Node Without Servers: Event-Driven Computing with AWS Lambda

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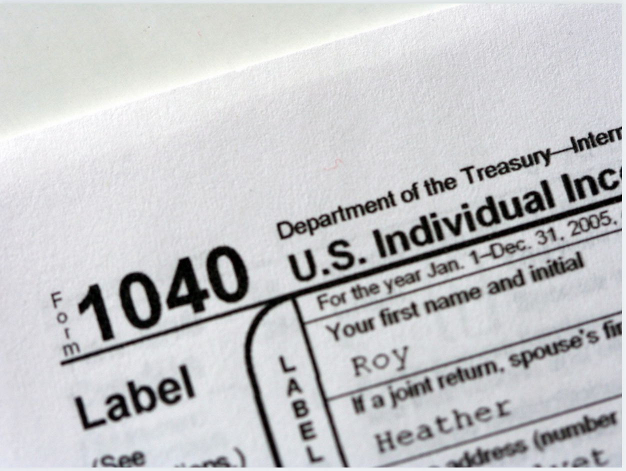
Events



Form 1040

Department of the Treasury—Intern

U.S. Individual Inc

For the year Jan. 1–Dec. 31, 2005,

Label

LABEL

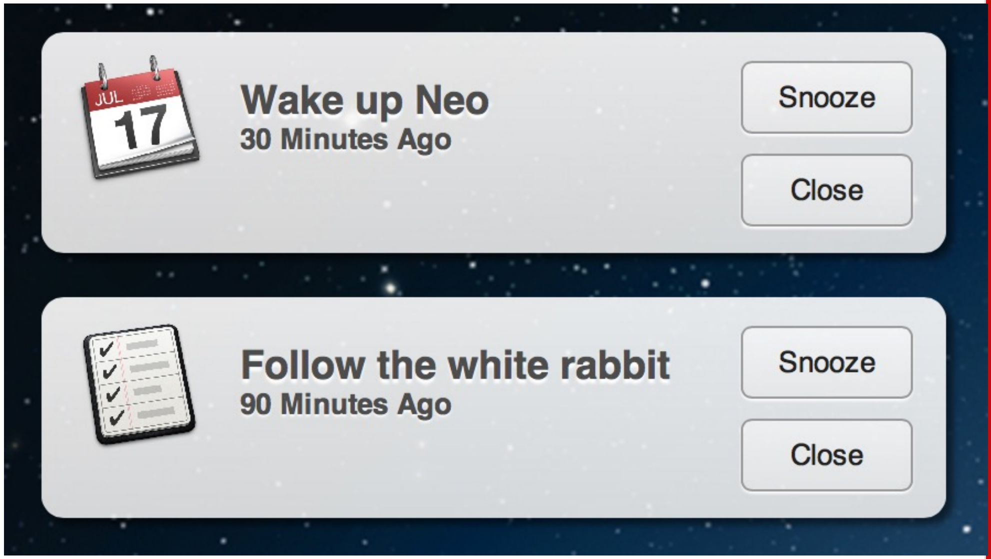
Your first name and initial

Roy

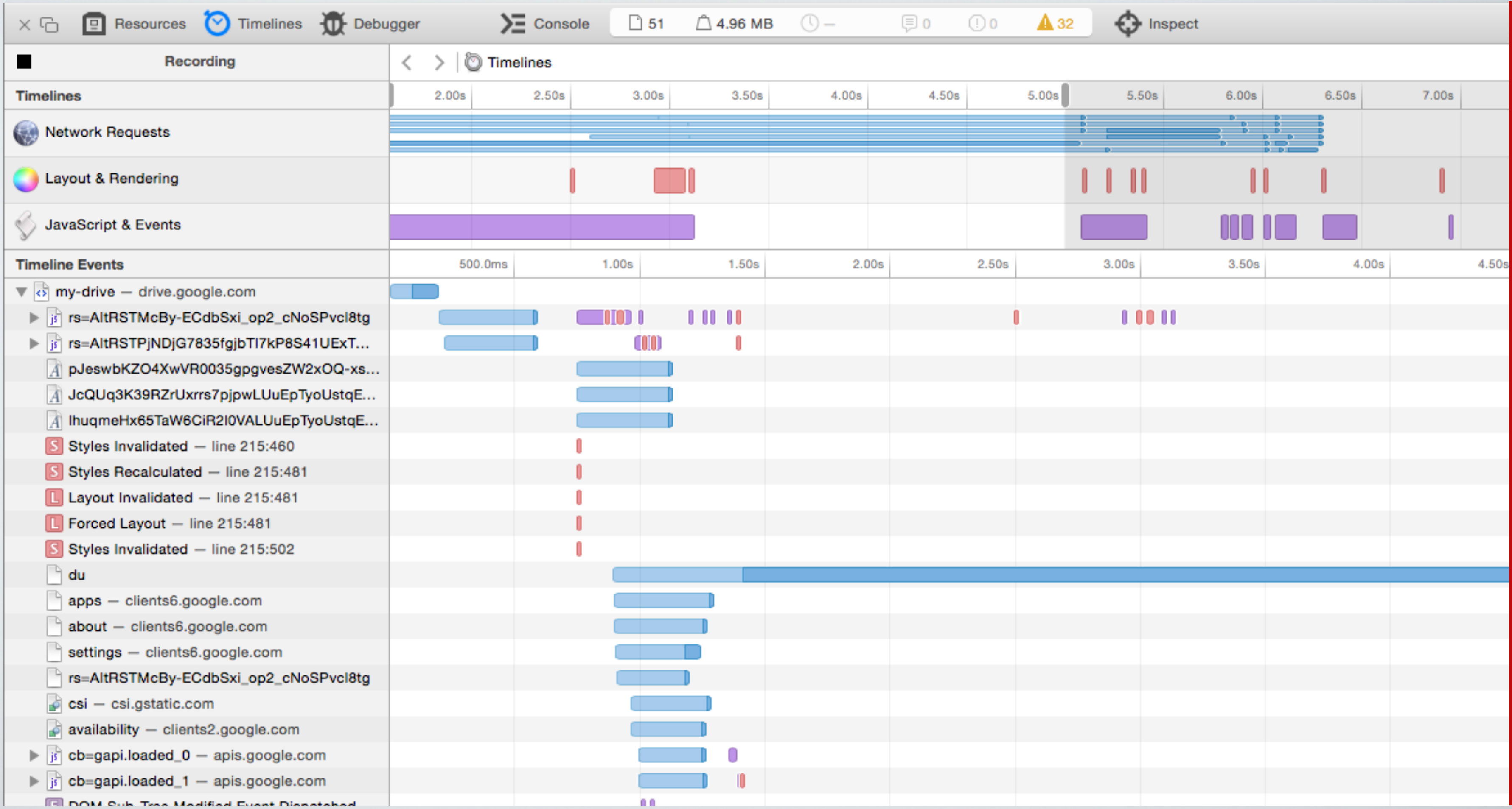
If a joint return, spouse's fi

Heather

T-Mobile 4G
9:59 PM
Leanna Lofte
00:40
mute
keypad
speaker
add call
FaceTime
contacts
End

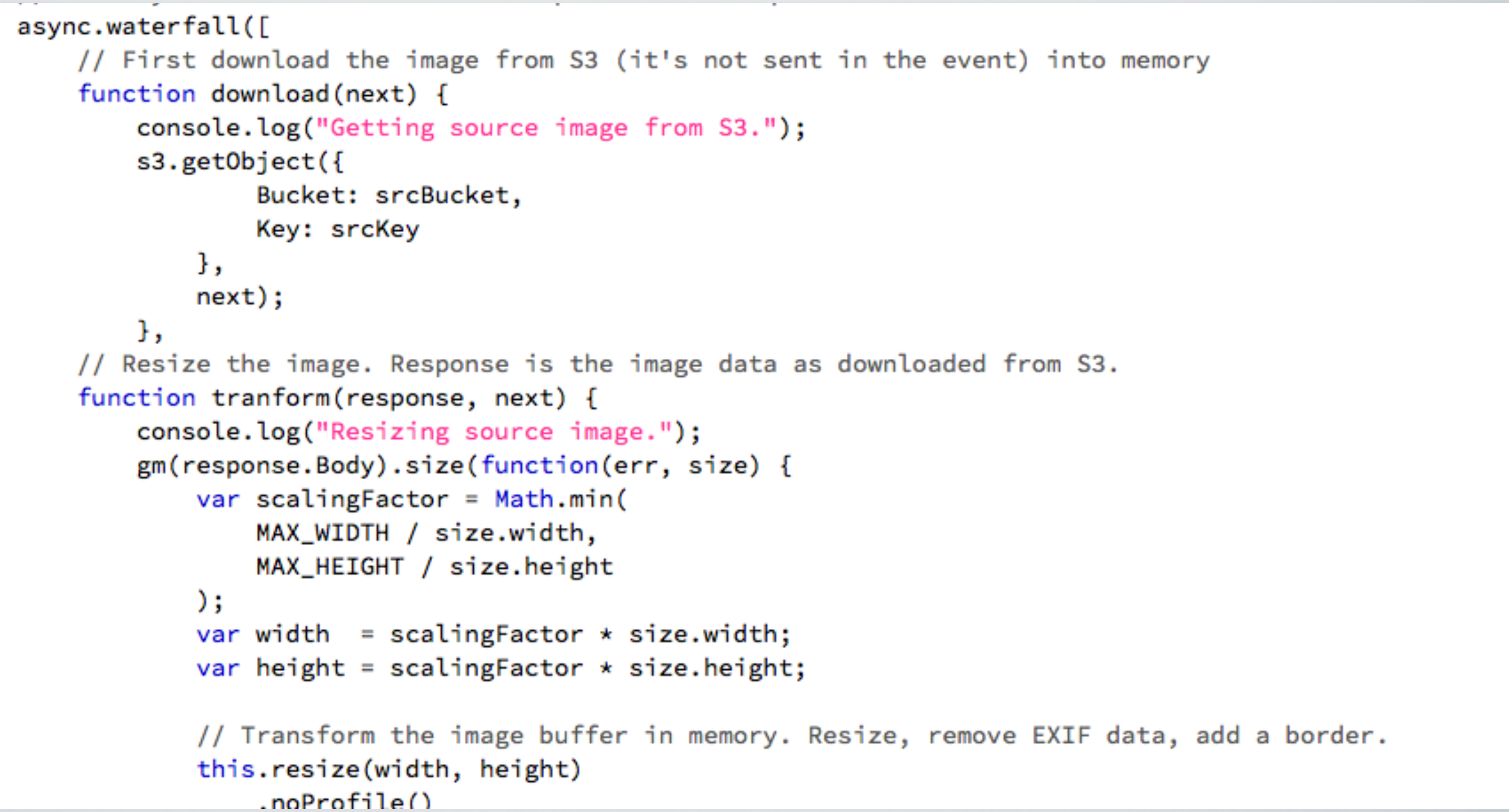

Wake up Neo
30 Minutes Ago

Follow the white rabbit
90 Minutes Ago



my-drive — drive.google.com
rs=AItRSTMcBy-ECdbSxi_op2_cNoSPvcl8tg
rs=AItRSTPjNDjG7835fgjbTI7kP8S41UExT…
pJeswbKZO4XwVR0035gpgvesZW2xOQ-xs…
JcQUq3K39RZrUxrrs7pjpwLUuEpTyoUstqE…
IhuqmeHx65TaW6CiR2I0VALUuEpTyoUstqE…
Styles Invalidated — line 215:460
Styles Recalculated — line 215:481
Layout Invalidated — line 215:481
Forced Layout — line 215:481
Styles Invalidated — line 215:502
du
apps — clients6.google.com
about — clients6.google.com
settings — clients6.google.com
rs=AItRSTMcBy-ECdbSxi_op2_cNoSPvcl8tg
csi — csi.gstatic.com
availability — clients2.google.com
cb=gapi.loaded_0 — apis.google.com
cb=gapi.loaded_1 — apis.google.com
DOM Sub-Tree Modified Event Dispatched

RG 38-66
RG 02-30



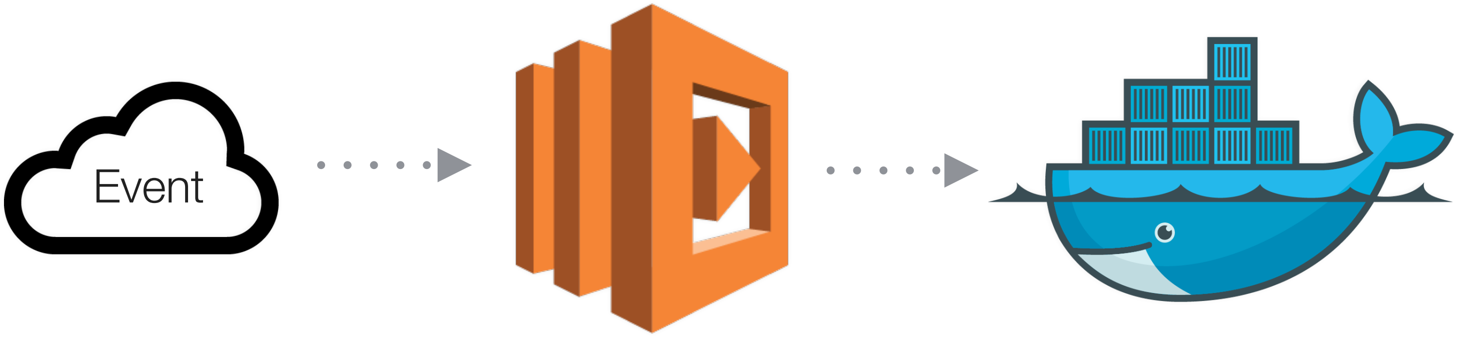
```
async.waterfall([
    // First download the image from S3 (it's not sent in the event) into memory
    function download(next) {
        console.log("Getting source image from S3.");
        s3.getObject({
                Bucket: srcBucket,
                Key: srcKey
            },
            next);
        },
    // Resize the image. Response is the image data as downloaded from S3.
    function tranform(response, next) {
        console.log("Resizing source image.");
        gm(response.Body).size(function(err, size) {
            var scalingFactor = Math.min(
                MAX_WIDTH / size.width,
                MAX_HEIGHT / size.height
            );
            var width  = scalingFactor * size.width;
            var height = scalingFactor * size.height;

            // Transform the image buffer in memory. Resize, remove EXIF data, add a border.
            this.resize(width, height)
                .noProfile()
```

What is and how does it work?

What good can do for me?

Code
Memory setting
Timeout setting


Event

Full AWS Linux AMI

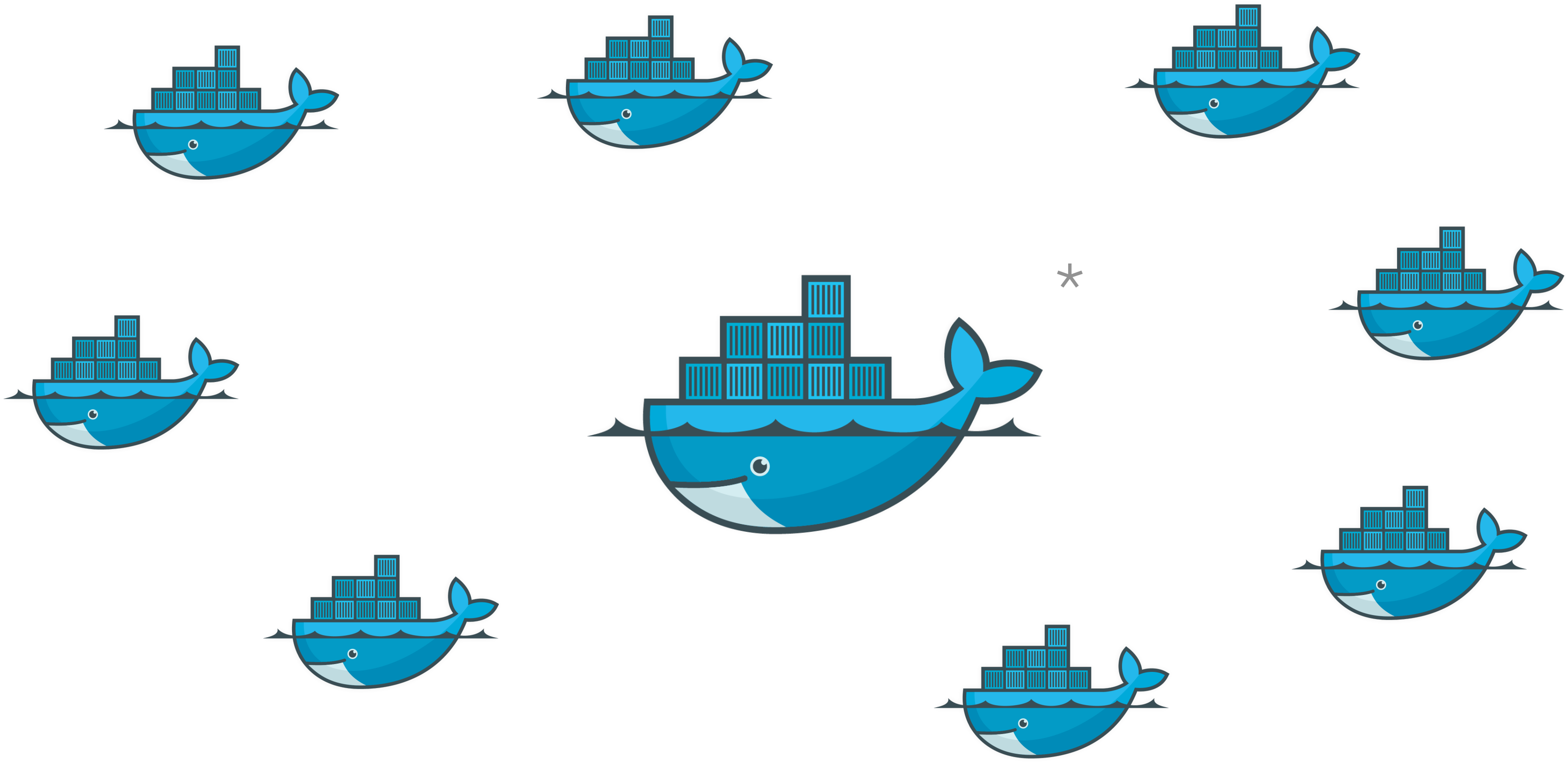
(ami-dfc39aef, Linux Kernel 3.14.35-28.38.amzn1.x86_64)

Node v0.10.33

ImageMagick

AWS JS SDK v2.1.22

Up to 1024MB RAM
and 512MB of ephemeral disk storage



* May not actually be Docker

Every event

Every config change = new (🐳)

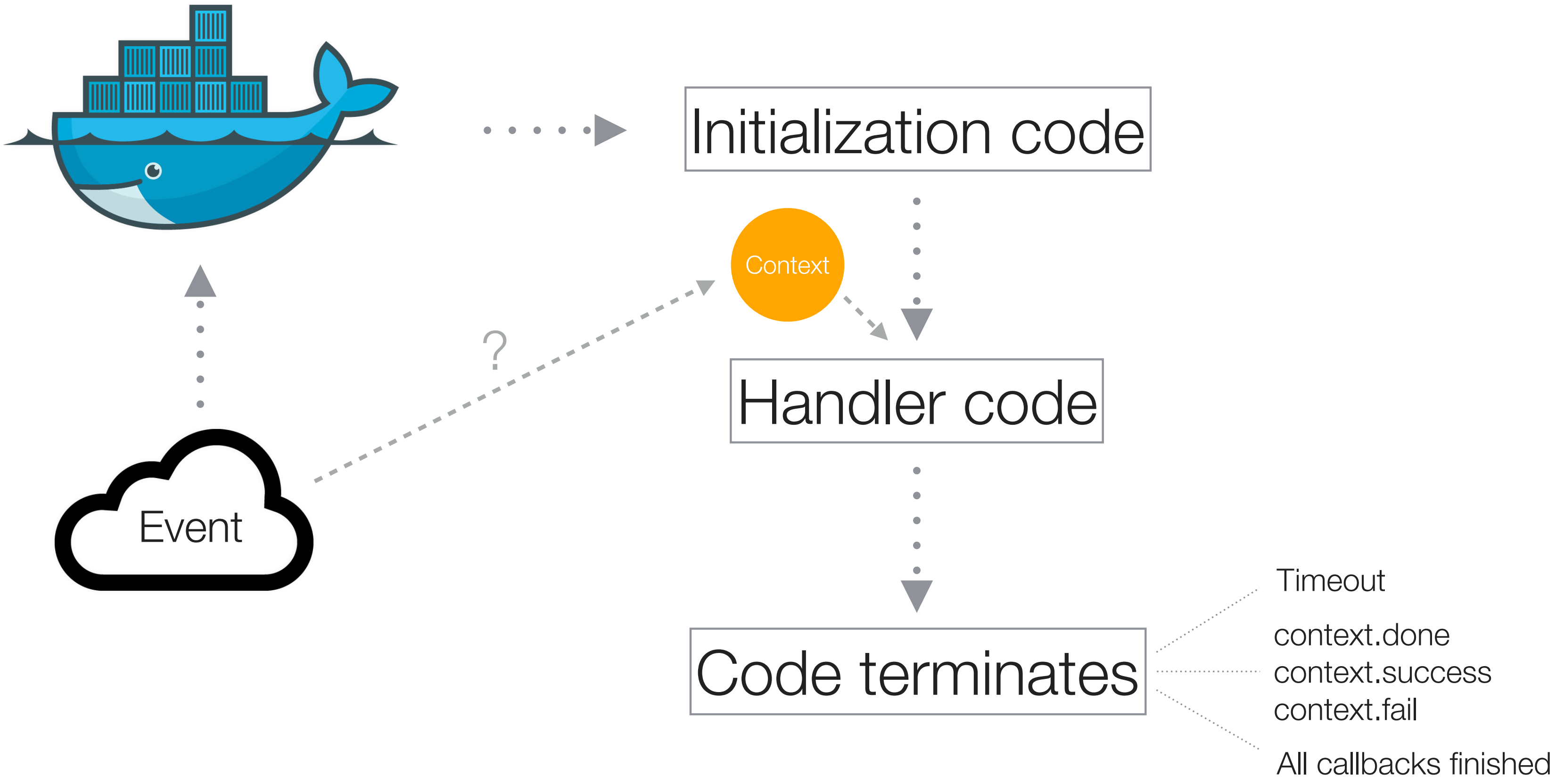
Every code change

~~express~~

~~socket.io~~

Lambda = one function

```
exports.handler = function(event, context) {
  console.log('Hello', event);
  // more JS goes here
  context.done(null, 'Success');
}
```



Initialization code

Context

Handler code

Code terminates

Timeout

context.done
context.success
context.fail

All callbacks finished

Never assume Lambda will re–use a container.

Pricing: Charged by Compute Time

Free Tier

First million requests are free

400,000 GB-seconds of compute time

220 hours of free compute time per month
@ 512MB of RAM

Paid Tier

$0.20 per 1 million requests thereafter

$0.00001667 for every GB-second

http://aws.amazon.com/lambda/pricing

* You also have to pay for in/out data transfer fees

Event–Driven Computing

Event notification

Run a compute cycle

Shut down

Where do events come from?

S3

SNS

AWS SDK

Kinesis

DynamoDB

Cognito

CloudFormation

Custom Events

S3

Fast, durable, cheap storage

Events on file put/post, copy

SNS

Many AWS services
can post to SNS

GitHub has a post-commit hook

AWS SDK

Custom Events

All SDKs support Lambda function invocation

Java, Ruby, Node, Python, JavaScript, PHP, .NET, iOS, Android, and the CLI

Lambda in Action

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Template Example

IAM

Identity Access Management

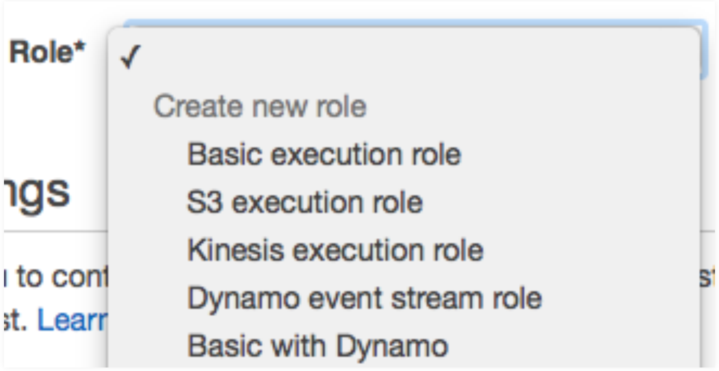
IAM

Users → AccessKey + SecretKey

Groups

Roles

IAM



Role*

✓

Create new role

Basic execution role

S3 execution role

Kinesis execution role

Dynamo event stream role

Basic with Dynamo

Roles = JSON

IAM

```
{
  "Version":"2008-10-17",
  "Id":"http referrer policy example",
  "Statement":[
    {
      "Sid":"Allow get requests referred by www.mysite.com
and mysite.com",
      "Effect":"Allow",
      "Principal":"*",
      "Action":"s3:GetObject",
      "Resource":"arn:aws:s3:::example-bucket/*",
      "Condition":{
        "StringLike":{
          "aws:Referer":[
            "http://www.mysite.com/*",
            "http://mysite.com/*"
          ]
        }
      }
    }
  ]
}
```

How do we know it’s done?

When responding to events from within AWS, we don’t.

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Notifying that It’s Done

Options for notifying that work is complete

SQS

SNS (http, SMS, email)

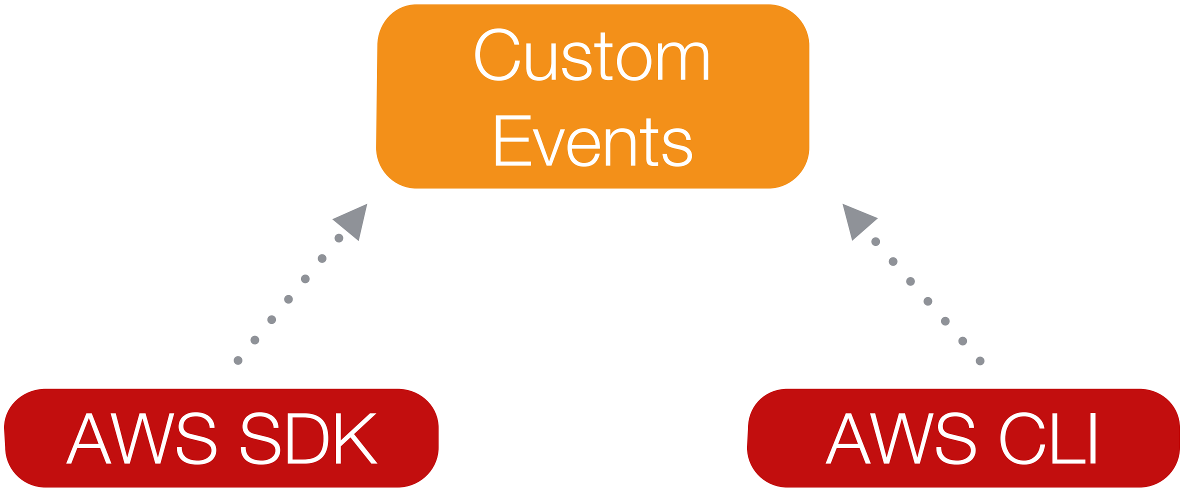
DynamoDB table

File updating in S3

Only one Lambda function per S3 bucket.

5

Custom Events



Custom Events

AWS SDK

AWS CLI

Event body
[Event context]

Custom events are synchronous calls

Default invocation-type: RequestResponse

invocation-type: Event for async events

Invoking via the CLI using ColdFusion

Name of your Lambda function

Invoking via the CLI

```
aws lambda invoke --function-name myFunctionName --payload
'{"key1":"value1", "key2":"value2", "key3":"value3"}' outfile.txt
```

JSON passed in to the Lambda function as the “event” structure.

Response is written to a file. This is the name of that file.

Note you can specify --payload file://input.txt to use a file instead.

On–demand Node functionality

What Good is Lambda Anyway?

Asynchronous task server
Background job processor

S3 Event Handler

Media conversion service

ImageMagick

Native modules

AWS Elastic Transcoder

Real–time analytics aggregator

Microservice backend?

Lambda is great when
every event is independent
and can be processed incrementally.

Beyond JS/Node

Native Node Modules

Statically compile on an Amazon Linux AMI

Install the module as part of your Node app on the same AMI

ZIP up the function, binary, and the node_modules folder

https://aws.amazon.com/blogs/compute/nodejs-packages-in-lambda/

Any Compiled Executable

Make sure it's compiled for the Linux AMD64 architecture

Make sure it can run standalone or is visible to /bin/bash/ or /usr/bin/python

Use `child_process.spawnSync()` to make sure the child process finishes before `context.success/done()` executes

Include the executable in the ZIP file you upload to Lambda

https://aws.amazon.com/blogs/compute/running-executables-in-aws-lambda/

Java

Native Java support announced April 9

Go Do!

Code at github.com/brianklaas

Session evaluation!

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