What's New with AWS Lambda

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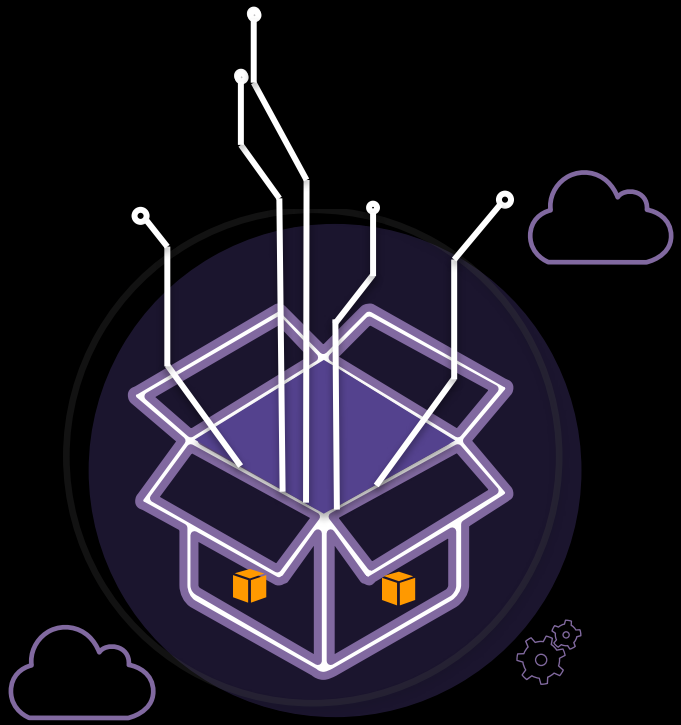
julsimon@amazon.fr

@julsimon

amazon web services

Capabilities of a serverless platform



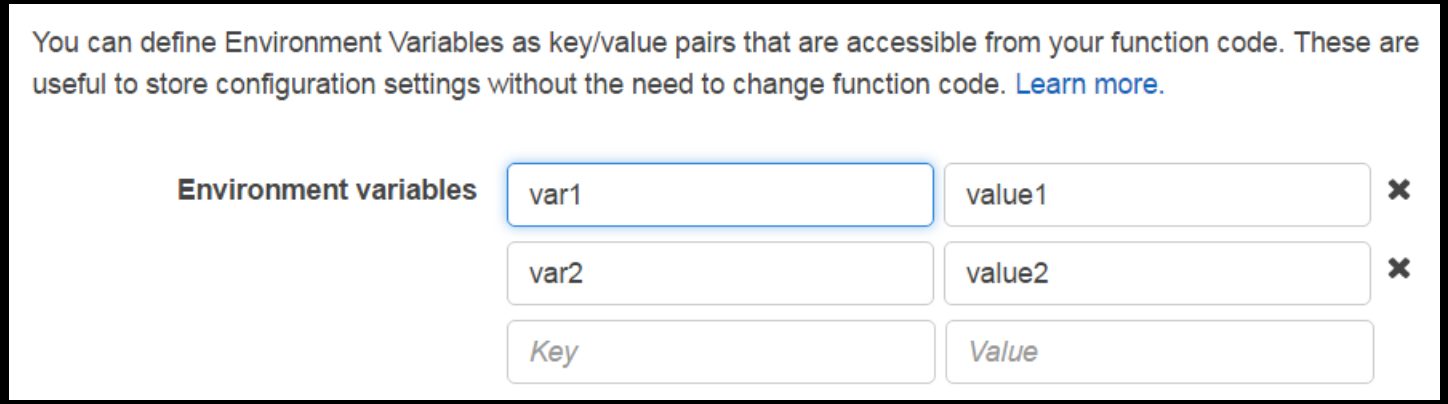
- Cloud Logic Layer
- Orchestration and State Management
- Responsive Data Sources
- Application Modeling Framework
- Developer Ecosystem
- Integrations Library
- Security and Access Control
- Reliability and Performance
- Global Scale

CI/CD for serverless apps

- New features
- AWS SAM
- SAM in AWS CloudFormation
- Serverless CI/CD pipelines
  - with AWS CodePipeline and AWS CodeBuild

Environment variables for Lambda functions

New




```
var AWS = require('aws-sdk');

    exports.handler = function(event, context, callback) {

        var bucketName = process.env.S3_BUCKET;
        callback(null, bucketName);
        });
    }
```

AWS Serverless Application Model ("SAM") New

- A common language for describing the contents of a serverless app.
- CloudFormation now "speaks serverless" with native support for SAM.
- New CloudFormation tools to package and deploy Lambda-based apps.
- Export Lambda blueprints and functions in SAM from the AWS Lambda console.

AWS Serverless Application Model

New

```
AWSTemplateFormatVersion: '2010-09-09'
Transform: AWS::Serverless-2016-10-31
Resources: GetHtmlFunction:
Type: AWS::Serverless::Function
Properties:
CodeUri: s3://flourish-demo-bucket/todo_list.zip
Handler: index.gethtml
Runtime: nodejs4.3
Policies: AmazonDynamoDBReadOnlyAccess
Events:
GetHtml: Type: Api
Properties: Path: /{proxy+} Method: ANY
ListTable: Type: AWS::Serverless::SimpleTable
```

Functions

APIs

Storage

AWS Serverless Application Model

New

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Properties: Path: /{proxy+} Method: ANY
ListTable: Type: AWS::Serverless::SimpleTable
```

REPLACES:

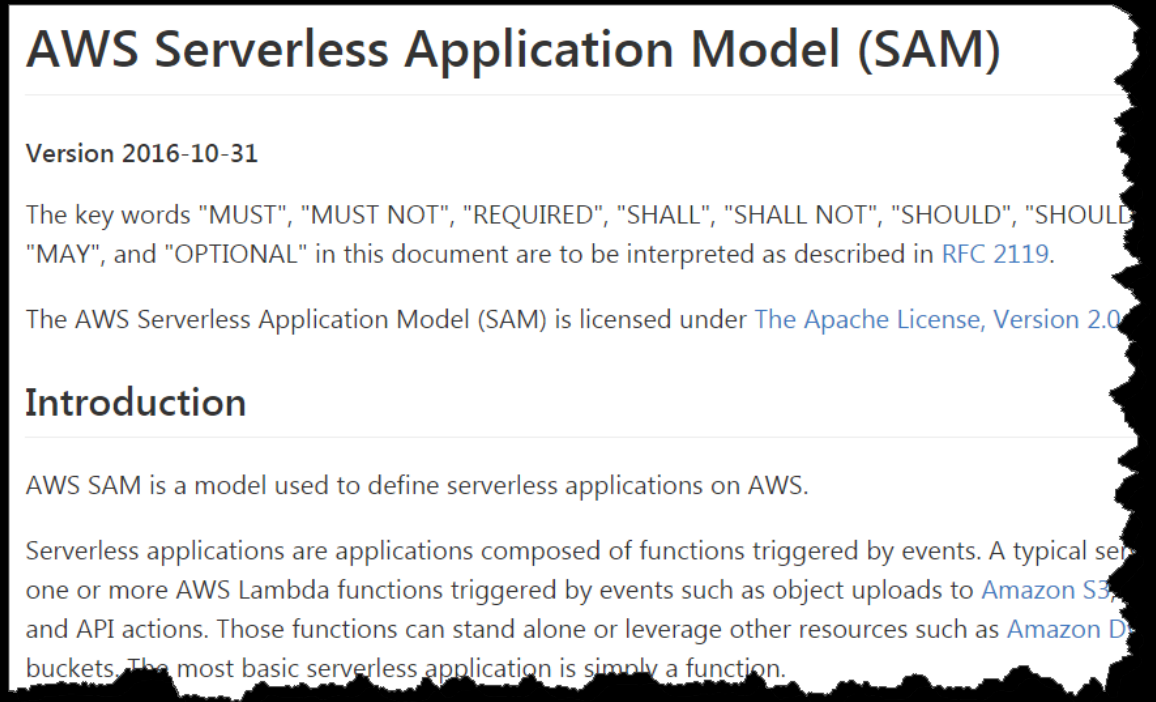
```
AWSTemplateFormatVersion: '2010-09-09'
Resources:
GetHtmlFunctionGetHtmlPermissionProd:
Type: AWS::Lambda::Permission
Properties:
Action: lambda:invokeFunction
Principal: apigateway.amazonaws.com
FunctionName:
Ref: GetHtmlFunction
SourceArn:
Fn::Sub: arn:aws:execute-api:$
{AWS::Region}:${AWS::AccountId}:$
{ServerlessRestApi}/Prod/ANY/*
ServerlessRestApiProdStage:
Type: AWS::ApiGateway::Stage
Properties:
DeploymentId:
Ref: ServerlessRestApiDeployment
RestApiId:
Ref: ServerlessRestApi
StageName: Prod
ListTable:
Type: AWS::DynamoDB::Table
Properties:
ProvisionedThroughput:
WriteCapacityUnits: 5
ReadCapacityUnits: 5
AttributeDefinitions:
- AttributeName: id
AttributeType: S
KeySchema:
- KeyType: HASH
AttributeName: id
GetHtmlFunction:
Type: AWS::Lambda::Function
Properties:
Handler: index.gethtml
Code:
S3Bucket: flourish-demo-bucket
S3Key: todo_list.zip

Role:
Fn::GetAtt:
- GetHtmlFunctionRole
- Arn
Runtime: nodejs4.3
GetHtmlFunctionRole:
Type: AWS::IAM::Role
Properties:
ManagedPolicyArns:
-
arn:aws:iam::aws:policy/AmazonDynamoDB
ReadOnlyAccess
-
arn:aws:iam::aws:policy/service-role/AWSLa
mbdaBasicExecutionRole
AssumeRolePolicyDocument:
Version: '2012-10-17'
Statement:
- Action:
- sts:AssumeRole
Effect: Allow
Principal:
Service:
- lambda.amazonaws.com
ServerlessRestApiDeployment:
Type: AWS::ApiGateway::Deployment
Properties:
RestApiId:
Ref: ServerlessRestApi
Description: 'RestApi deployment id:
127e3fb91142ab1ddc5f5446adb094442581a
90d'
StageName: Stage
GetHtmlFunctionGetHtmlPermissionTest:
Type: AWS::Lambda::Permission
Properties:
Action: lambda:invokeFunction
Principal: apigateway.amazonaws.com
FunctionName:
Ref: GetHtmlFunction
SourceArn:
Fn::Sub: arn:aws:execute-api:$
{AWS::Region}:${AWS::AccountId}:$
{ServerlessRestApi}/*/ANY/*
ServerlessRestApi:
Type: AWS::ApiGateway::RestApi
Properties:
Body:
info:
version: '1.0'
title:
Ref: AWS::StackName
paths:
"/{proxy+}":
x-amazon-apigateway-any-method:
x-amazon-apigateway-integration:
httpMethod: ANY
type: aws_proxy
uri:
Fn::Sub: arn:aws:apigateway:$
{AWS::Region}:lambda:path/2015-03-
31/functions/${GetHtmlFunction.Arn}/
invocations
responses: {}
swagger: '2.0'
```

SAM: Open Specification New

A common language to describe the content of a serverless application *across the ecosystem*.

Apache 2.0 licensed GitHub project



AWS Serverless Application Model (SAM)

Version 2016-10-31

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD
"MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119.

The AWS Serverless Application Model (SAM) is licensed under The Apache License, Version 2.0

Introduction

AWS SAM is a model used to define serverless applications on AWS.

Serverless applications are applications composed of functions triggered by events. A typical se
one or more AWS Lambda functions triggered by events such as object uploads to Amazon S3,
and API actions. Those functions can stand alone or leverage other resources such as Amazon D
buckets. The most basic serverless application is simply a function.

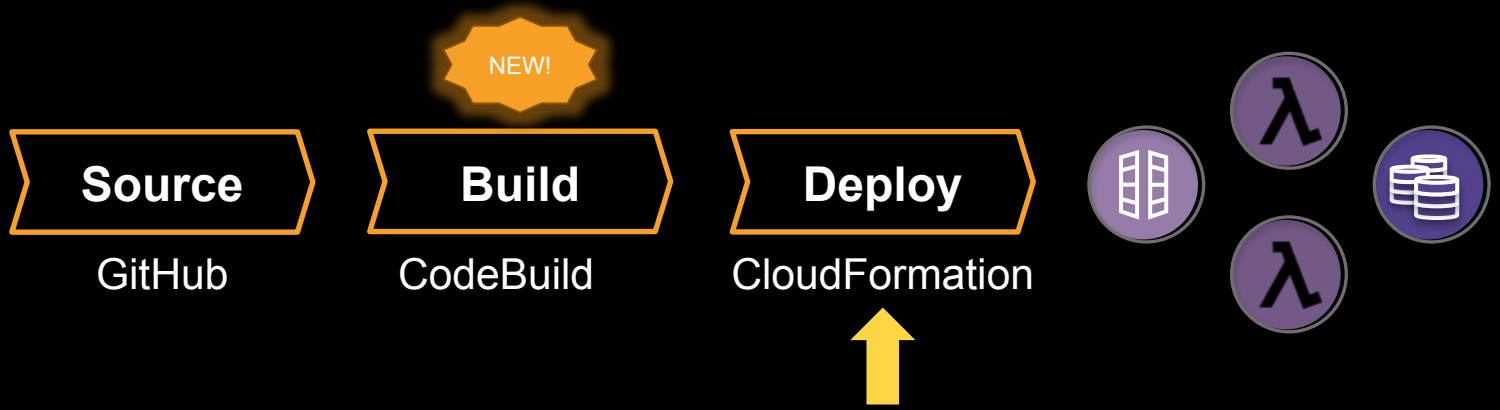
Serverless CI/CD pipeline

- Pull source directly from GitHub or CodeCommit using CodePipeline

Serverless CI/CD pipeline

- Pull source directly from GitHub or AWS CodeCommit using AWS CodePipeline
- Build and package serverless apps with AWS CodeBuild
  - npm, pip, Java compilation, BYO Docker…

Serverless CI/CD pipeline



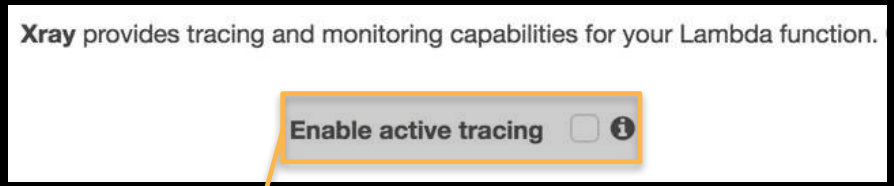
- Pull source directly from GitHub or AWS CodeCommit using AWS CodePipeline
- Build and package serverless apps with AWS CodeBuild
- Deploy your completed Lambda app with AWS CloudFormation

How do I diagnose Lambda apps?

Introducing X-Ray Preview

Gain visibility into events traveling through services

Trace calls and timing from Lambda functions to other AWS services



Easy configuration

Easy setup

```
1  const AWSXRay = require('aws-xray-sdk');
2
3  exports.handler = AWSXRay.captureLambda((event, context, callback) => {
4      const segment = context.xrayContext.segment;
5      // TODO implement
6      callback(null, 'Hello from Lambda');
7  });
```

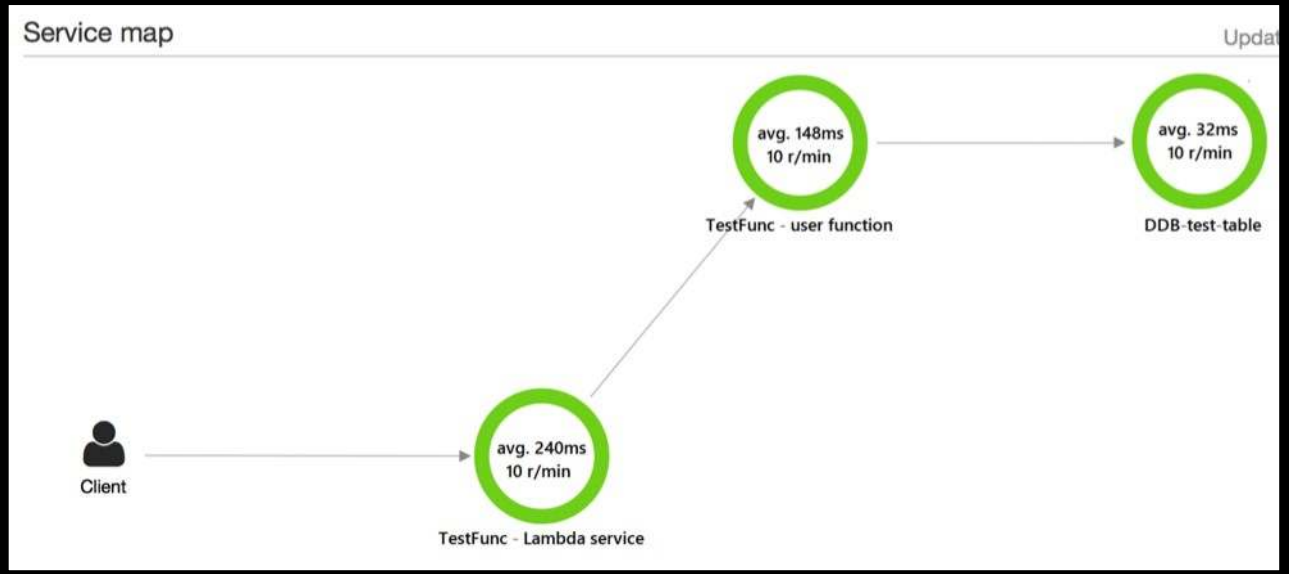
Lambda support coming soon

Introducing X-Ray Preview

View the dynamic topology of your application

See actual dependencies among microservice components

Easily detect and diagnose missing events and throttles

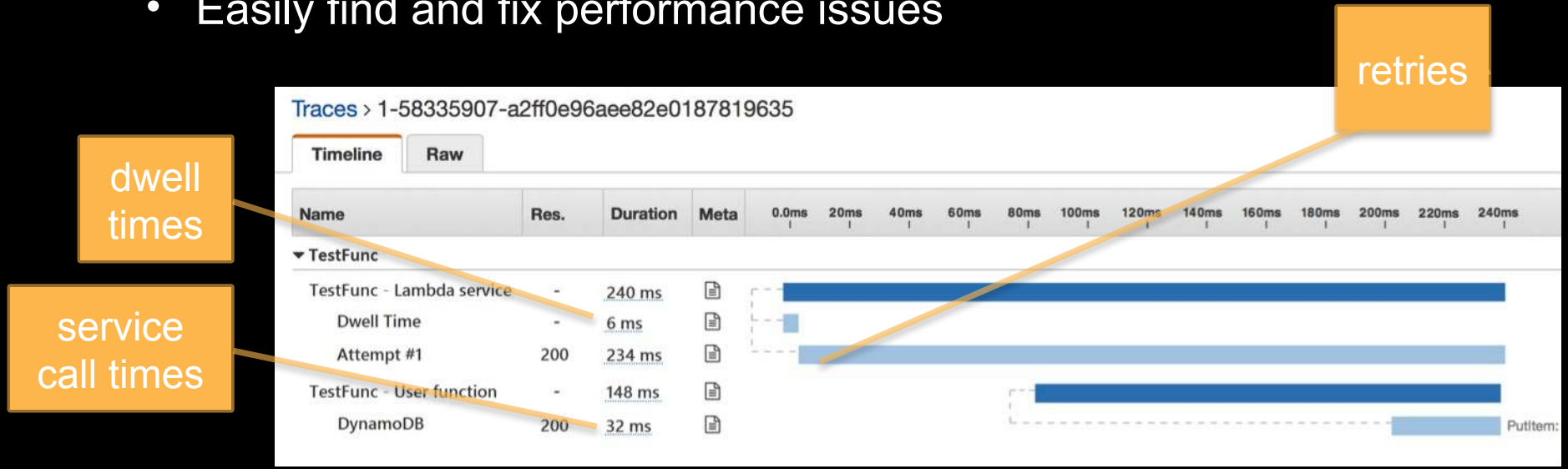


Introducing X-Ray Preview

See dwell time and retries for async invokes

Profile performance of calls your code makes to other AWS services

- Detect failures in event processing
- Easily find and fix performance issues



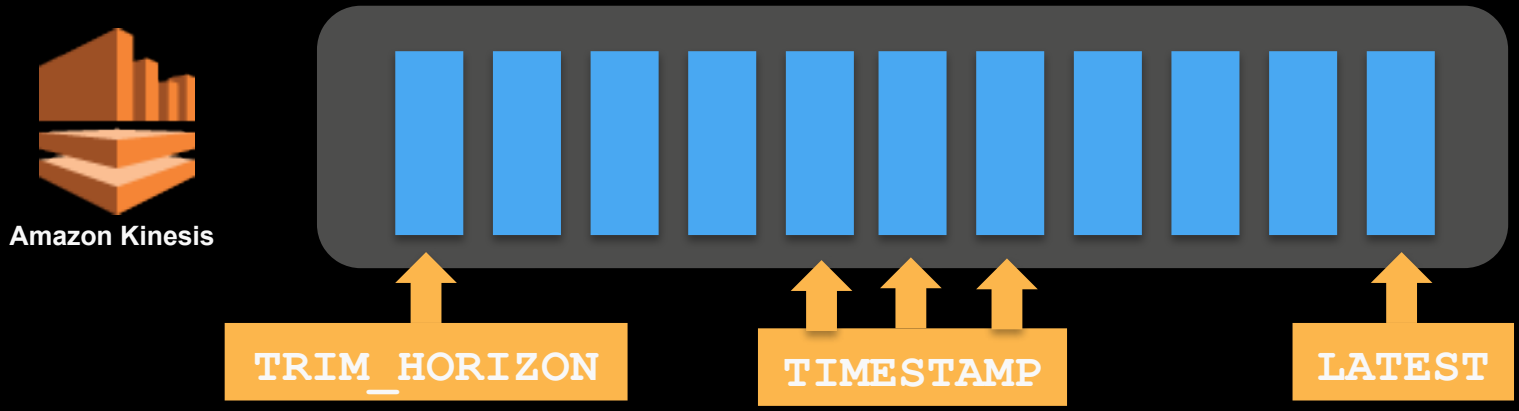
New Lambda features

- `AT_TIMESTAMP` Amazon Kinesis iterator
- C# with .NET Core
- Dead letter queue

AT_TIMESTAMP Amazon Kinesis iterator

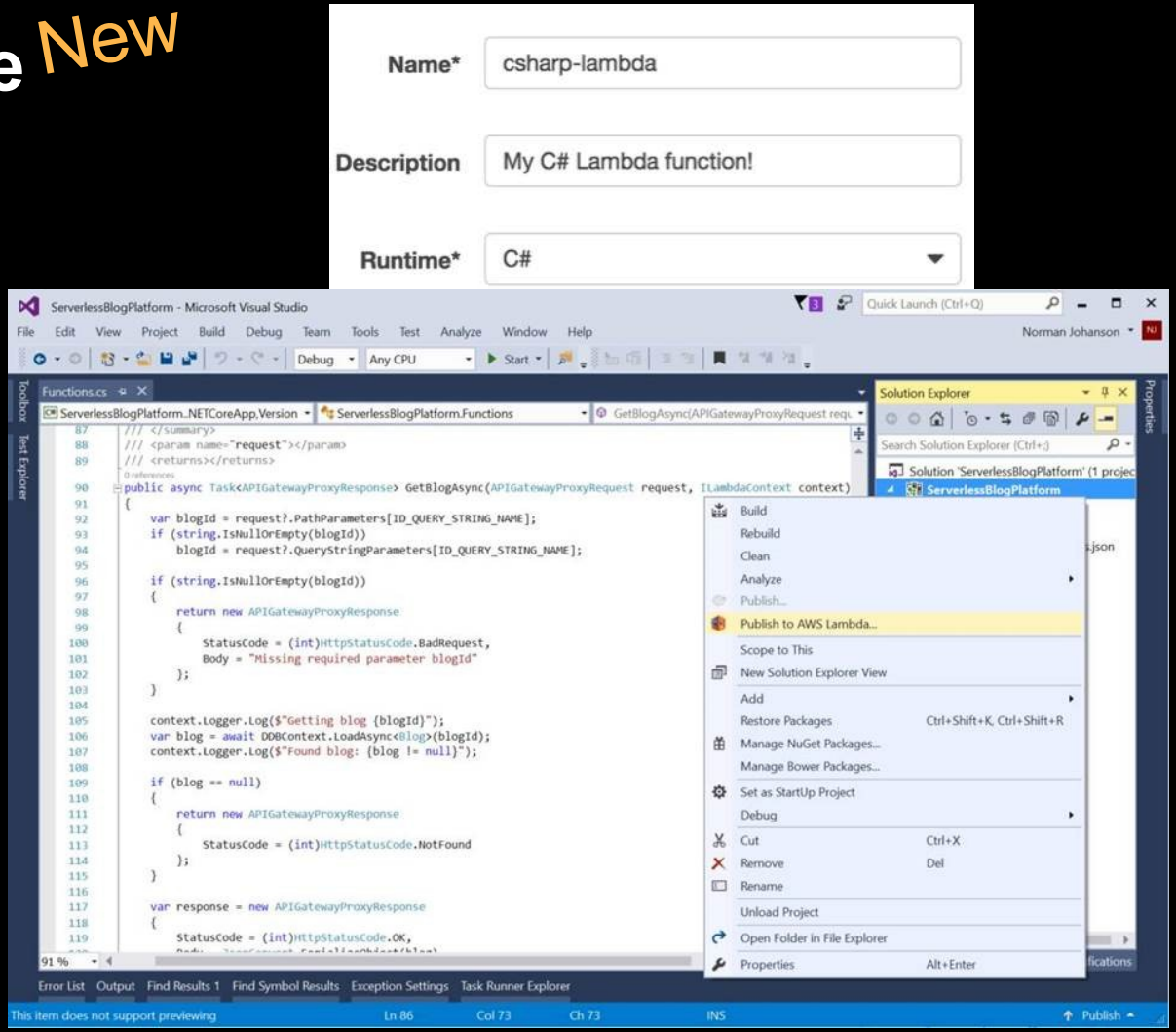
New

- Process streaming data in Amazon Kinesis at any point in time
- Stop and start processing without rewinding or losing data



C# and .NET Core New

- Write Lambda functions in C#
- netcoreapp 1.0 on Amazon Linux
- Built-in logging and metrics
- Supports common AWS event types (S3, SNS)

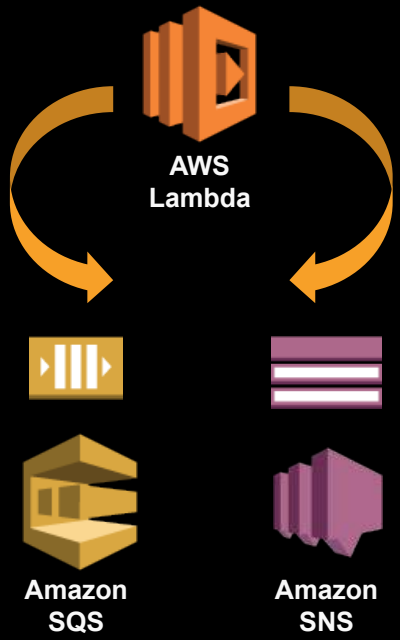


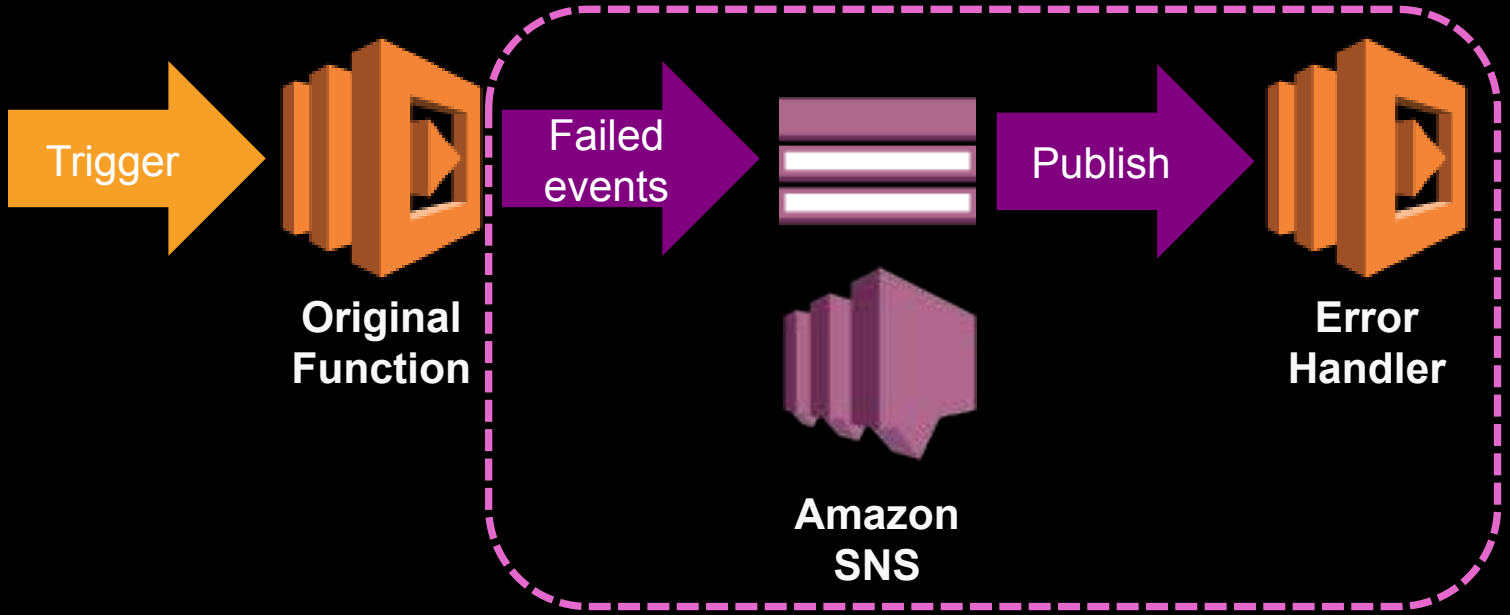
Dead-letter queue for events

New

Easily create reliable end-to-end event processing solutions

- Sends all unprocessed events to your SQS queue or SNS topic: 3 strikes rule
- Preserves events *even if your code has an issue* or the call was throttled
- Per-function
- Works for all async invokes, *including S3 and SNS events*





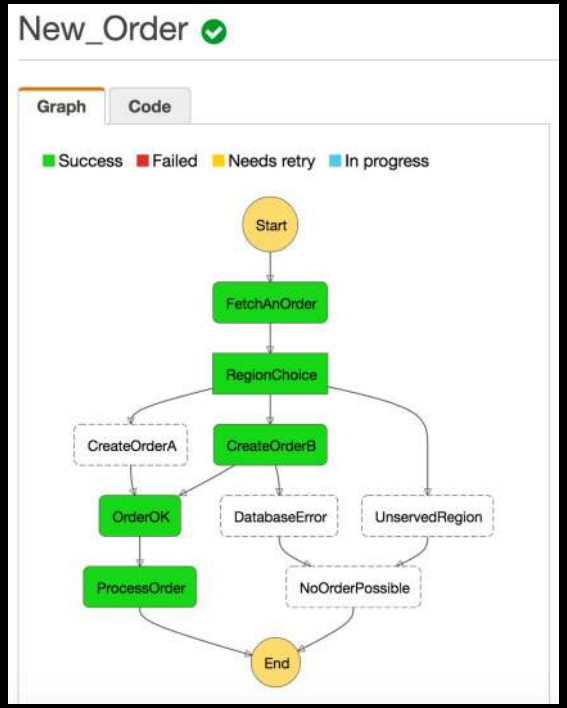
Lambda DLQ in action

Orchestrating Lambda functions

AWS Step Functions New

Reliably orchestrate multiple Lambda functions

Attempt a function more than 3X
Add callbacks to asynchronous functions
Handle situations that require waiting
Chain function execution (A→B→C)
Supports long-running workflows

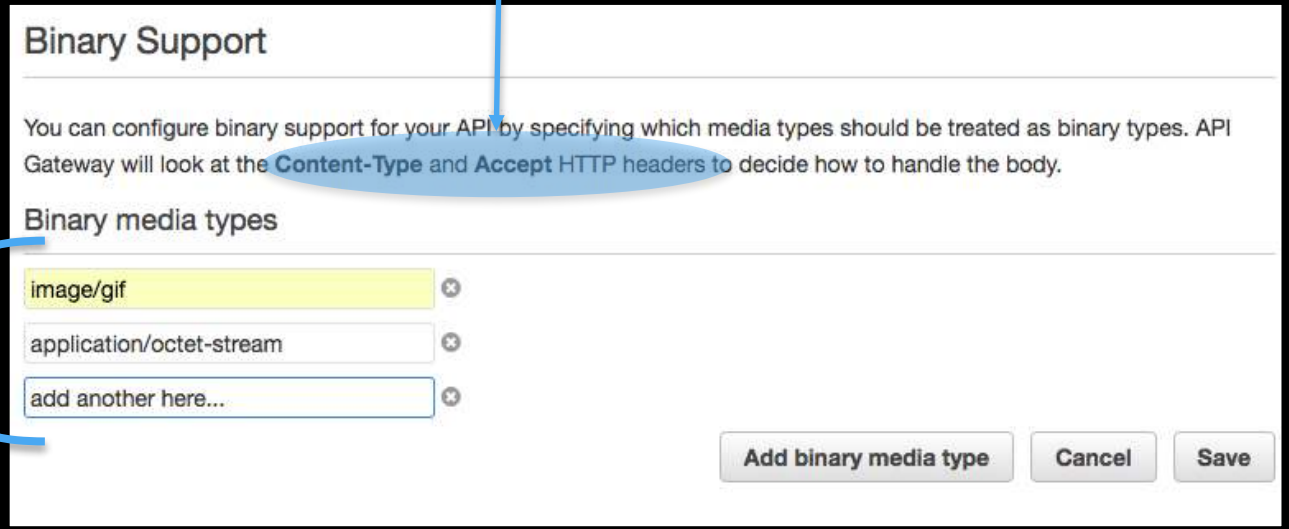


New API Gateway features

- Binary encoding
- Documentation support
- AWS Marketplace SaaS integration
- Developer Portal Reference Implementation

Binary encoding New

Uses Content-Type and Accept headers

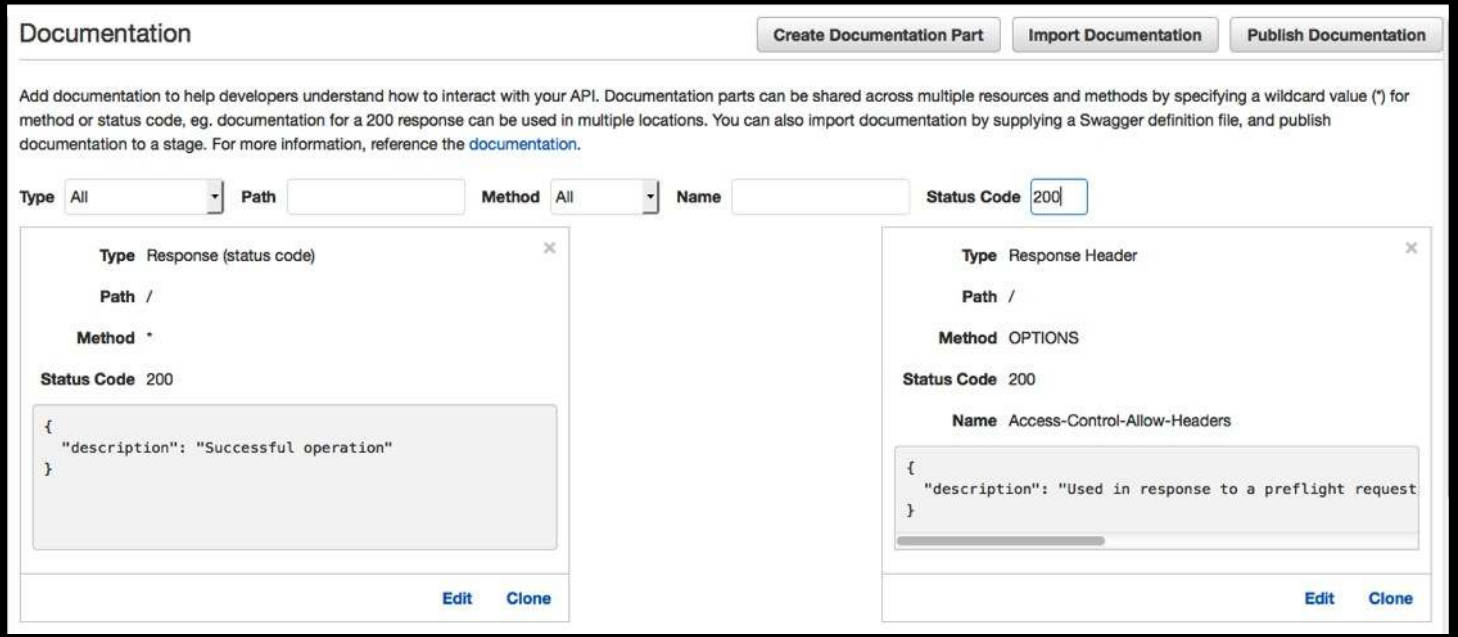


Serve images, audio, and other binary content

Automatically base64-encodes Lambda integrations

API documentation New

- Document your APIs – edit doc parts directly in the API Gateway console
- Swagger import/export – fully round-trip-able
- Supports tech writers – independent update and publish flow



API Gateway and AWS Marketplace integration New

- Use API Gateway to simplify building and operating APIs
- Sell your APIs on the AWS Marketplace
- Easy discovery and procurement for your API's consumers
- Track API usage by consumer / key
- Automated billing through AWS

URL Reputation APIs

Speech understanding APIs

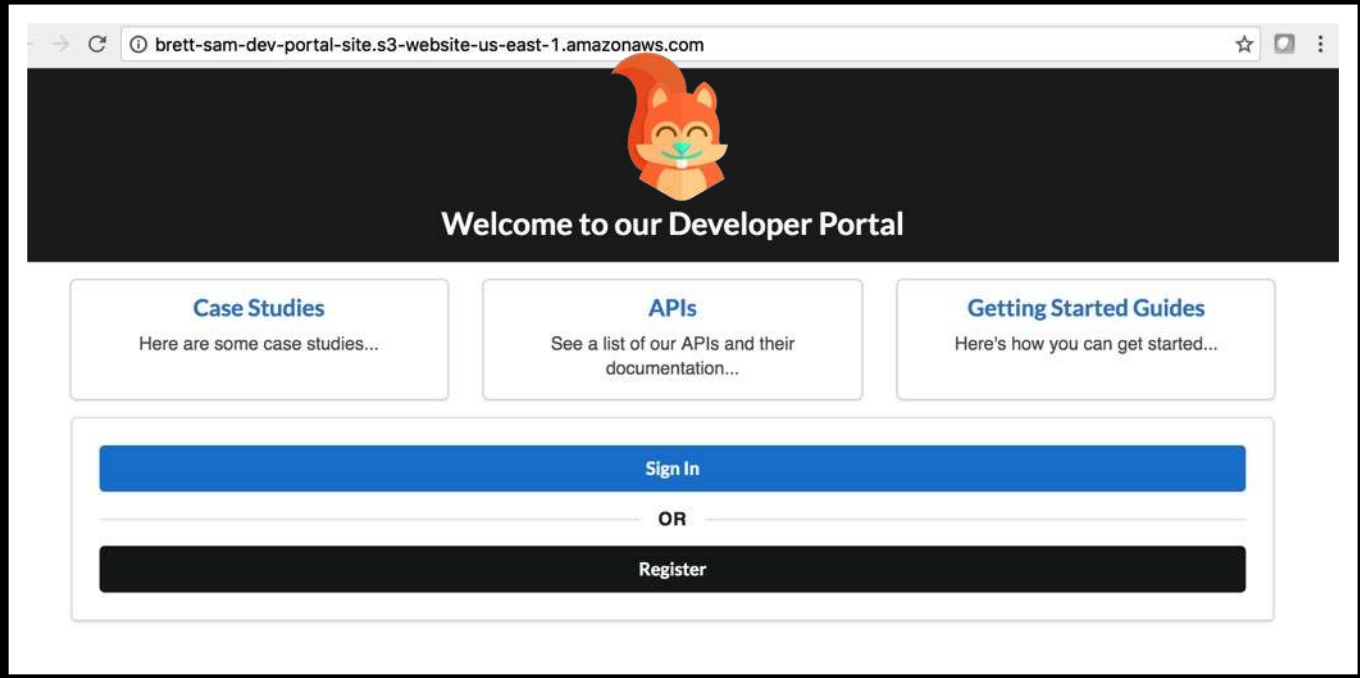
Monetize your microservices!

API Gateway Developer Portal
Open source reference implementation

New

SAM-based implementation available on GitHub

- Help developers consume your APIs
- Vend API Keys
- AWS Marketplace integration
- Supports Cognito authN

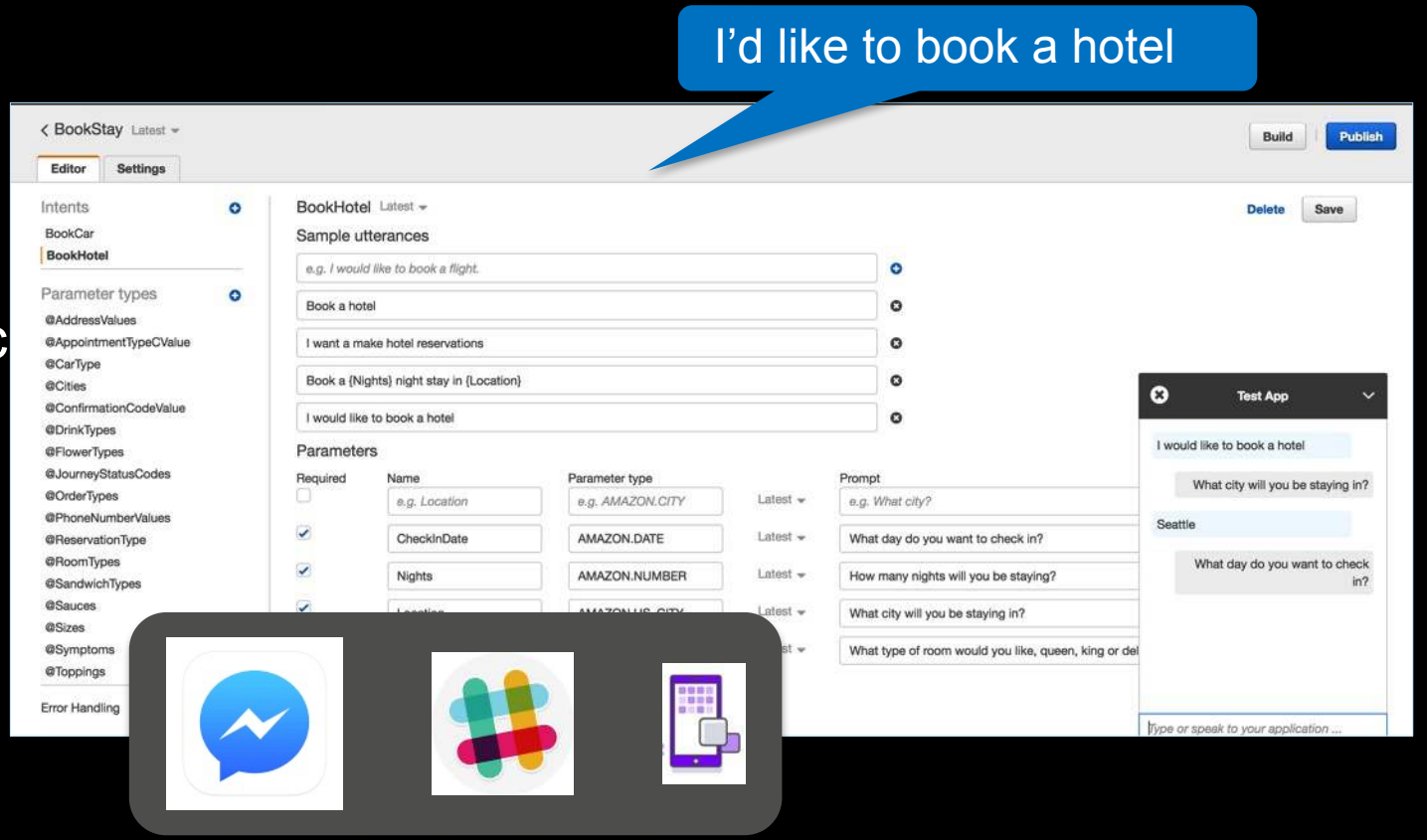


New places you can use Lambda functions

- Lambda Bots
- Amazon Kinesis Firehose
- On-prem storage
- Devices
- Edge/CDN

Lambda Bots and Amazon Lex Preview

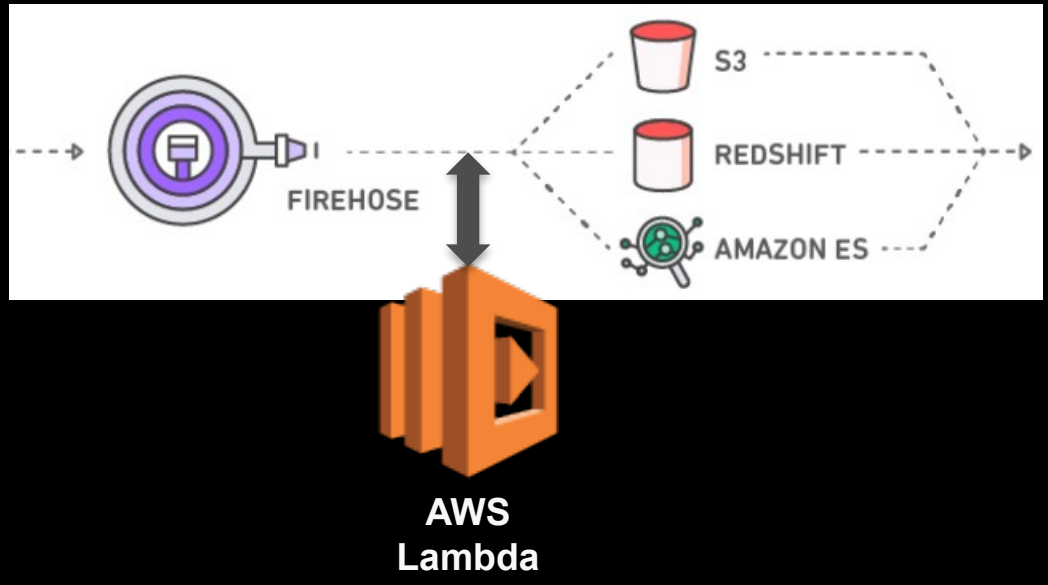
- Text and speech
- Lambda functions run business logic
- Facebook, AWS Mobile Hub
- Slack and Twilio integration coming soon



Amazon Kinesis Firehose integration

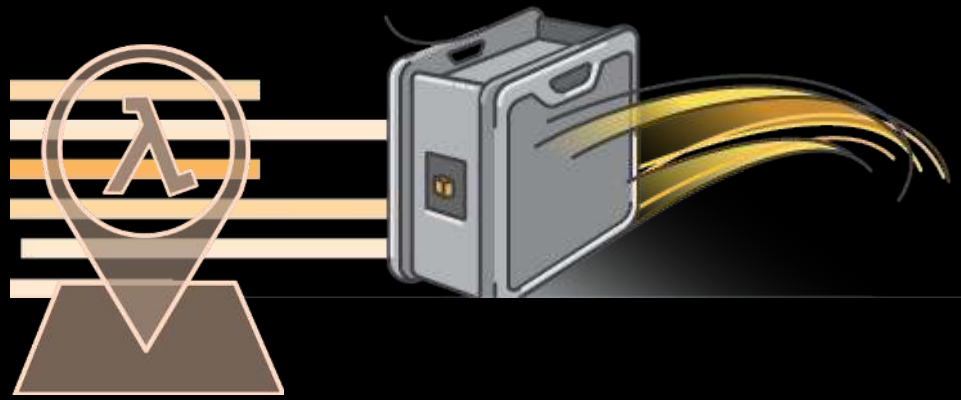
Coming Soon

- Simple, real-time data streaming
- Transform, audit, or aggregate records in flight with Lambda
- Flexible buffering
- Lambda and Firehose both scale automatically



AWS Snowball Edge New

- Fast, simple, secure data transfer from on-prem to/from AWS Cloud
- 100 TB capacity
- Local S3 storage APIs
- **Local Lambda functions**
- Transcode multimedia content, compress in-real time, custom auditing



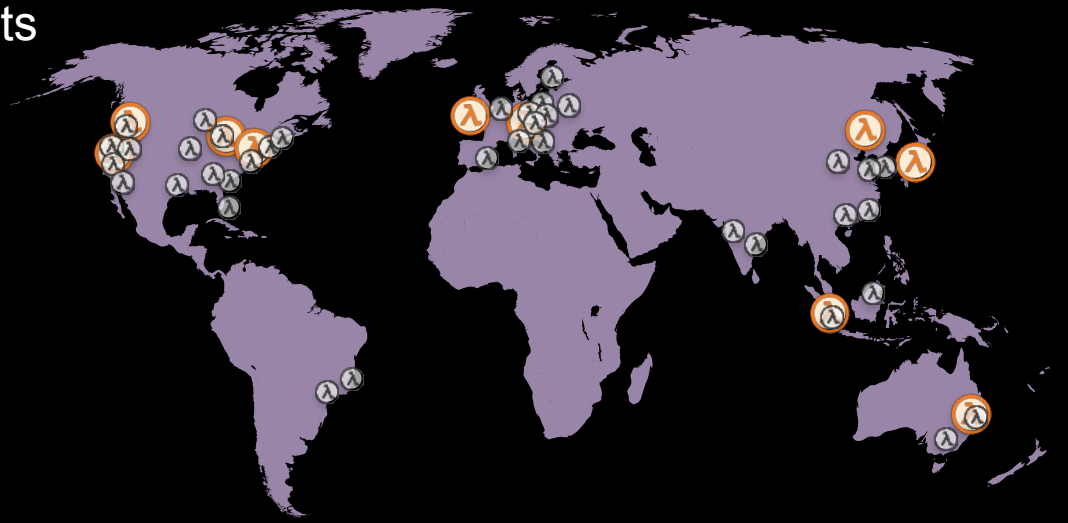
AWS Greengrass Preview

- Greengrass extends AWS processing onto devices
- Low-latency, near-real time

- **Lambda functions run right on the device**
- Cloud storage and compute via AWS IoT service
- BYOH – 1GHz, 128MB, x86 or ARM, Linux

Lambda@Edge Preview

- Low-latency request/response customization
- Supports viewer and origin events
- Preview limitations:
  - Node.js only
  - **50** ms max
  - Headers only
- Pricing: $0.60/M requests and $0.00000625125 per 128MB-s
  - 4K requests free/month

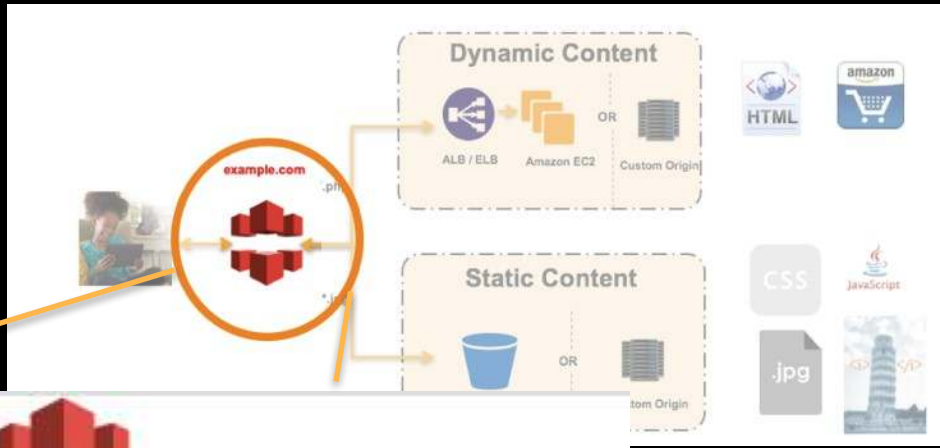


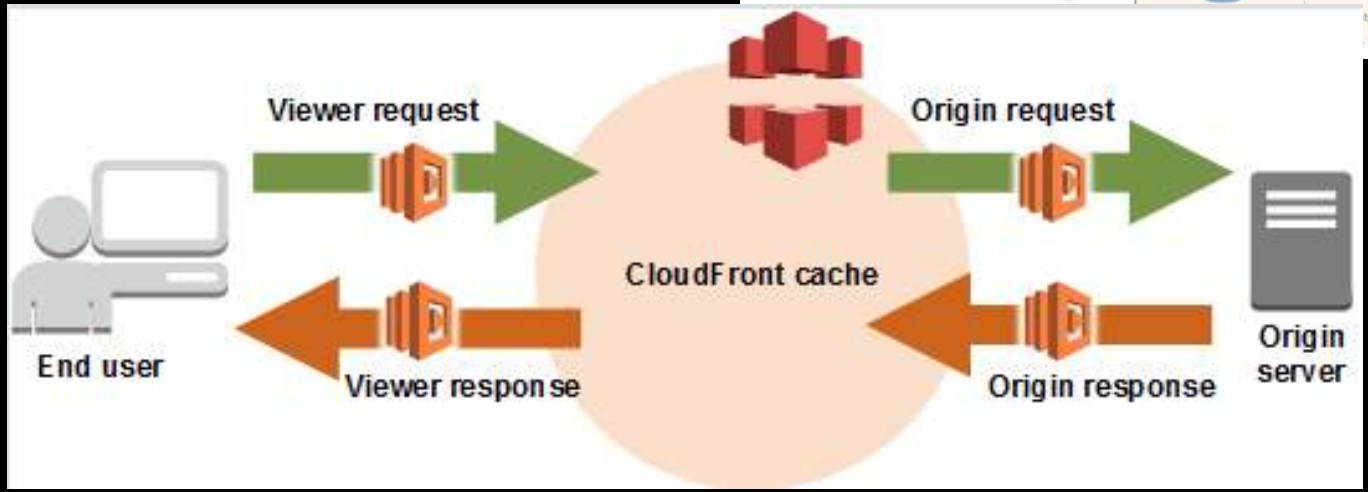
Sign up to join the preview!

Lambda@Edge use cases

- Customize content, based on user/device properties
- Validate visitors: check tokens, filter bot traffic
- Rewrite URLs: inject ads, hide file structure
- Run A/B testing

CloudFront Triggers for Lambda@Edge Functions





New Lambda videos from re:Invent 2016

AWS re:Invent 2016: What's New with AWS Lambda (SVR202)https://www.youtube.com/watch?v=CwxWhyGteNc

AWS re:Invent 2016: Serverless Apps with AWS Step Functions (SVR201)
https://www.youtube.com/watch?v=75MRve4nv8s

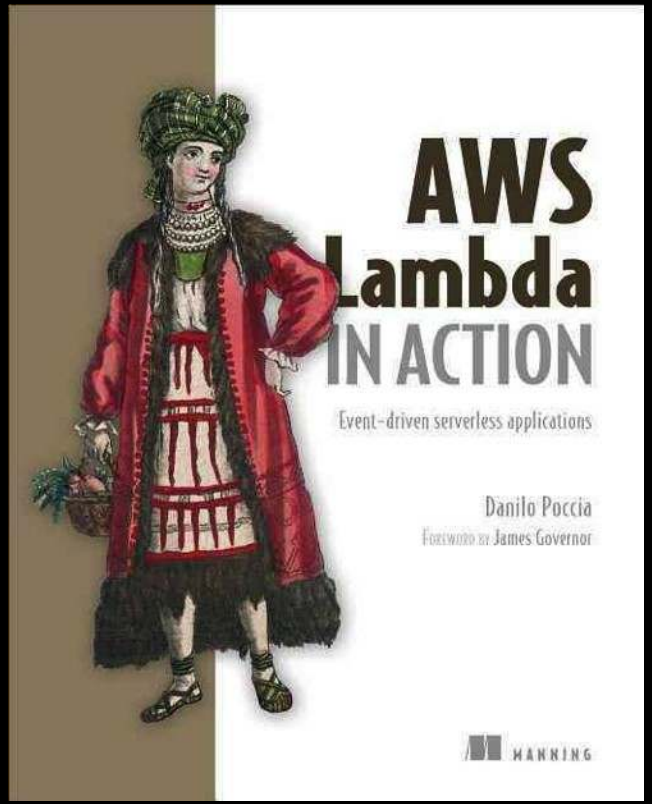
AWS re:Invent 2016: Real-time Data Processing Using AWS Lambda (SVR301)
https://www.youtube.com/watch?v=VFLKOy4GKXQ

AWS re:Invent 2016: Serverless Architectural Patterns and Best Practices (ARC402)
https://www.youtube.com/watch?v=b7UMoc1iUYw

AWS re:Invent 2016: Bringing AWS Lambda to the Edge (CTD206)
https://www.youtube.com/watch?v=j26novaqF6M

AWS re:Invent 2016: Ubiquitous Computing with Greengrass (IOT201)
https://www.youtube.com/watch?v=XQQjX8GTEko

The only Lambda book you need to read

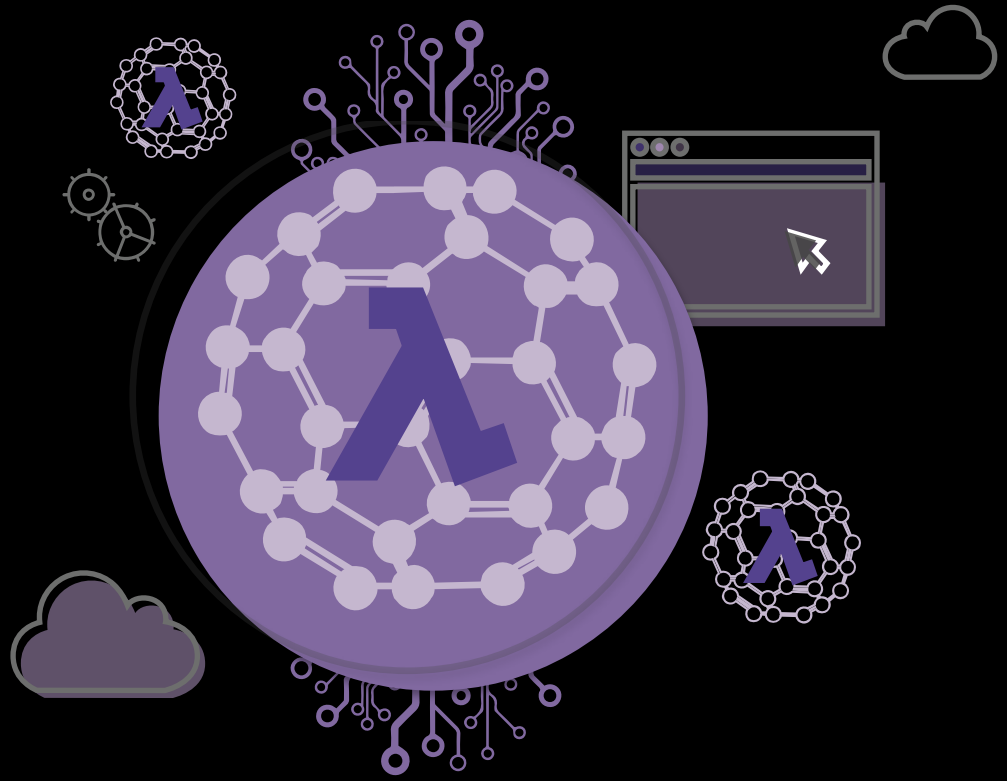


Written by AWS Technical Evangelist Danilo Poccia

Released in December 2016

https://www.amazon.com/Aws-Lambda-Action-Event-driven-Applications/dp/1617293717/

Enjoy your serverless journey!



Thank you!

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