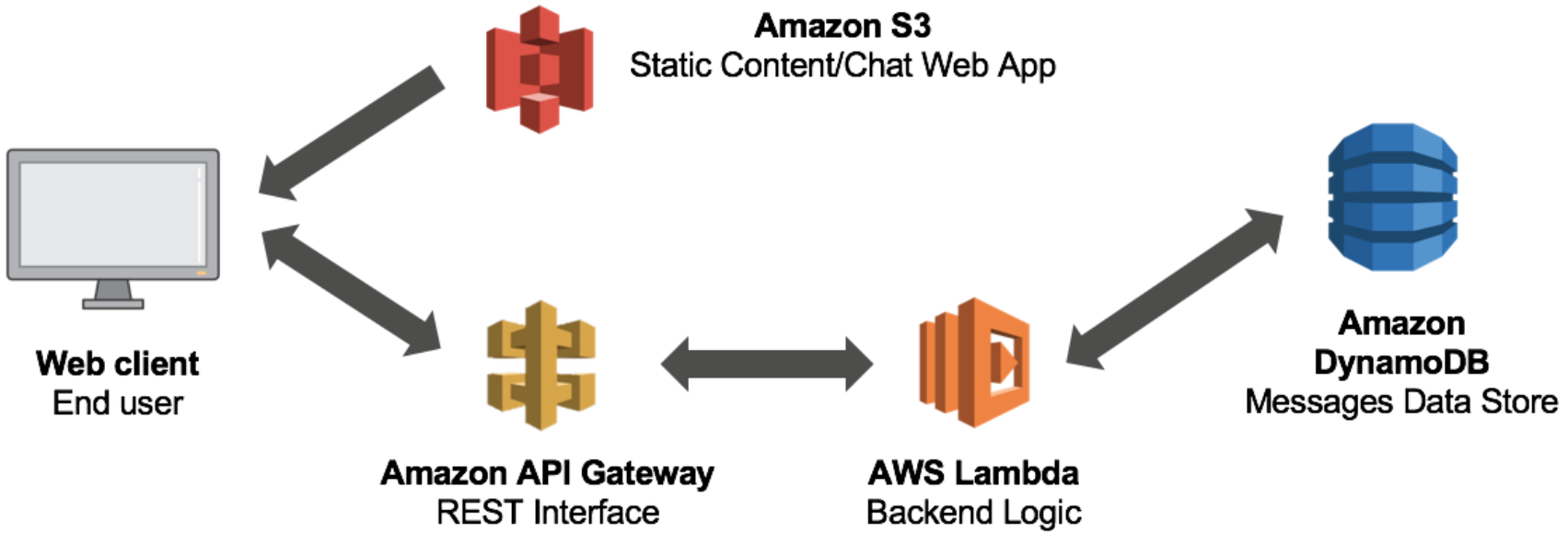
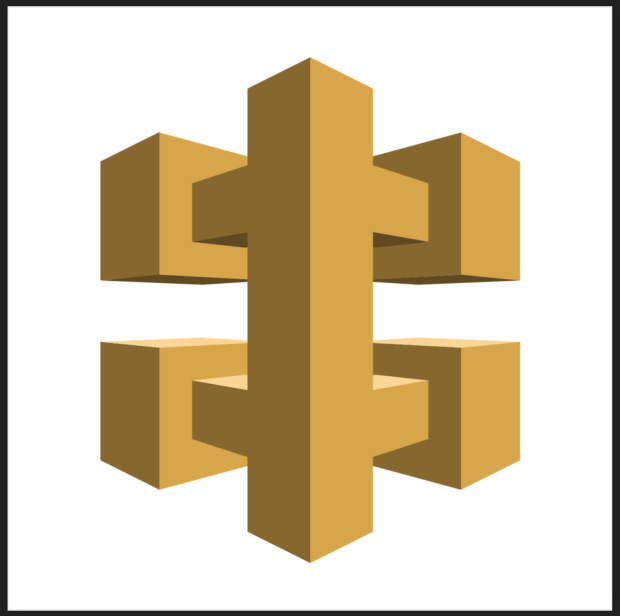





REST API EXAMPLE



AMAZON API GATEWAY

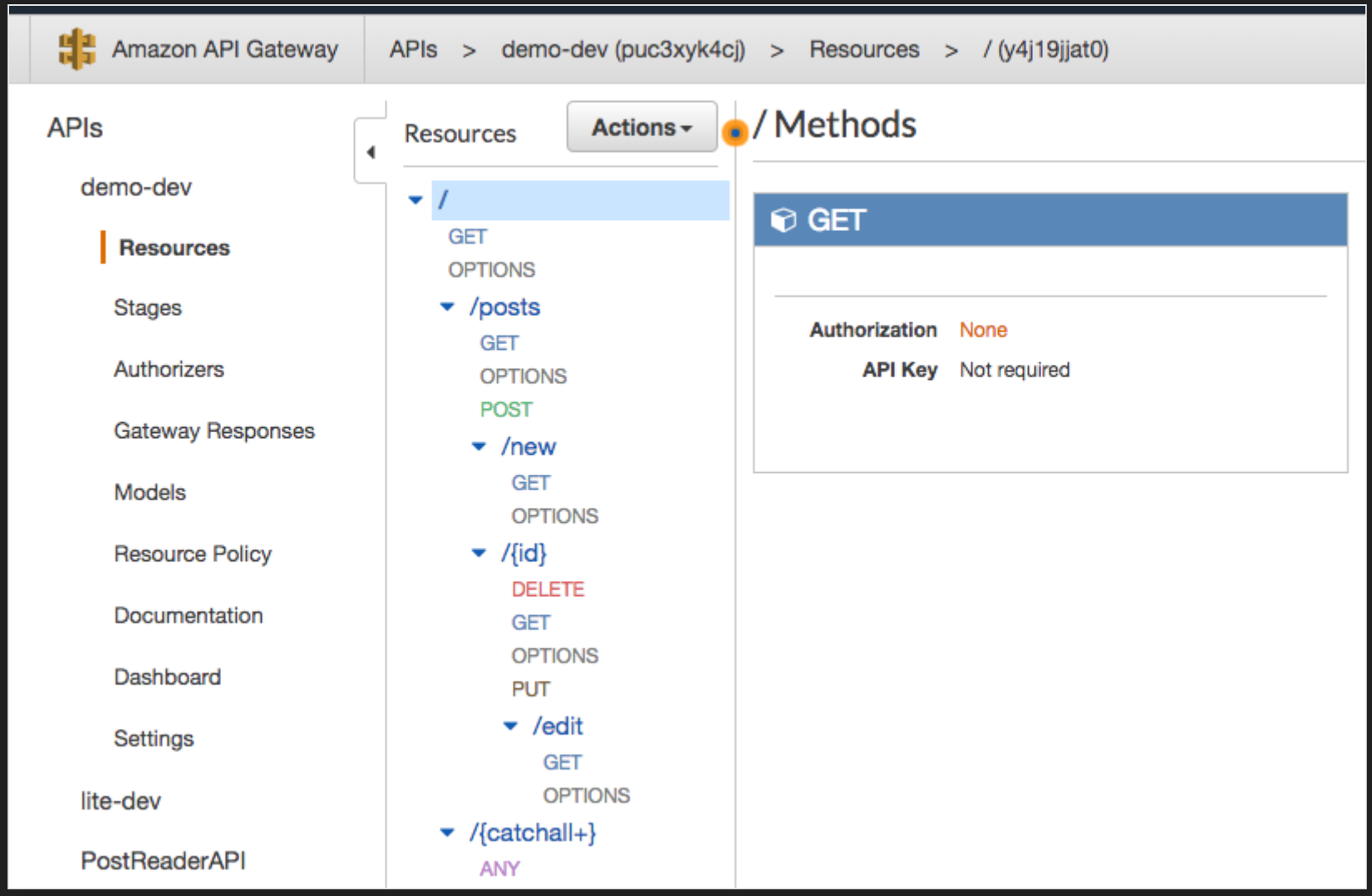


Amazon API Gateway is a fully managed service that makes it easy for developers to create, publish, maintain, monitor, and secure APIs at any scale.

AMAZON API GATEWAY

- Easy API Creation and Deployment
- Support for HTTP/REST APIs and WebSocket APIs
- Resiliency
- API Lifecycle Management
- Monitoring
- Import from swagger/postman

ONLINE EDITOR API GATEWAY



AWS LAMBDA FUNCTION

- AWS Lambda is a compute service that lets you run code without procisioning or managing servers
- AWS Lambda executes your code only when needed and scales automatically, from a few requests per day to thousands per second
- Lambda functions can be used to join thogether many different AWS services
- AWS Services can trigger Lambda functions

ANATOMY OF LAMBDA FUNCTION (RUBY)

```ruby
def handler(event:, context:)
  #some logic
  { status: 200, body: {} }
end
```

ruby2.5

ANATOMY OF LAMBDA FUNCTION (NODEJS)

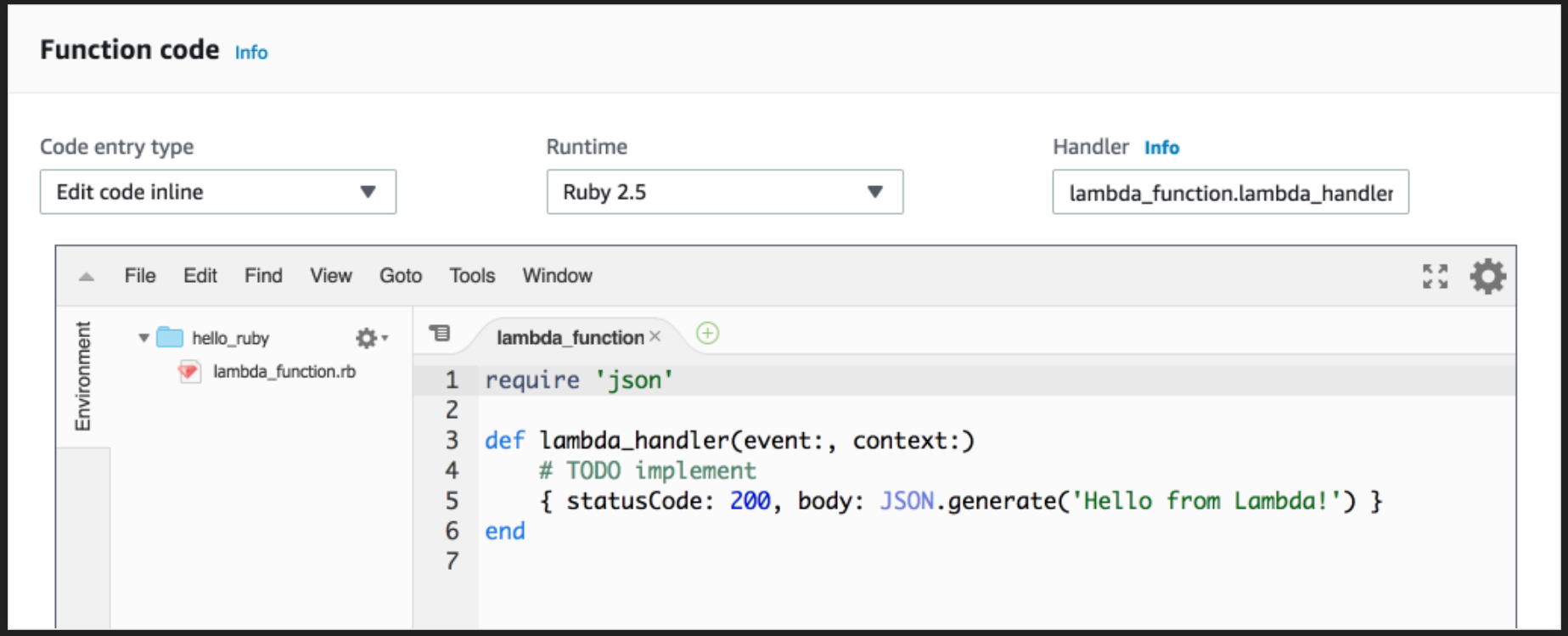
```
exports.handler = function(event, context, callback) {
 //some logic
 callback(null, { status: 200, body: {} })
}
```

nodejs6.10

```
exports.handler = async (event, context) => {
 //some logic
 return { status: 200, body: {} }
}
```

nodejs8.10

ONLINE EDITOR LAMBDA



AWS CLI + ZIP

```
cd lambda
zip –X –r ../index.zip *
aws lambda update-function-code --function-name
    MyLambdaFunction --zip-file fileb://index.zip
```

AWS CLI + CLOUDFORMATION OR SAM


```
{
  "AWSTemplateFormatVersion": "2010-09-09",
  "Description": "The AWS CloudFormation template for this Serverless application",
  "Resources": {
    "ResizeCategoryLogGroup": {
      "Type": "AWS::Logs::LogGroup",
      "Properties": {
        "LogGroupName": "/aws/lambda/lvg-develop-reports"
      }
    },
    "ResizeCategoryLambdaFunction": {
      "Type": "AWS::Lambda::Function",
      "Properties": {
        "Code": {
          "S3Bucket": "lvg-cloudformation",
          "S3Key": "serverless/lvg/develop/1553255530306-2019-03-22T11:52:10.306Z/lvg.zip"
        },
        "FunctionName": "lvg-develop-reports",
        "Handler": "handler-reports.handler",
        "MemorySize": 320,
        "Role": "arn:aws:iam::704493629240:role/lvgRole",
        "Runtime": "nodejs8.10",
        "Timeout": 300,
        "Environment": {
          "Variables": {
            "STAGE": "develop",
```

SERVERLESS FRAMEWORKS

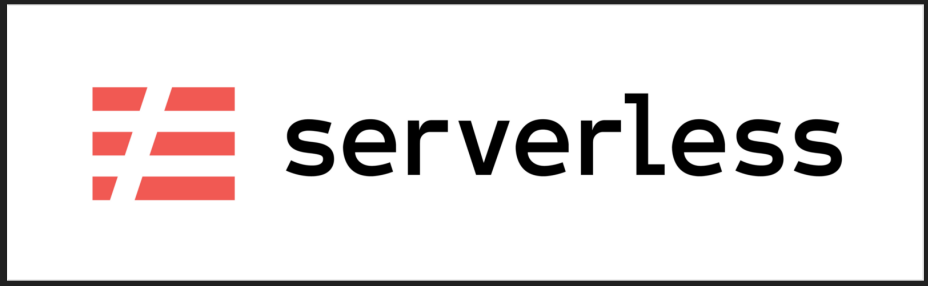
APEX
serverless architecture

Claudia.js

SPARTA

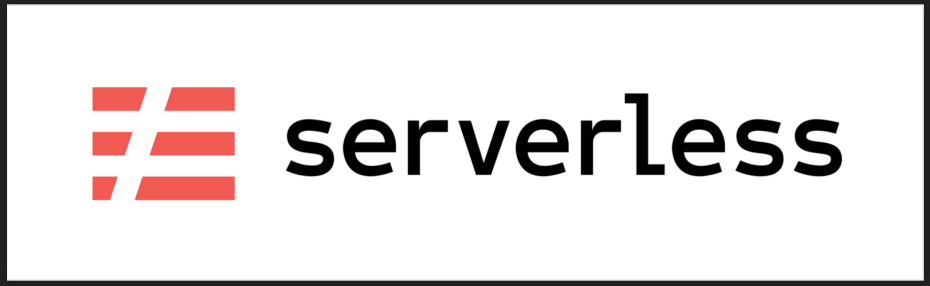
serverless

SERVERLESS FRAMEWORK



SERVERLESS FRAMEWORK

- Cross vendor support



SERVERLESS FRAMEWORK

- Cross vendor support
- Dozens of plugins

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- Cross vendor support
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- YAML

SERVERLESS FRAMEWORK

- Cross vendor support
- Dozens of plugins
- YAML
- Invoke function localy

SERVERLESS FRAMEWORK

- Cross vendor support
- Dozens of plugins
- YAML
- Invoke function localy
- MIT License

SERVERLESS CONFIG

```
service: serverless-thumbnail
runtime: ruby2.5
provider:
  name: aws
  timeout: 30
  memorySize: 128
  role: ${env:AWS_ROLE}
  deploymentBucket:
    name: ${env:DEPLOYMENT_BUCKET}
  iamRoleStatements:
  - Effect: Allow
    Action:
    - s3:putObject
    Resource: '*'
functions:
  thumbnail:
    events:
      - http: get thumbnail
    handler: handler.thumbnail
resources:
  Resources:
    NewResource:
      Type: AWS::S3::Bucket
```

DEPLOY

```
serverless deploy
```

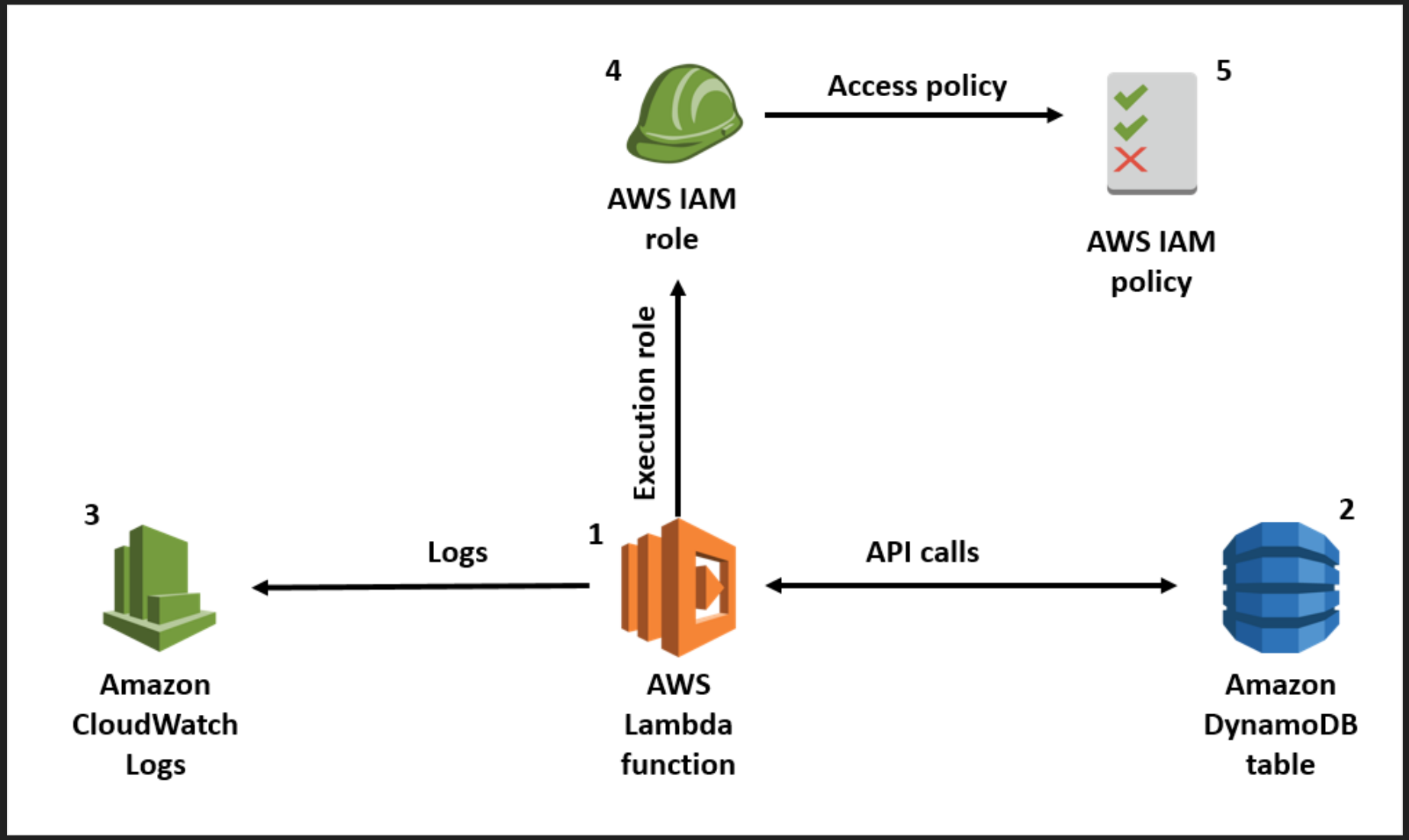
SERVERLESS CLI

```
serverless deploy -f sendEmail

serverless invoke local --function sendEmail

serverless logs -f sendEmail
```

SERVERLESS PLUGINS

- serverless-plugin-existing-s3
- serverless-dotenv-plugin
- serverless-secrets-plugin
- serverless-offline
- serverless-dynamodb-local

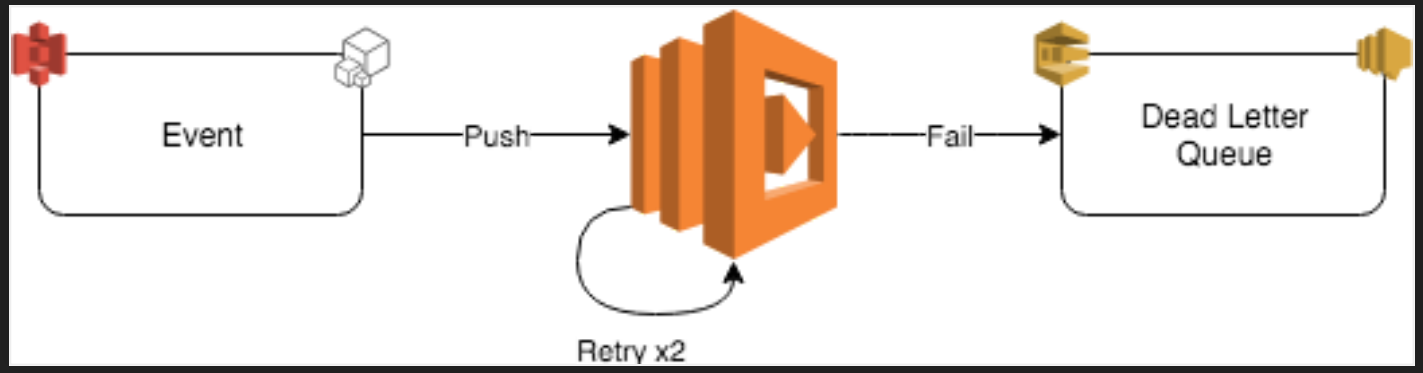
PERMISSIONS



INVOCATION TYPES

- Synchronous
- Asynchronous

RETRY BEHAVIOUR



DLQ - Dead Letter Queue

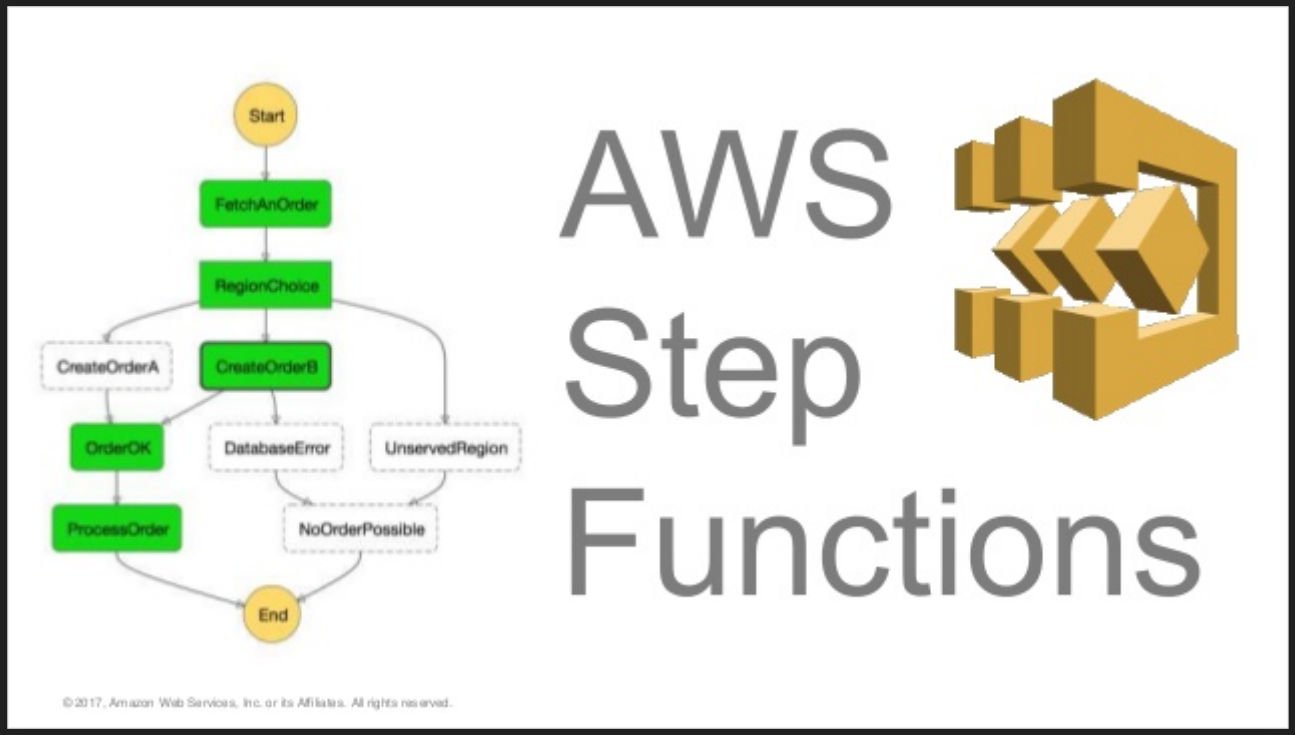
BINARIES

Your libraries must be for the Linux x64 platform/architecture.

```
npm --arch=x64 --platform=linux
```

or deploy with CI, docker container

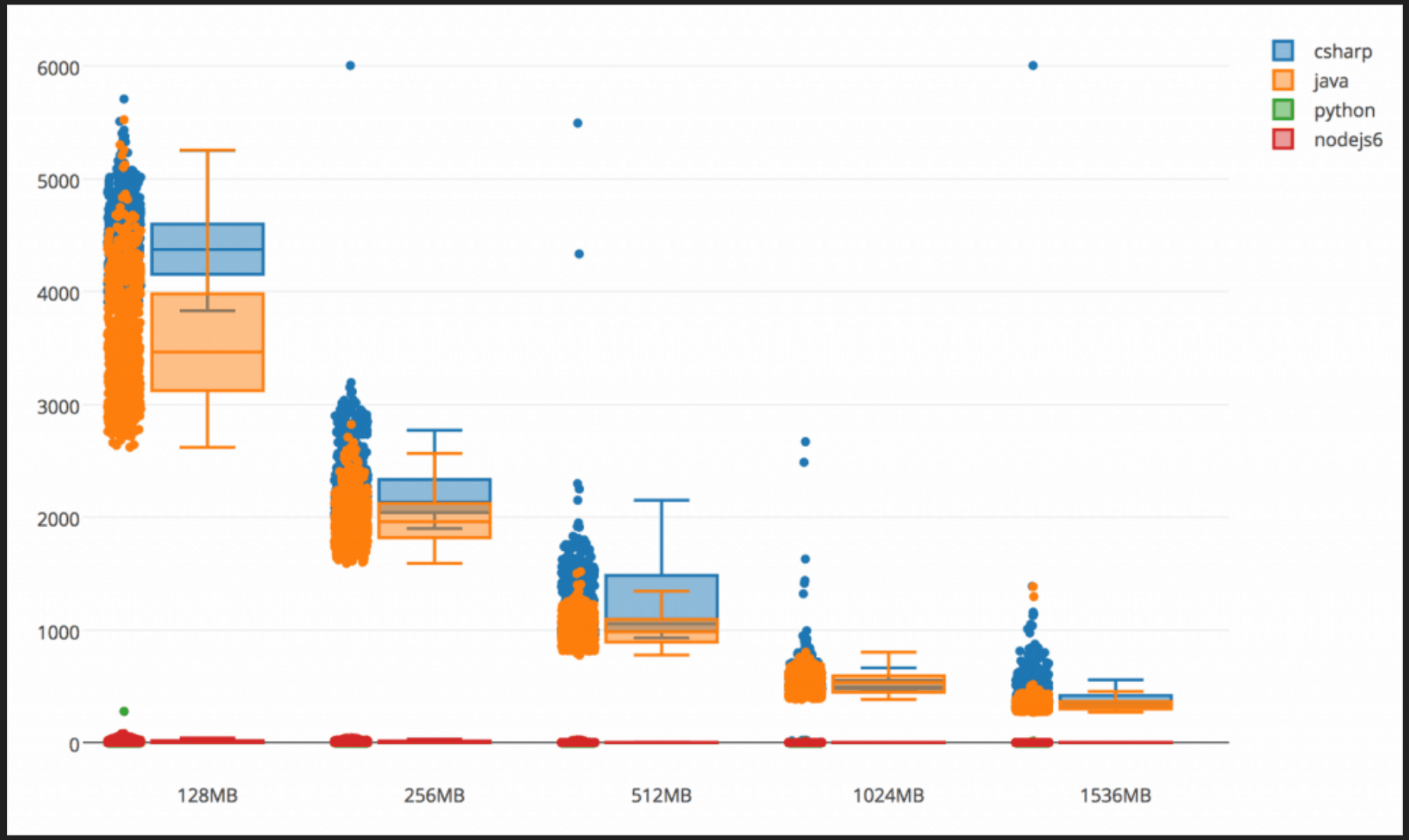
STEP FUNCTIONS



CONS

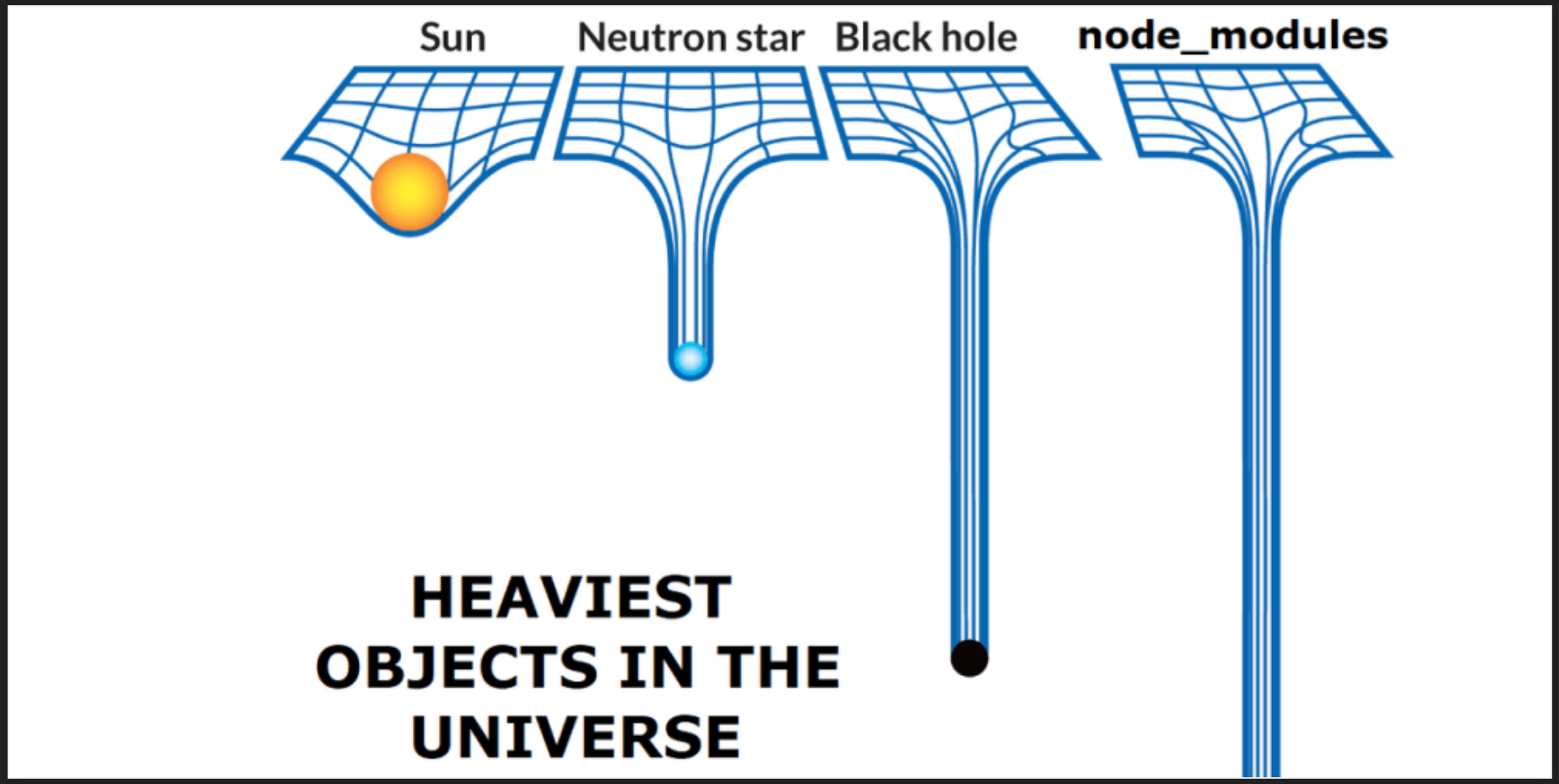
STATELESS

COLDSTART TIME

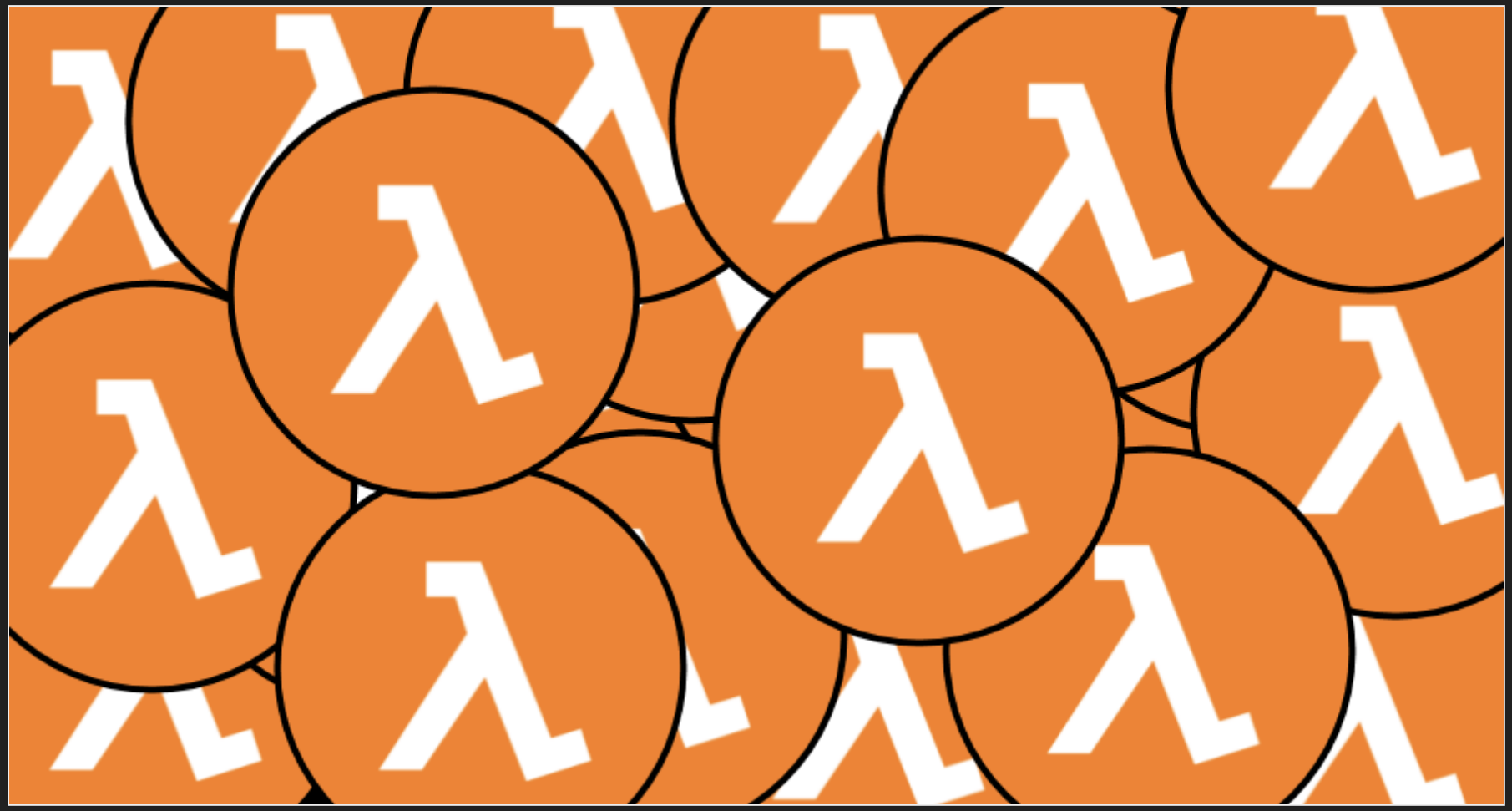


LAMBDA LIMITS

- /tmp directory storage - 512 MB
- Function timeout - 900 seconds (15 minutes)
- Body payload size - sync 6MB, async 128KB
- Function memory allocation - 128 MB to 3008 MB
- Deployment package size - 50 MB (zipped), 250 MB (unzipped)
- Concurrent executions - 1000 (per account)


Sun
Neutron star
Black hole
node_modules
HEAVIEST OBJECTS IN THE UNIVERSE

LAMBDA SCALING



1000+

VENDOR LOCK

OPENFAAS

OpenFaaS® (Functions as a Service) is a framework for building Serverless functions with Docker and Kubernetes which has first-class support for metrics. Any process can be packaged as a function enabling you to consume a range of web events without repetitive boiler-plate coding.

PRICES

FREE TIER

	IBM OpenWhisk	AWS Lambda	Azure Functions	GCP Functions
Requests	5M reqs	1M reqs	1M reqs	2M reqs
GB/s (compute time)	$0.000017 per GB-s	400,000 GB-s	400,000 GB-s	400,000 GB-s
Networking	None	None	None	5GB out

Compute Time = Invocations × Duration × RAM / 1024

PRICES

	IBM OpenWhisk	AWS Lambda	Azure Functions	GCP Functions
Requests	N/A	$0.2 per 1M requests	$0.2 per 1M requests	$0.4 Per 1M requests
GB/s (compute time)	$0.000017 per GB-s	$0.000016 per GB-s	$0.000016 per GB-s	$0.00000231/GB-s
Data Transfer (IN)	Free	$0.1-$0.2 between VPCs/regions	Free	Free
Data Transfer (OUT)	$0.05- $0.09 per GB	$0.05- $0.09 per GB	$0.05- $0.09 per GB	$0.12 per GB
API Gateway	Free	$3.50 per 1M calls	Free	$3.00 per 1M calls

LOW COMPUTE USE CASE

Low Compute Use Case

- Allocated memory 512 MB
- No. of invocations: 20,000 times/month
- Execution duration: 1 sec

AWS Lambda	
GB-sec = 20,000 * 512/1024	10,000 GB-sec
Compute charges = 10,000 * 0.00001667	$0.1667
Request charges = (20,000/1,000,000) * $0.2/Million	$0.004
Total	$0.1707

EC2 (on-demand t2.nano)	
$0.0081 * 24 * 30	$5.832
Total	$5.832

HIGH COMPUTE USE CASE

High Compute Use Case

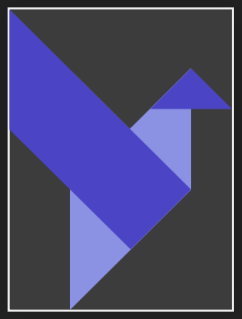
- Allocated memory 2496 MB
- No. of invocations: 30,000,000 times/month
- Execution duration: 500 sec

AWS Lambda	
GB-sec = 30,000,000 * 0.5s * 2496/1024	36,562,500 GB-sec
Compute charges = 36,562,500 * 0.00001667	$609.5
Request charges = (30,000,000/1,000,000) * $0.2/Million	$6
Total	$615.5

EC2 (on-demand m4.large)	
$0.192 * 24 * 30	$138.24
Total	$138.24

3RD PARTY TOOLS

- Epsagon
- Thundra
- Dashbird
- Sentry
- Rollbar



USE CASES

- Web appliactions
- IoT
- Media Transformation (audio/video/image)
- Multi-Location Media Transformation with **Lambda@Edge** and **CloudFront**
- Mass Emailing
- Real-time Data Transformation
- CRON Jobs with **CloudWatch**
- Chatbot
- ~~Websockets~~

CONCLUSIONS

- Keep the Lambda handler lean
- Avoid hardcoding, use enviroment variables
- One function, One task
- Watch the deployment package size, remove unused dependencies
- Make use of error handling mechanisme, DLQs
- Keep containers warm
- Use frameworks

THANKS!

QUESTIONS