An introduction to serverless architectures

Julien Simon
Principal Technical Evangelist, AWS
julsimon@amazon.fr
@julsimon

Agenda

- An introduction to serverless
- AWS Lambda
- Amazon API Gateway
- Demo: writing your first Lambda function
- Demo: building a serverless pipeline
- Additional resources
- Q&A

An introduction to serverless

Requirements For Internet-scale Apps

Simplicity

Scalability

Low Cost

Reliability

Low Latency

Building Blocks For Internet-scale Apps

Storage

**Amazon
S3**

Data Store

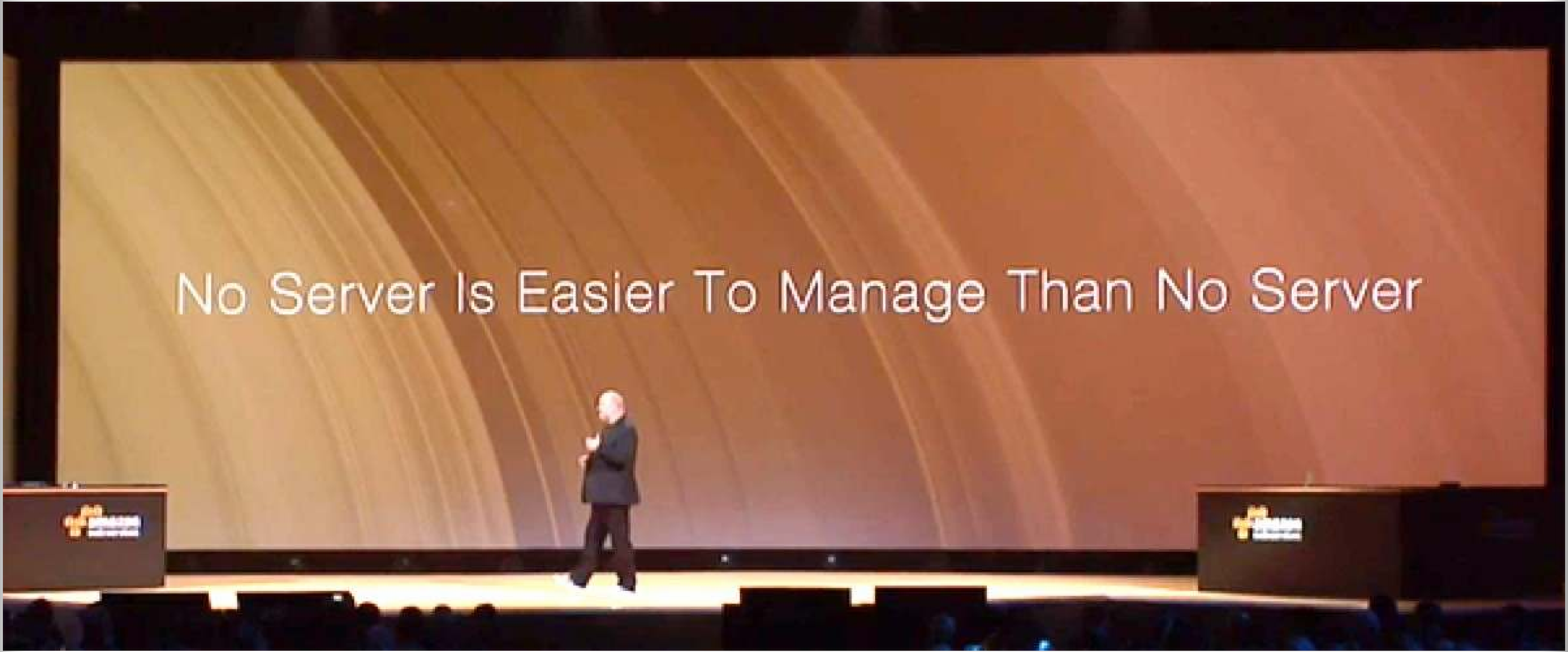
**Amazon
DynamoDB**

Compute

?

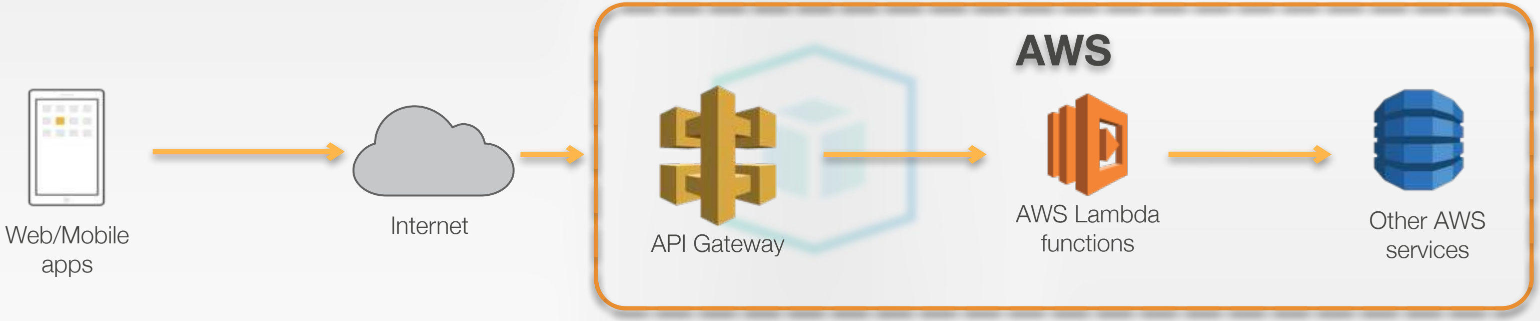
Evolution of Computing

Weeks	Minutes	Seconds
On-premises	Amazon EC2	Amazon EC2 Container Service



Werner Vogels, CTO, Amazon.com
AWS re:Invent 2015

Serverless architecture:
Managed services + AWS Lambda



Reference architectures: http://www.allthingsdistributed.com/2016/06/aws-lambda-serverless-reference-architectures.html

Selected serverless customers

FireEye

THREAT INTELLIGENCE
AND ANALYTICS

kik·

MOBILE
CHAT APP

AdRoll

AD DATA ANALYTICS
AND ROUTING

Localytics

MOBILE APP
ANALYTICS

Periscope

IMAGE CONTENT
FILTERING

Quicken Loans

WEB
APPLICATIONS

Coca-Cola

WEB APPLICATIONS

twilio

CLOUD
TELEPHONY

VidRoll

REAL-TIME VIDEO
AD BIDDING

Zillow.com
Your Edge in Real Estate

DATA
PROCESSING

NORDSTROM

PRODUCT
RECOMMANDATION

THOMSON REUTERS

NEWS CONTENT
PROCESSING

BUSTLE

NEWS CONTENT
PROCESSING

Benchling

GENE SEQUENCE
SEARCH

mlbam

GAME METRICS ANALYTICS

AWS Lambda

AWS Lambda

- Announced at re:Invent 2014
- Deploy functions in Java, Python, Node.js and C#
- Just code, without the infrastructure drama
- Built-in scalability and high availability
- Integrated with many AWS services
- Pay as you go
  - Combination of execution time (100ms slots) & memory used
  - Starts at $0.000000208 per 100ms
  - Free tier available: first 1 million requests per month are free

http://aws.amazon.com/lambda

AWS re:Invent 2014 | (MBL202) NEW LAUNCH: Getting Started with AWS Lambda https://www.youtube.com/watch?v=UFj27laTWQA

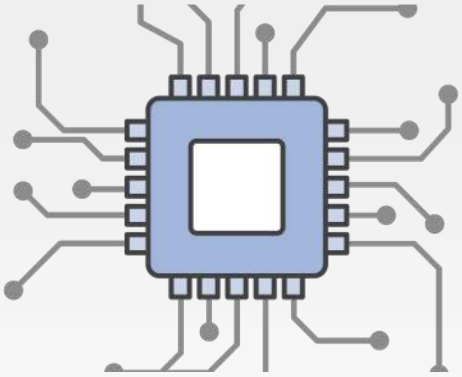
What can you do with AWS Lambda?

- Glue together parts of your AWS infrastructure
- Build event-driven applications
- Build APIs together with Amazon API Gateway
  - RESTful APIs
  - Resources, methods
  - Stages

http://aws.amazon.com/apigateway

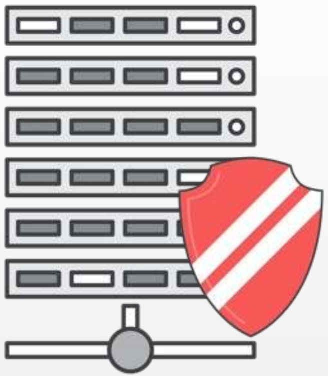
Amazon API Gateway

Amazon API Gateway



Create a unified API frontend for multiple micro-services

Traffic throttling for your backends



Authenticate and authorize requests to a backend

Creating APIs with Amazon API Gateway

- Complex to do with the CLI / SDK: 9 *aws apigateway* calls
- Use the console
- Import a Swagger definition file
  http://docs.aws.amazon.com/apigateway/latest/developerguide/api-gateway-import-api.html
- Use a development framework (Serverless, Chalice, etc.)

Writing your first Lambda

Typical development workflow

1. Write and deploy a Lambda function
2. Create a REST API with API Gateway
3. Connect the API to the Lambda function
4. Invoke the API
5. Test, debug and repeat ;)

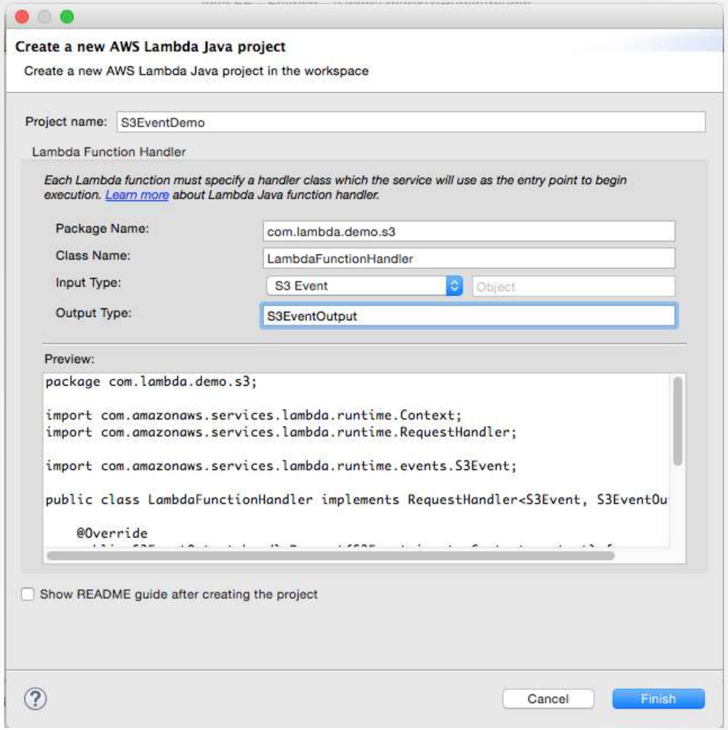
A simple Lambda function in Python

```
def lambda_handler(event,context):
   result = event['value1'] + event['value2']
   return result
```

```
aws lambda create-function --function-name add \
--handler myFunc.lambda_handler --runtime python2.7 \
--zip-file fileb://myFunc.zip --memory-size 128 \
--role arn:aws:iam::ACCOUNT_NUMBER:role/lambda_basic_execution

aws lambda invoke --function-name add \
--payload '{"value1":5, "value2":7}' \
--invocation-type RequestResponse result.txt
```

Demo

AWS Lambda in Java with Eclipse



Create a new AWS Lambda Java project

Create a new AWS Lambda Java project in the workspace

Project name: S3EventDemo

Lambda Function Handler

Each Lambda function must specify a handler class which the service will use as the entry point to begin execution. Learn more about Lambda Java function handler.

Package Name: com.lambda.demo.s3

Class Name: LambdaFunctionHandler

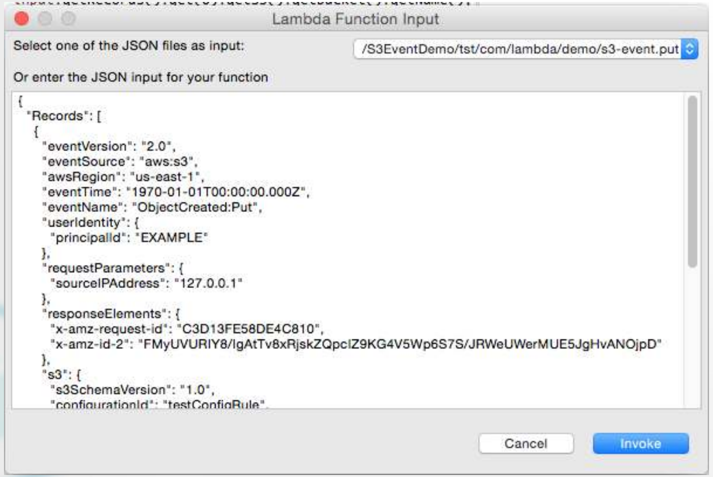
Input Type: S3 Event | Object

Output Type: S3EventOutput

Preview:

```
package com.lambda.demo.s3;

import com.amazonaws.services.lambda.runtime.Context;
import com.amazonaws.services.lambda.runtime.RequestHandler;

import com.amazonaws.services.lambda.runtime.events.S3Event;

public class LambdaFunctionHandler implements RequestHandler<S3Event, S3EventOu

    @Override
```

□ Show README guide after creating the project

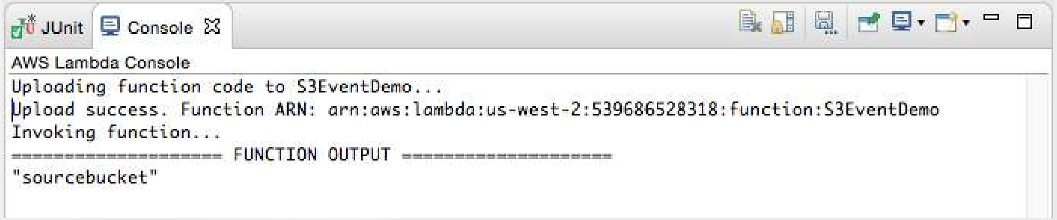


Lambda Function Input

Select one of the JSON files as input: /S3EventDemo/tst/com/lambda/demo/s3-event.put

Or enter the JSON input for your function

```
{
 "Records": [
  {
   "eventVersion": "2.0",
   "eventSource": "aws:s3",
   "awsRegion": "us-east-1",
   "eventTime": "1970-01-01T00:00:00.000Z",
   "eventName": "ObjectCreated:Put",
   "userIdentity": {
    "principalId": "EXAMPLE"
   },
   "requestParameters": {
    "sourceIPAddress": "127.0.0.1"
   },
   "responseElements": {
    "x-amz-request-id": "C3D13FE58DE4C810",
    "x-amz-id-2": "FMyUVURIY8/IgAtTv8xRjskZQpcIZ9KG4V5Wp6S7S/JRWeUWerMUE5JgHvANOjpD"
   },
   "s3": {
    "s3SchemaVersion": "1.0",
    "configurationId": "testConfigRule",
```

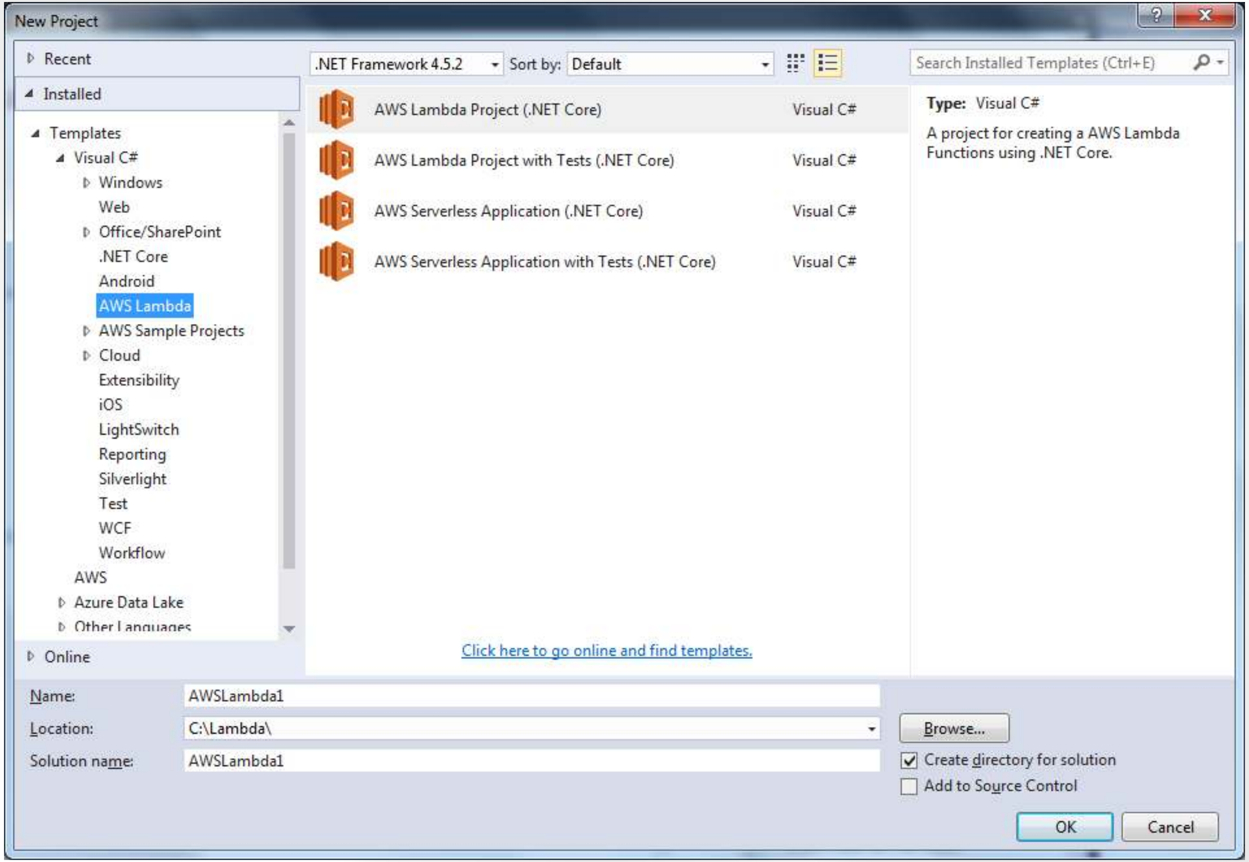


AWS Lambda Console

```
Uploading function code to S3EventDemo...
Upload success. Function ARN: arn:aws:lambda:us-west-2:539686528318:function:S3EventDemo
Invoking function...
==================== FUNCTION OUTPUT ====================
"sourcebucket"
```

https://java.awsblog.com/post/TxWZES6J1RSQ2Z/Testing-Lambda-functions-using-the-AWS-Toolkit-for-Eclipse

AWS Lambda in C# with Visual Studio


New Project
Recent
Installed
Templates
Visual C#
Windows
Web
Office/SharePoint
.NET Core
Android
AWS Lambda
AWS Sample Projects
Cloud
Extensibility
iOS
LightSwitch
Reporting
Silverlight
Test
WCF
Workflow
AWS
Azure Data Lake
Other Languages
Online
Search Installed Templates (Ctrl+E)
AWS Lambda Project (.NET Core) Visual C#
AWS Lambda Project with Tests (.NET Core) Visual C#
AWS Serverless Application (.NET Core) Visual C#
AWS Serverless Application with Tests (.NET Core) Visual C#
Click here to go online and find templates.
Browse...
OK
Cancel

.NET Framework 4.5.2 Sort by: Default

Type: Visual C#

A project for creating a AWS Lambda Functions using .NET Core.

Name: AWSLambda1

Location: C:\Lambda\

Solution name: AWSLambda1

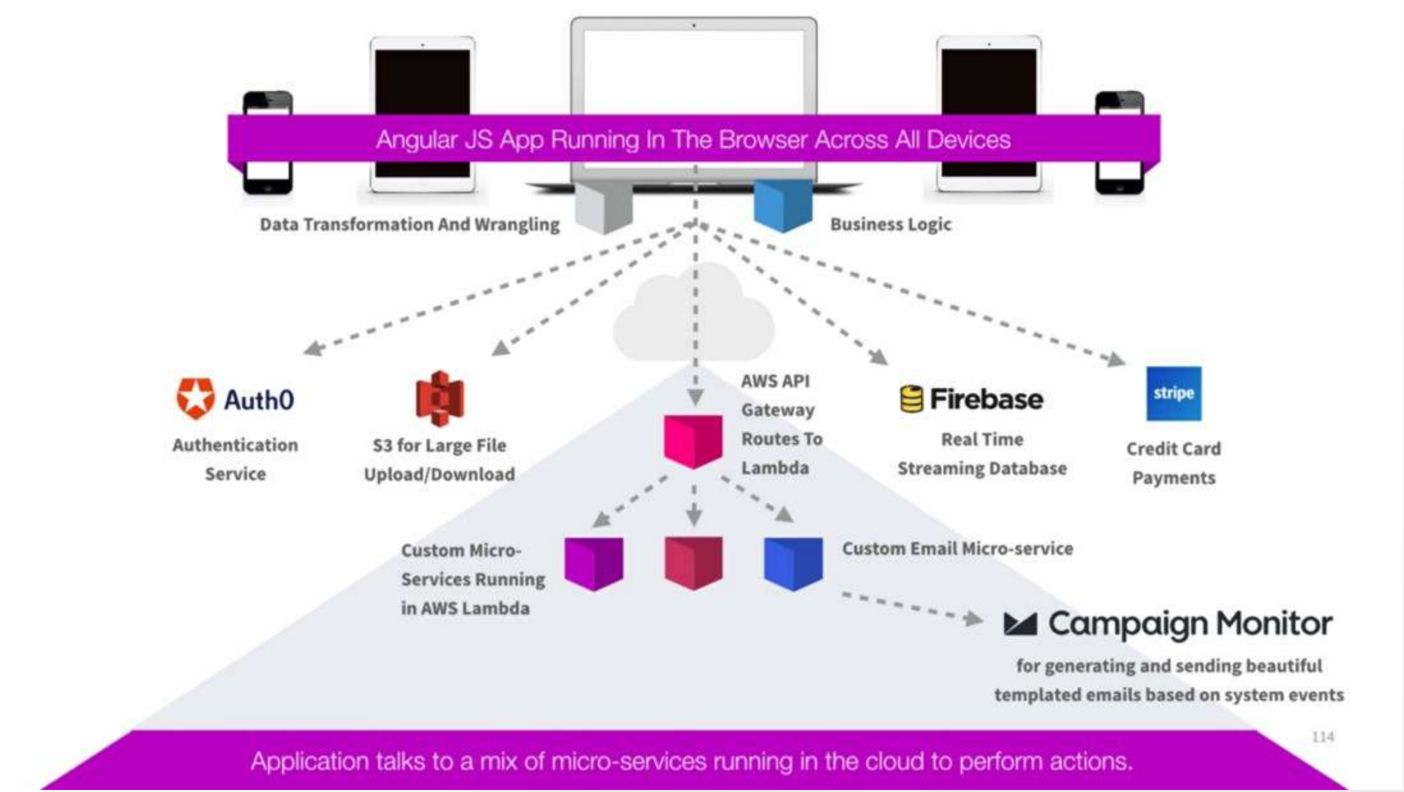
☑ Create directory for solution

□ Add to Source Control

https://docs.aws.amazon.com/toolkit-for-visual-studio/latest/user-guide/lambda.html

A Cloud Guru: 100% Serverless

A CLOUD GURU

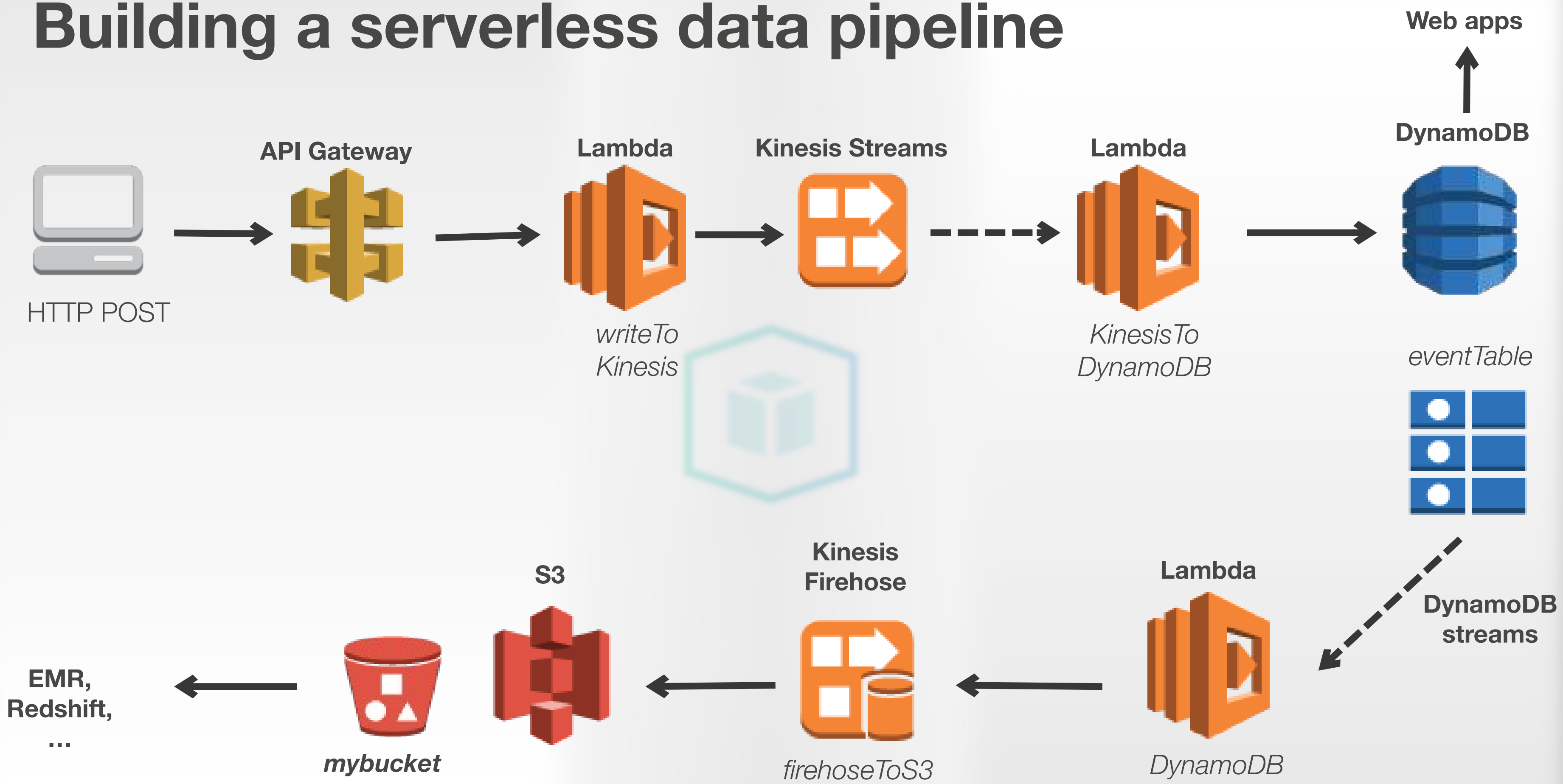


Angular JS App Running In The Browser Across All Devices
Data Transformation And Wrangling
Business Logic
Auth0
Authentication Service
S3 for Large File Upload/Download
AWS API Gateway Routes To Lambda
Firebase
Real Time Streaming Database
stripe
Credit Card Payments
Custom Micro-Services Running in AWS Lambda
Custom Email Micro-service
Campaign Monitor
for generating and sending beautiful templated emails based on system events
114
Application talks to a mix of micro-services running in the cloud to perform actions.

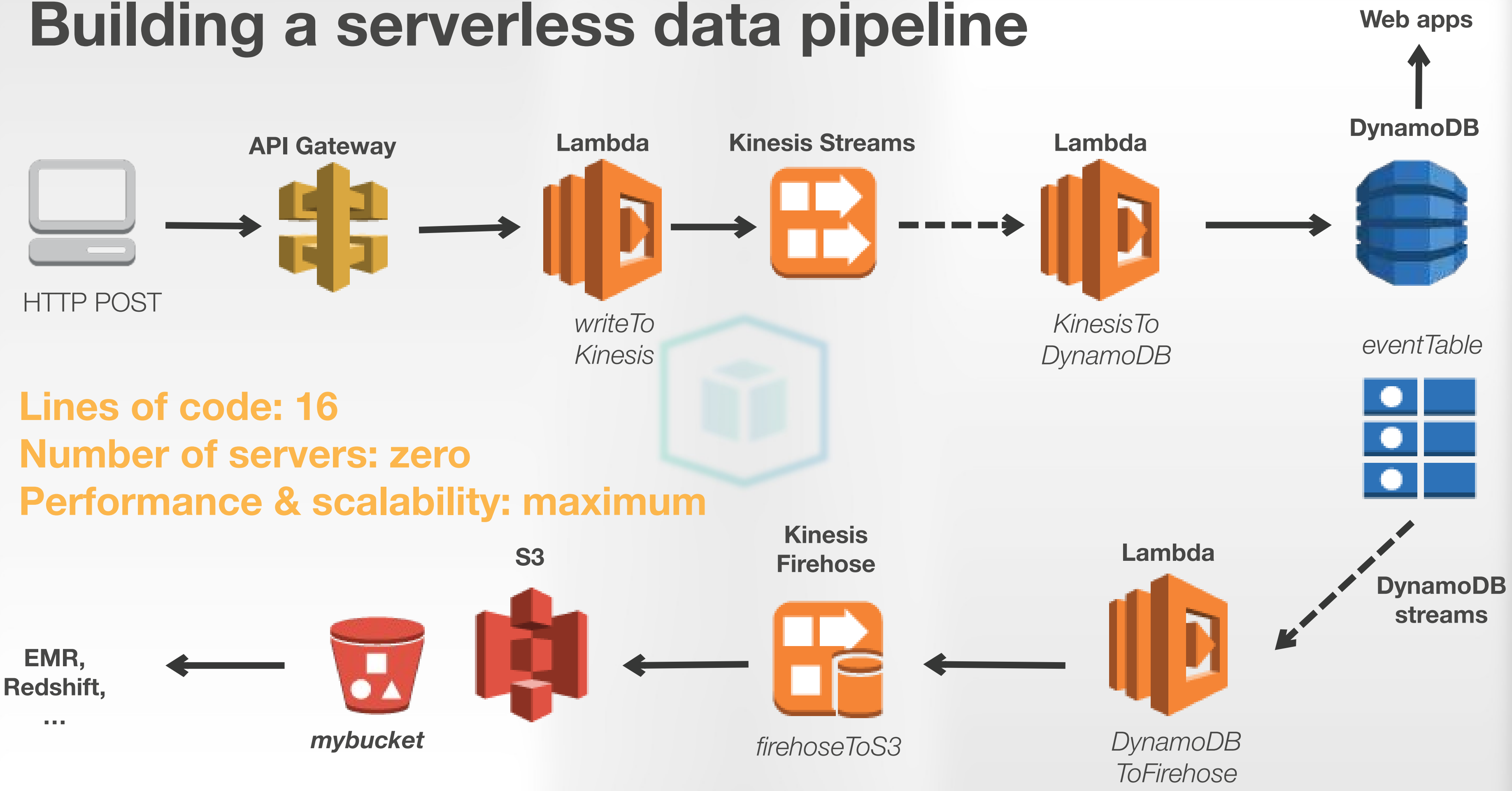
https://read.acloud.guru/serverless-the-future-of-software-architecture-d4473ffed864

Building a serverless pipeline

Building a serverless data pipeline



Building a serverless data pipeline



Lines of code: 16

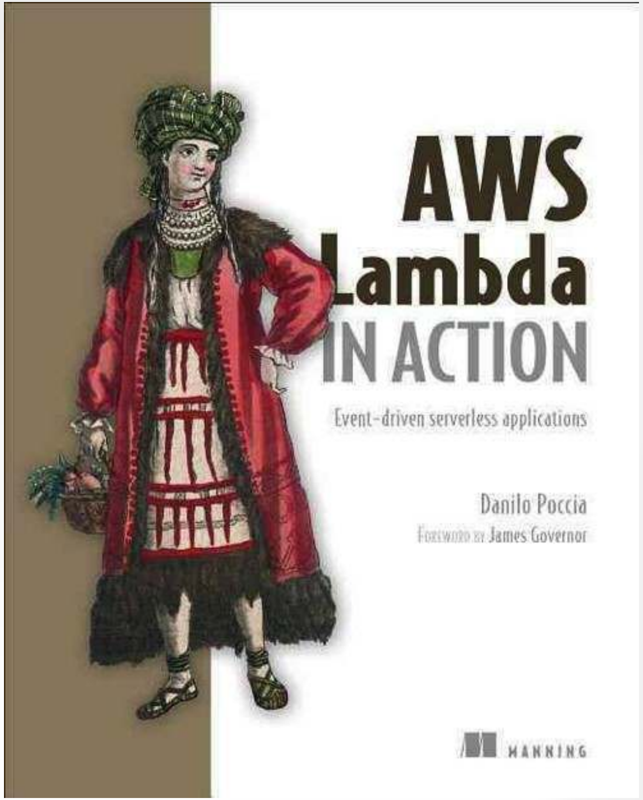
Number of servers: zero

Performance & scalability: maximum

Ready for some testing?
http://api.julien.org

Additional resources

The only Lambda book you need to read


AWS
Lambda
IN ACTION
Event-driven serverless applications
Danilo Poccia
Foreword by James Governor
MANNING

Written by AWS Technical Evangelist Danilo Poccia

Just released!

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

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

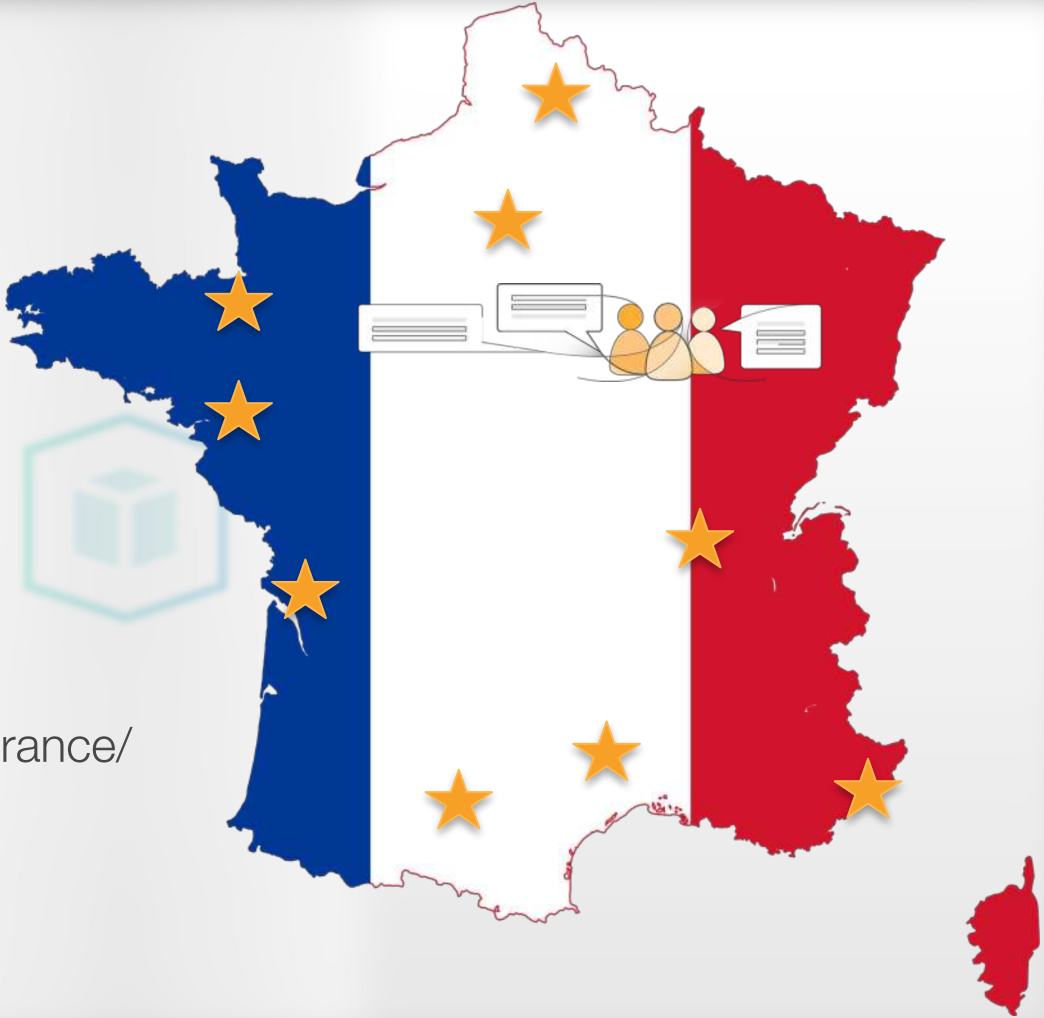
AWS re:Invent 2016: Serverless Architectural Patterns and Best Practices (ARC402)
https://www.youtube.com/watch?v=b7UMoc1iUYw

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

AWS User Groups

Lille
Paris
Rennes
Nantes
Bordeaux
Lyon
Montpellier
Toulouse
Côte d'Azur (new!)



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Merci !

Julien Simon
Principal Technical Evangelist, AWS
julsimon@amazon.fr
@julsimon