Quick stack building, an introduction to AWS CDK and infrastructure as code.

Slides will be online later

Leo Lapworth (@leolapworth)

Me: Leo Lapworth
@leolapworth

- 20+ years developer / sysadmin / team lead
- Talk: @YAPC::EU 2007 - Evolving Architecture
- Talk @ YAPC::EU 2008 - Evolving Architecture - further
- **Everything** has changed… even more!

Exceptions

- Cache invalidation
- Naming

Topics

- **Infrastructure as Code**
- **CloudFormation**
- **CDK**
- **Tips along the way**

Context…

A history of…
before…
`Infrastructure as Code`

(abridged)

Version control (history)

> cp important_file.txt important_file.txt.bak

> cp important_file.txt important_file.txt.bak2

> cvs

> svn ➜ subversion

> mercurial

Version control (now)

> git

“Git proved I could be more than a one-hit wonder” - Linus Oct 2019

Provisioning

> Client “Hello”

> Hosting “Hello, how can we help?”

> Client “Can I have a new server please?”

> Hosting “Sure.. what are the specs and which Christmas do you need it by?”

Configuration

> scp config/* root@new99.example.com:/

> NEW_HOST=new99.example.com sh setup_script.sh

> ssh root@new99.example.com; apt-get install puppet; puppet run —master: puppet.example.com; **make tea**; puppet run

> ansible new99.example.com <playbook>

Configuration?
provisioning?

> docker

> docker-compose

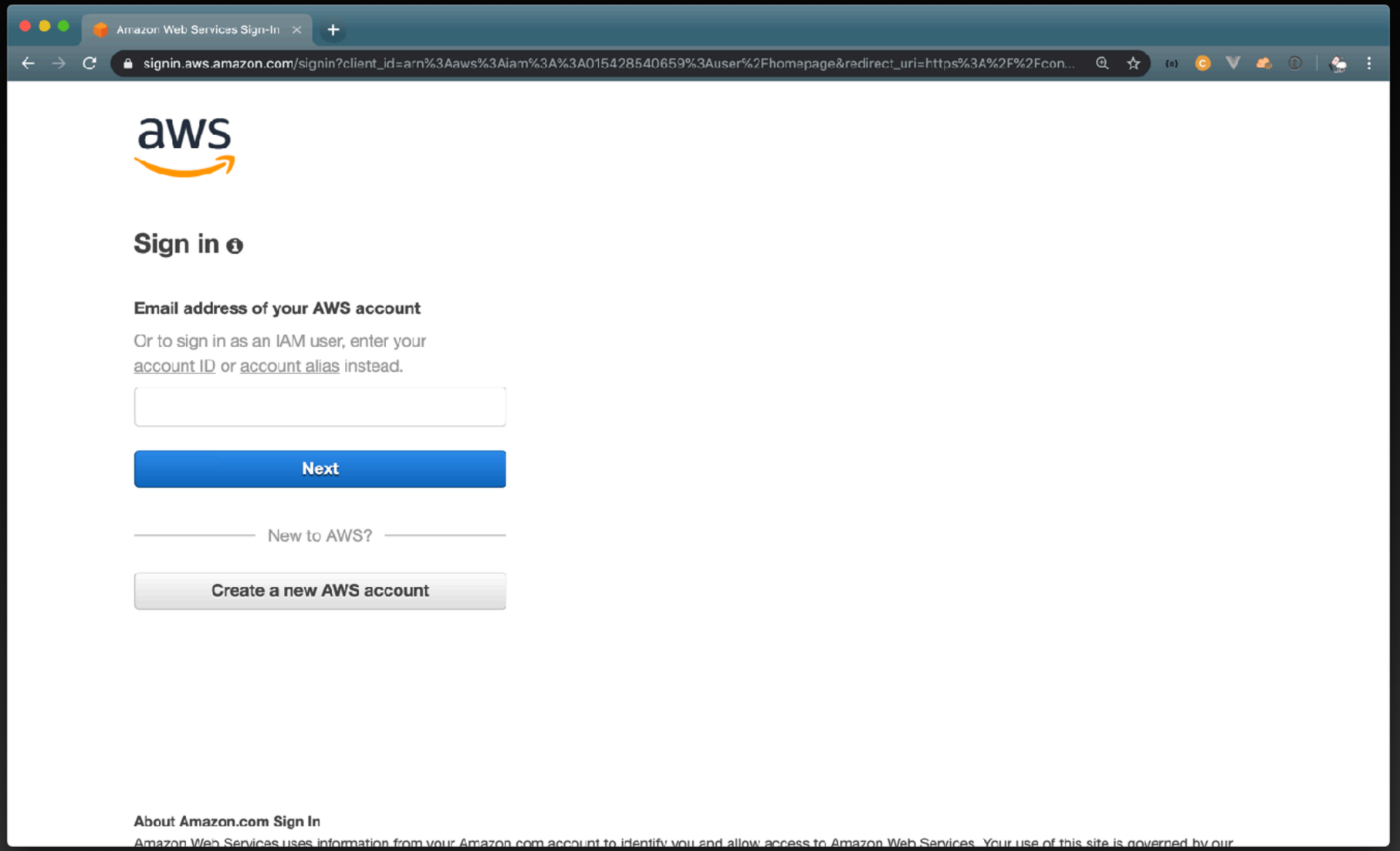
> docker-swarm

> Kubernetties something or other

History lesson over

Provisioning AWS resources

https://aws.amazon.com


Amazon Web Services Sign-In
signin.aws.amazon.com/signin?client_id=arn%3Aaws%3Aiam%3A%3A015428540659%3Auser%2Fhomepage&redirect_uri=https%3A%2F%2Fcon...
aws
Sign in
Email address of your AWS account
Or to sign in as an IAM user, enter your account ID or account alias instead.
Next
New to AWS?
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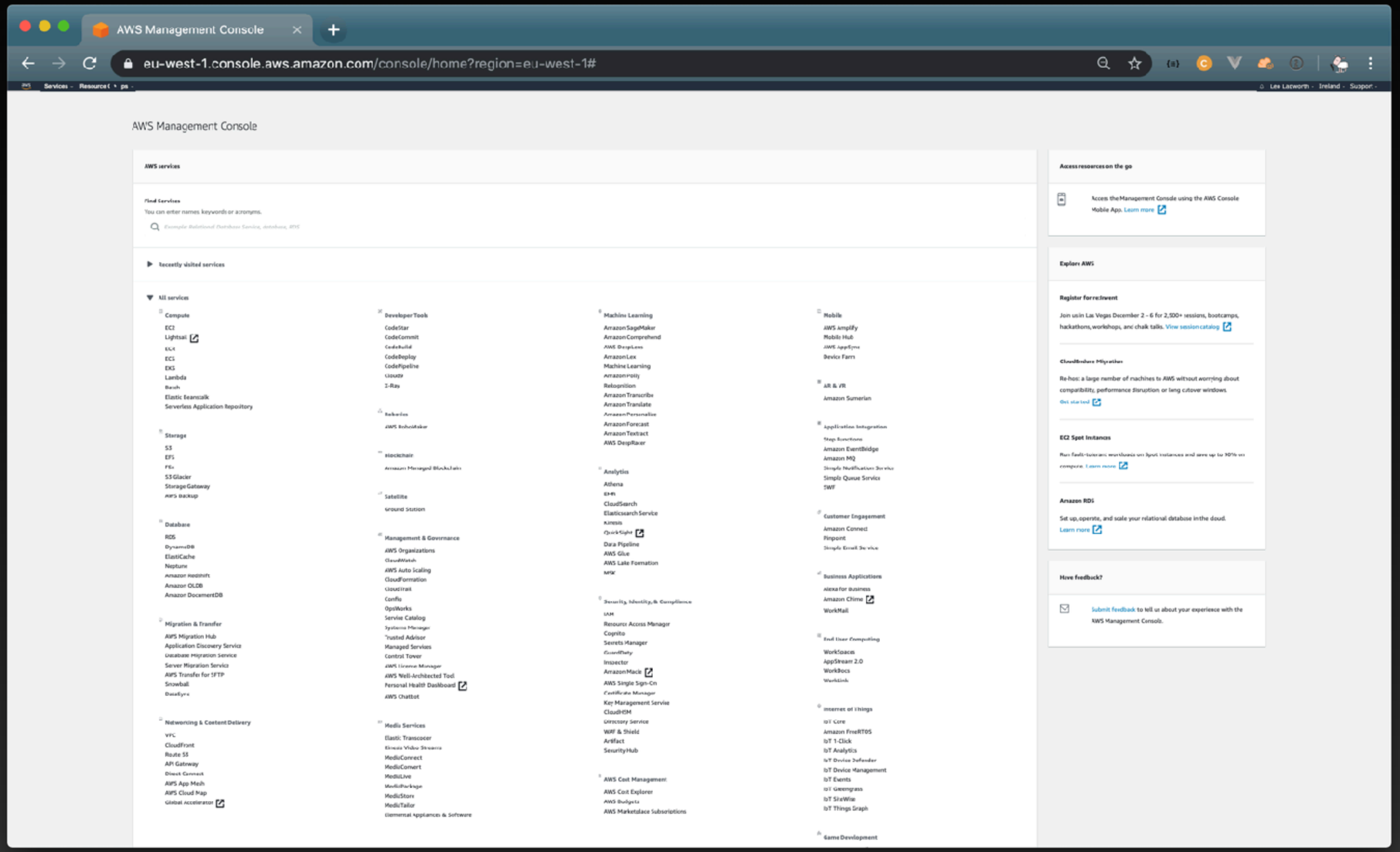
AWS Management Console
eu-west-1.console.aws.amazon.com/console/home?region=eu-west-1#
AWS Management Console
AWS services
Find Services
You can enter names keywords or acronyms.
Recently visited services
All services
Compute
EC2
Lightsail
ECR
ECS
EKS
Lambda
Batch
Elastic Beanstalk
Serverless Application Repository
Storage
S3
EFS
FSx
S3 Glacier
Storage Gateway
AWS Backup
Database
RDS
DynamoDB
ElastiCache
Neptune
Amazon Redshift
Amazon QLDB
Amazon DocumentDB
Migration & Transfer
AWS Migration Hub
Application Discovery Service
Database Migration Service
Server Migration Service
AWS Transfer for SFTP
Snowball
DataSync
Networking & Content Delivery
VPC
CloudFront
Route 53
API Gateway
Direct Connect
AWS App Mesh
AWS Cloud Map
Global Accelerator
Developer Tools
CodeStar
CodeCommit
CodeBuild
CodeDeploy
CodePipeline
Cloud9
X-Ray
Robotics
AWS RoboMaker
Blockchain
Amazon Managed Blockchain
Satellite
Ground Station
Management & Governance
AWS Organizations
CloudWatch
AWS Auto Scaling
CloudFormation
CloudTrail
Config
OpsWorks
Service Catalog
Systems Manager
Trusted Advisor
Managed Services
Control Tower
AWS License Manager
AWS Well-Architected Tool
Personal Health Dashboard
AWS Chatbot
Media Services
Elastic Transcoder
Kinesis Video Streams
MediaConnect
MediaConvert
MediaLive
MediaPackage
MediaStore
MediaTailor
Elemental Appliances & Software
Machine Learning
Amazon SageMaker
Amazon Comprehend
AWS DeepLens
Amazon Lex
Machine Learning
Amazon Polly
Rekognition
Amazon Transcribe
Amazon Translate
Amazon Personalize
Amazon Forecast
Amazon Textract
AWS DeepRacer
Analytics
Athena
EMR
CloudSearch
Elasticsearch Service
Kinesis
QuickSight
Data Pipeline
AWS Glue
AWS Lake Formation
MSK
Security, Identity, & Compliance
IAM
Resource Access Manager
Cognito
Secrets Manager
GuardDuty
Inspector
Amazon Macie
AWS Single Sign-On
Certificate Manager
Key Management Service
CloudHSM
Directory Service
WAF & Shield
Artifact
Security Hub
AWS Cost Management
AWS Cost Explorer
AWS Budgets
AWS Marketplace Subscriptions
Mobile
AWS Amplify
Mobile Hub
AWS AppSync
Device Farm
AR & VR
Amazon Sumerian
Application Integration
Step Functions
Amazon EventBridge
Amazon MQ
Simple Notification Service
Simple Queue Service
SWF
Customer Engagement
Amazon Connect
Pinpoint
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WorkMail
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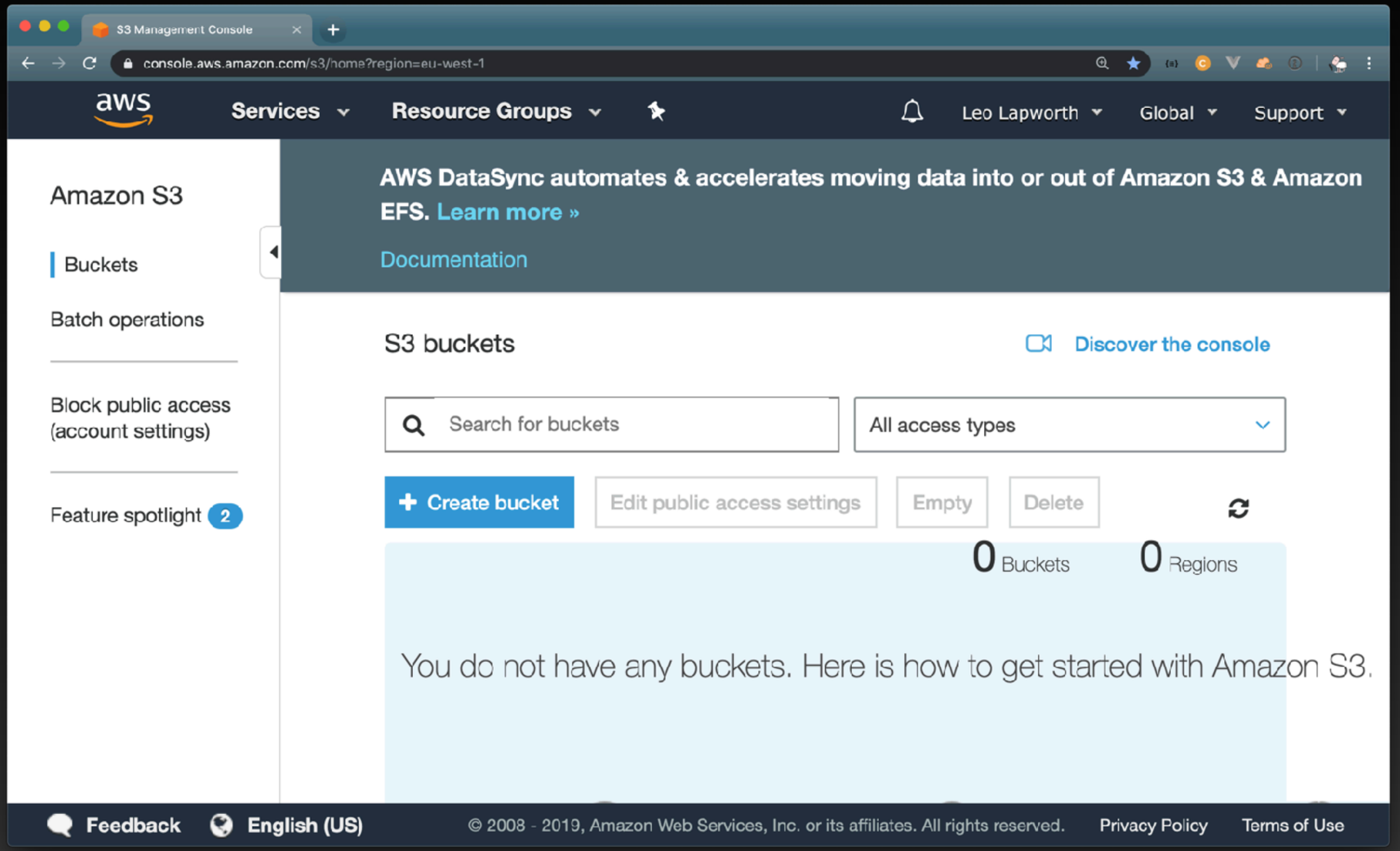
Amazon RDS
Set up, operate, and scale your relational database in the cloud.
Learn more
Have feedback?
Submit feedback to tell us about your experience with the AWS Management Console.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Support
Amazon S3
Buckets
Batch operations
Block public access (account settings)
Feature spotlight 2
AWS DataSync automates & accelerates moving data into or out of Amazon S3 & Amazon EFS. Learn more »
Documentation
S3 buckets
Discover the console
Search for buckets
All access types
Create bucket
Edit public access settings
Empty
Delete
0 Buckets
0 Regions
You do not have any buckets. Here is how to get started with Amazon S3.
Feedback
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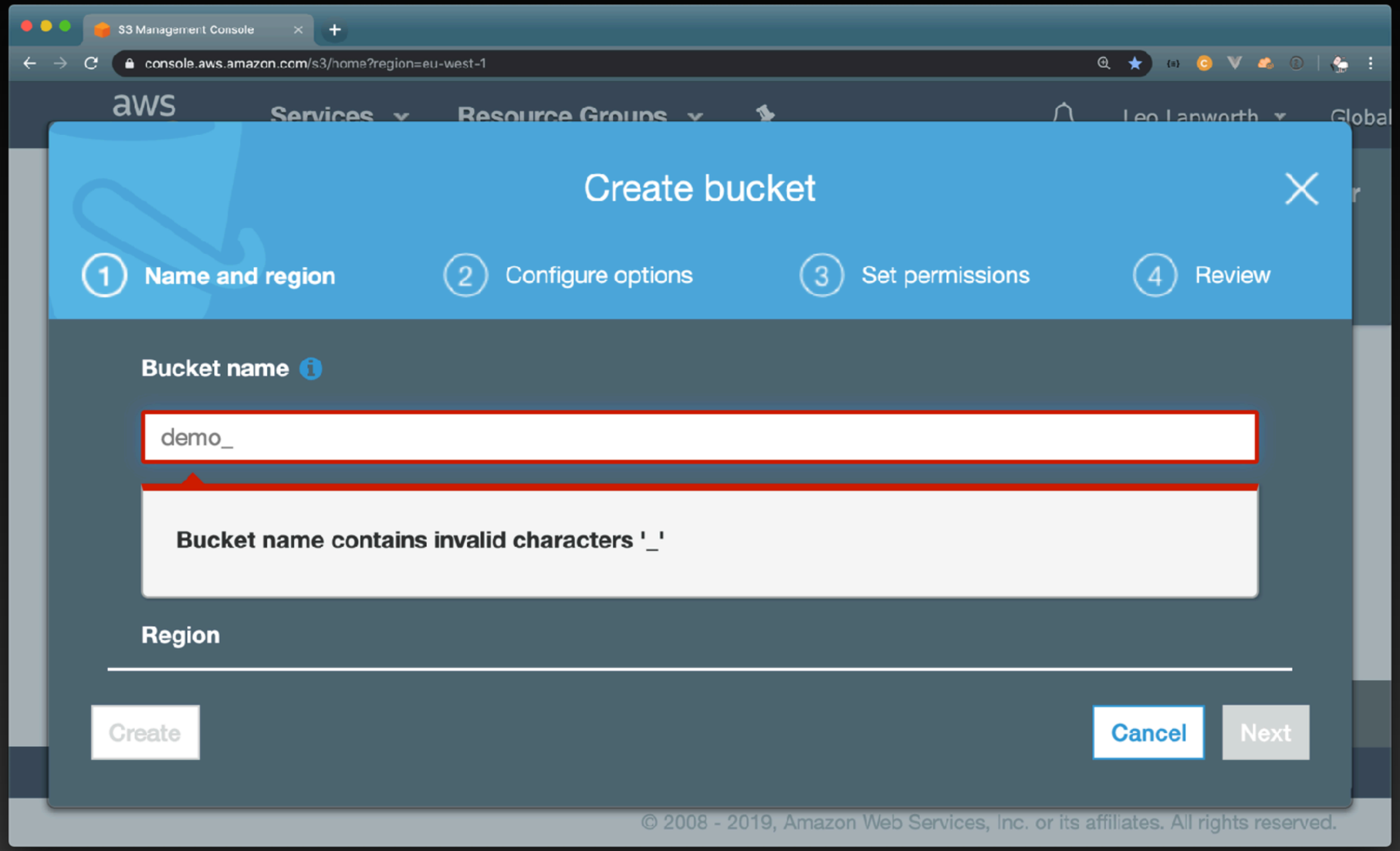
S3 Management Console
console.aws.amazon.com/s3/home?region=eu-west-1
aws
Services
Resource Groups
Leo Lanworth
Global
Create bucket
1 Name and region
2 Configure options
3 Set permissions
4 Review
Bucket name
demo_
Bucket name contains invalid characters '_'
Region
Create
Cancel
Next
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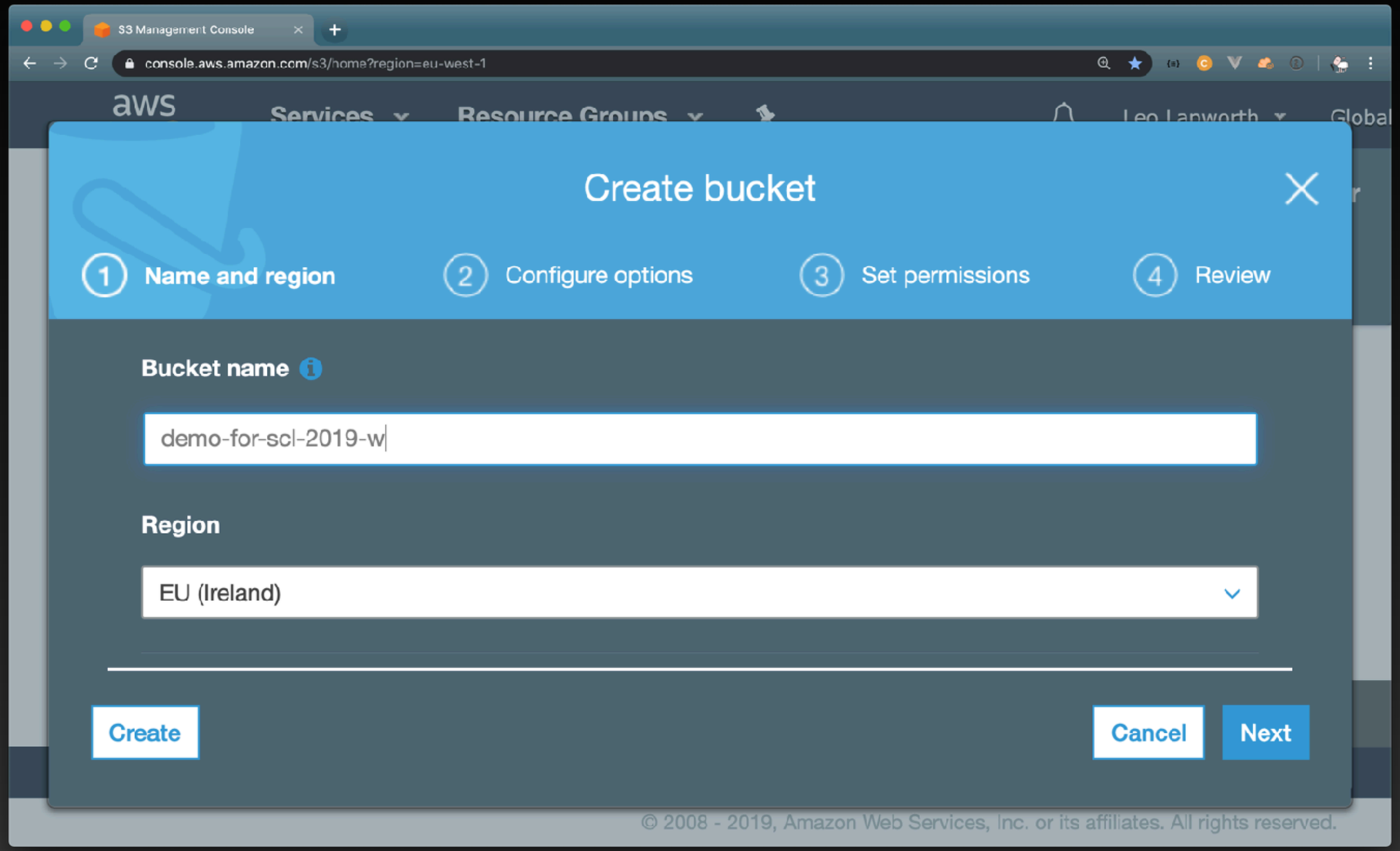
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aws
Services
Resource Groups
Leo Lanworth
Global
Create bucket
1 Name and region
2 Configure options
3 Set permissions
4 Review
Bucket name
demo-for-scl-2019-w
Region
EU (Ireland)
Create
Cancel
Next
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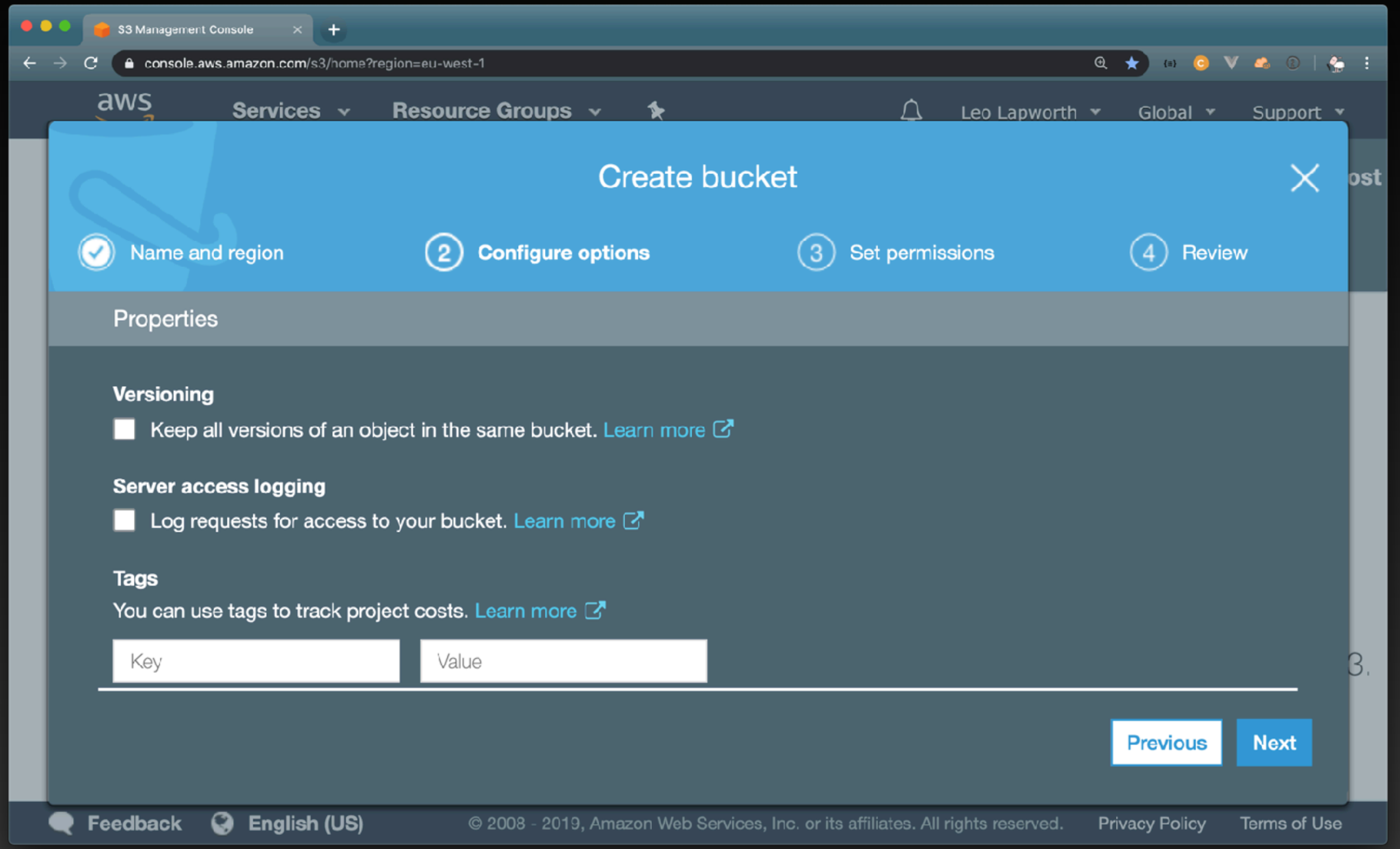
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Global
Support
Create bucket
1 Name and region
2 Configure options
3 Set permissions
4 Review
Properties
Versioning
Keep all versions of an object in the same bucket. Learn more
Server access logging
Log requests for access to your bucket. Learn more
Tags
You can use tags to track project costs. Learn more
Key
Value
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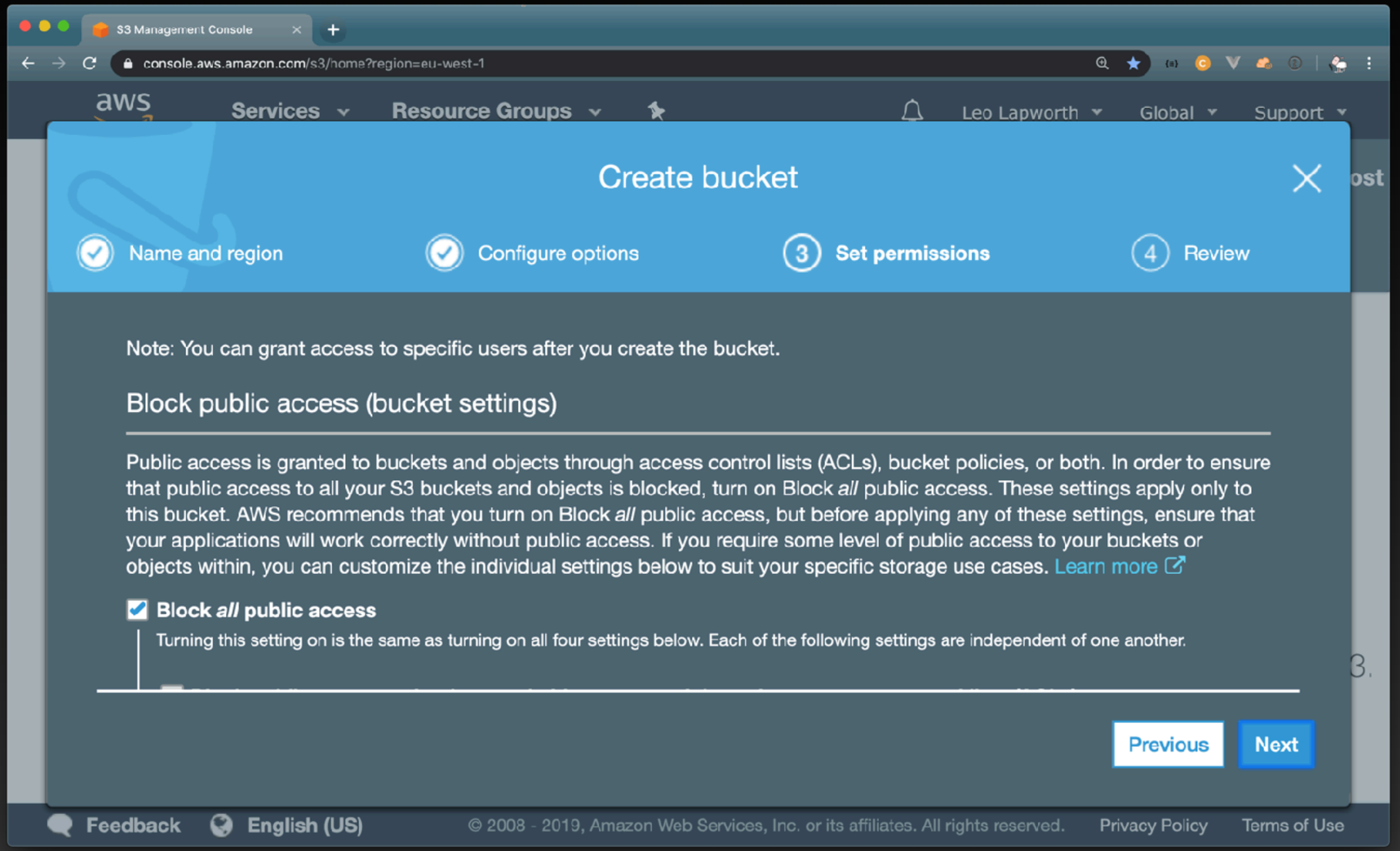
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aws
Services
Resource Groups
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Global
Support
Create bucket
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Note: You can grant access to specific users after you create the bucket.
Block public access (bucket settings)
Public access is granted to buckets and objects through access control lists (ACLs), bucket policies, or both. In order to ensure that public access to all your S3 buckets and objects is blocked, turn on Block all public access. These settings apply only to this bucket. AWS recommends that you turn on Block all public access, but before applying any of these settings, ensure that your applications will work correctly without public access. If you require some level of public access to your buckets or objects within, you can customize the individual settings below to suit your specific storage use cases. Learn more
Block all public access
Turning this setting on is the same as turning on all four settings below. Each of the following settings are independent of one another.
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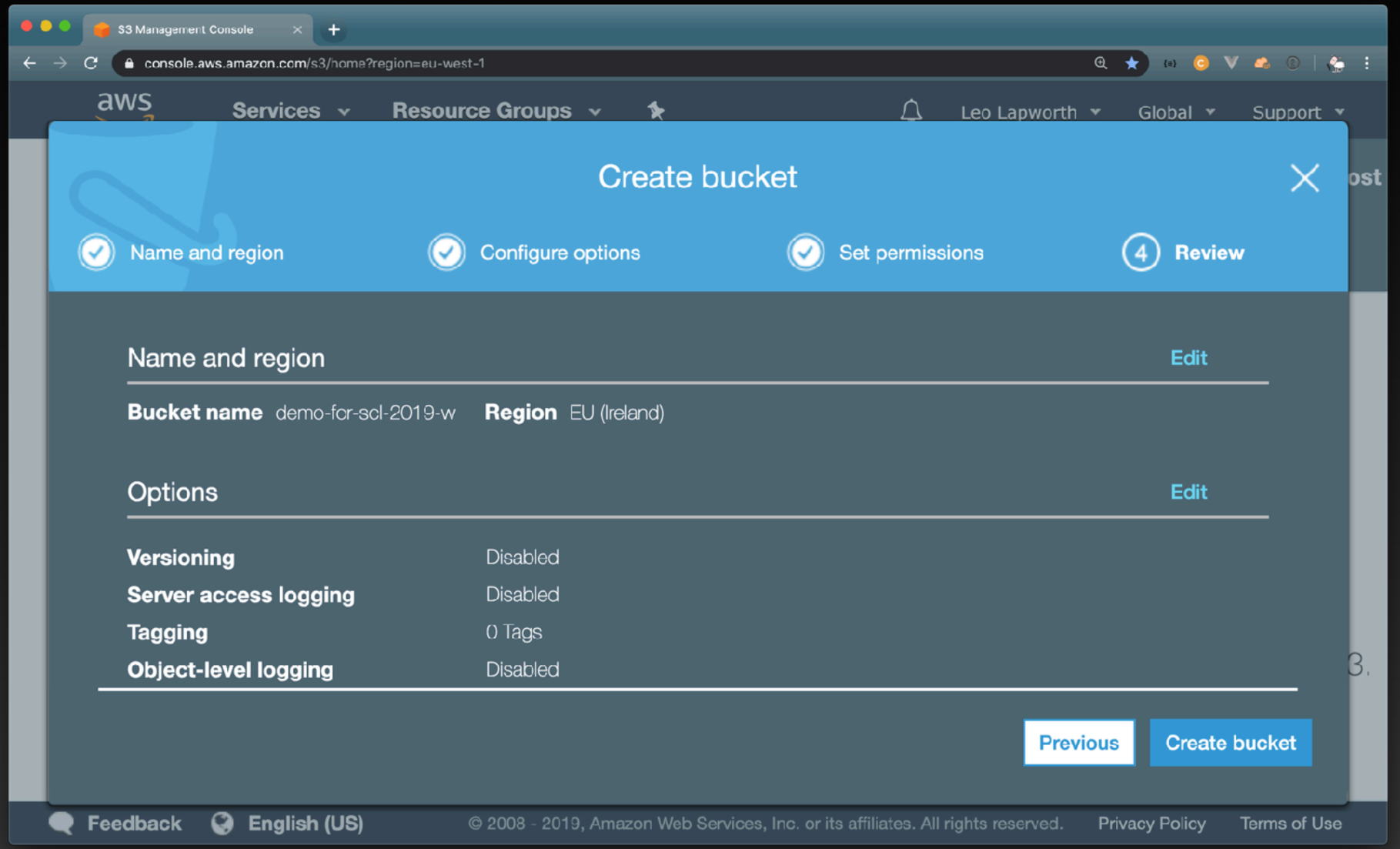
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Services
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Create bucket
Name and region
Configure options
Set permissions
4
Review
Name and region
Edit
Bucket name demo-for-scl-2019-w
Region EU (Ireland)
Options
Edit
Versioning
Disabled
Server access logging
Disabled
Tagging
0 Tags
Object-level logging
Disabled
Previous
Create bucket
Feedback
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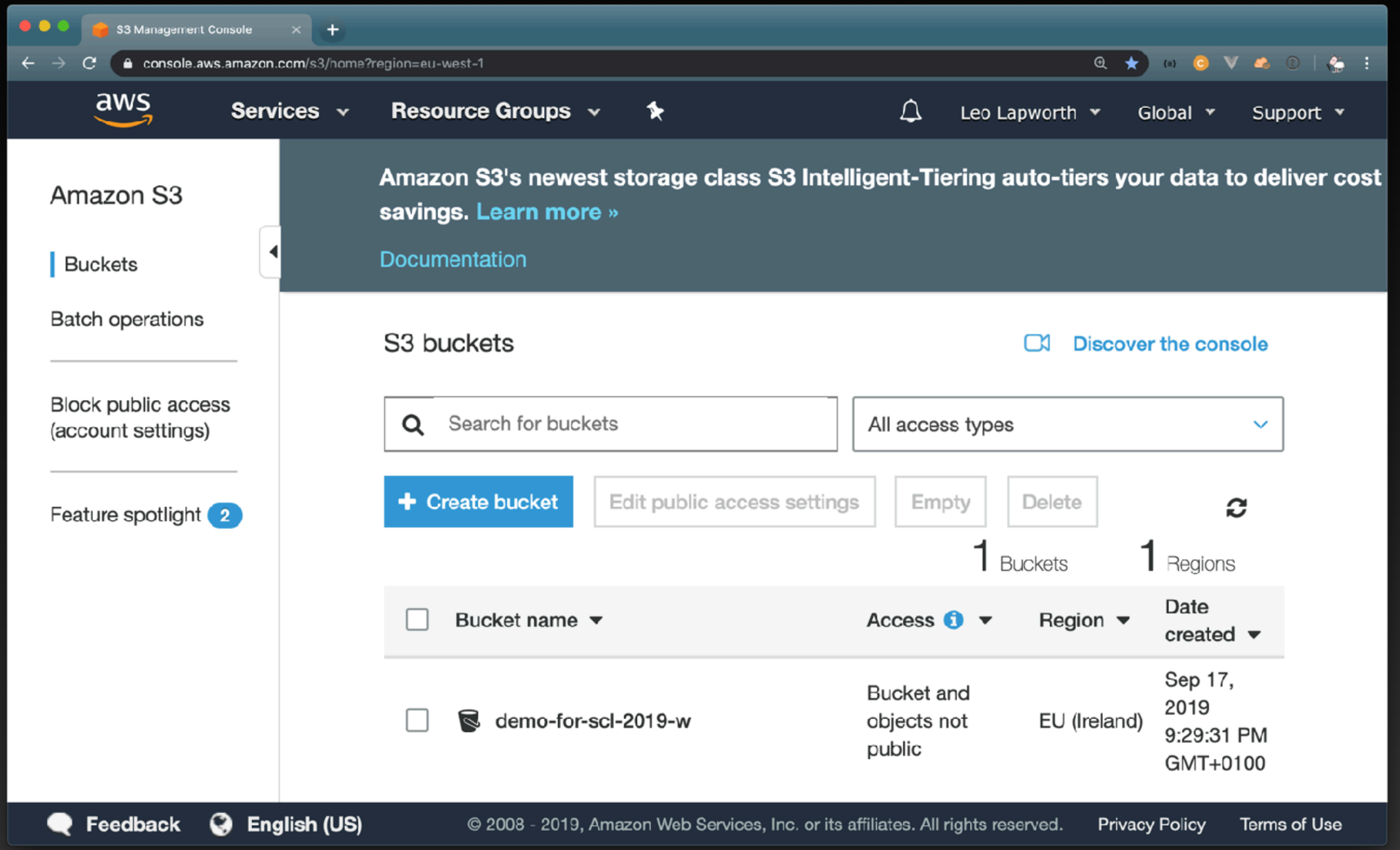
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Empty
Delete
1 Buckets
1 Regions
Bucket name
Access
Region
Date created
demo-for-scl-2019-w
Bucket and objects not public
EU (Ireland)
Sep 17, 2019 9:29:31 PM GMT+0100
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Provisioning AWS

```
> aws sqs create-queue

> aws ec2 run-instances --image-id ami-xxxxxxxx --count 1
  --instance-type t2.micro --key-name MyKeyPair --security-
  group-ids sg-903004f8 --subnet-id subnet-6e7f829e

> aws s3api create-bucket —bucket demo-for-scl-2019
```

What about

Version control?

Reproducibility?

Speed of provisioning?

That’s what
Infrastructure as code
gives you!

Some approaches to IaC

- Serverless framework https://serverless.com/
- Arc https://arc.codes
- Terraform https://www.terraform.io/
- AWS SAM (Serverless Application Model)
- AWS Native cloudformation

How do they work? (for AWS)

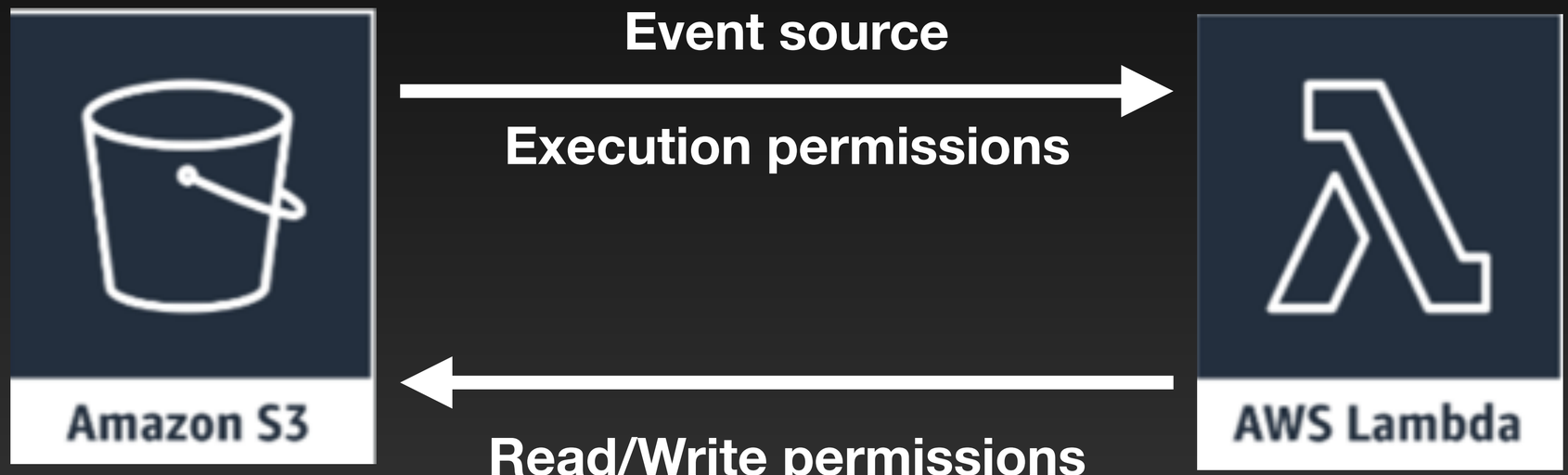
- Interface with AWS service APIs
- AWS CloudFormation

What are we trying to define?

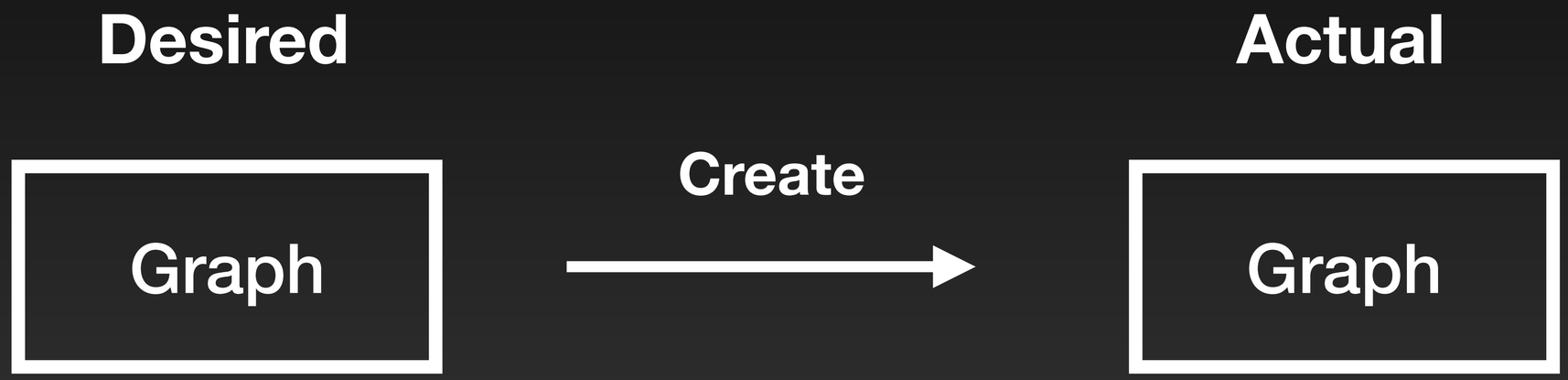
- Resources
- Parameters
- Permissions
- Triggers
- Dependencies
- Outputs

Infrastructure graphs

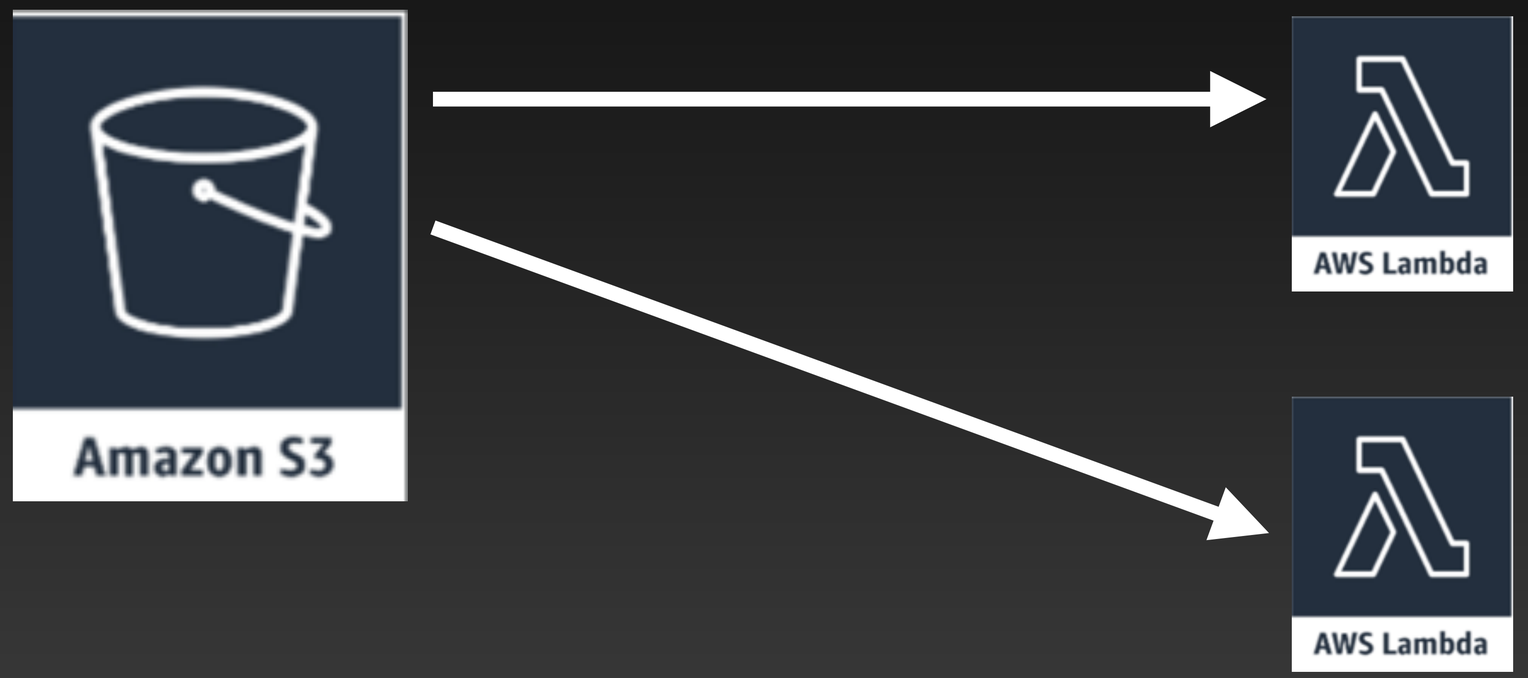
Infrastructure graph



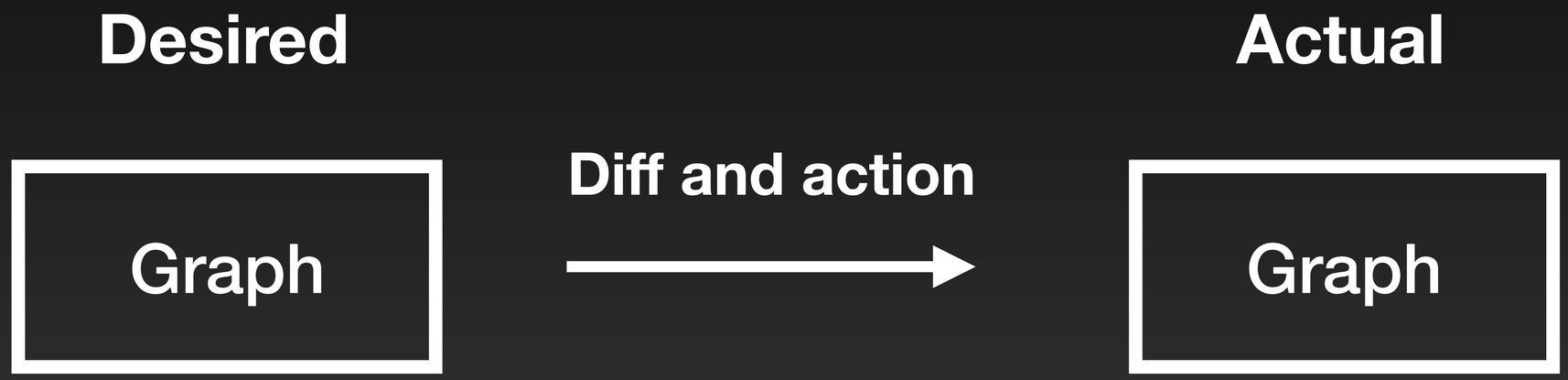
Infrastructure graph management



Infrastructure graph management



Infrastructure graph management



CloudFormation

```
> cat template.yaml

  Resources:
    MyDemoBucket:
      Type: AWS::S3::Bucket
      Properties:
        BucketName: demo-for-scl-2019
```

```
> aws cloudformation deploy --template-file
template.yaml --stack-name DemoStack3
```

Waiting for change-set to be created..

Waiting for stack create/update to complete

Successfully created/updated stack - DemoStack3

Why DemoStack3?

BucketName: dem_for_scl_2019

Failed to create/update the stack. Run the following command to fetch the list of events leading up to the failure

aws cloudformation describe-stack-events --stack-name DemoStack3


```
{
    "StackEvents": [
        {
            "StackId": "arn:aws:cloudformation:eu-west-1:374733882471:stack/DemoStack2/0363ce60-d8ba-11e9-b8ea-069f6d7e1780",
            "EventId": "1959c120-d8ba-11e9-bb16-0abc432e4032",
            "StackName": "DemoStack2",
            "LogicalResourceId": "DemoStack2",
            "PhysicalResourceId": "arn:aws:cloudformation:eu-west-1:374733882471:stack/DemoStack2/0363ce60-d8ba-11e9-b8ea-069f6d7e1780",
            "ResourceType": "AWS::CloudFormation::Stack",
            "Timestamp": "2019-09-16T19:42:21.223Z",
            "ResourceStatus": "ROLLBACK_COMPLETE"
        },
        {
            "StackId": "arn:aws:cloudformation:eu-west-1:374733882471:stack/DemoStack2/0363ce60-d8ba-11e9-b8ea-069f6d7e1780",
            "EventId": "MyFirstBucket-DELETE_COMPLETE-2019-09-16T19:42:20.814Z",
            "StackName": "DemoStack2",
            "LogicalResourceId": "MyFirstBucket",
            "PhysicalResourceId": "",
            "ResourceType": "AWS::S3::Bucket",
            "Timestamp": "2019-09-16T19:42:20.814Z",
            "ResourceStatus": "DELETE_COMPLETE",
```

```
            "LogicalResourceId": "DemoStack2",
            "PhysicalResourceId": "arn:aws:cloudformation:eu-west-1:374733882471:stack/DemoStack2/0
d8ba-11e9-b8ea-069f6d7e1780",
            "ResourceType": "AWS::CloudFormation::Stack",
            "Timestamp": "2019-09-16T19:41:52.401Z",
            "ResourceStatus": "ROLLBACK_IN_PROGRESS",
            "ResourceStatusReason": "The following resource(s) failed to create: [MyFirstBucket].
uested by user."
        },
        {
            "StackId": "arn:aws:cloudformation:eu-west-1:374733882471:stack/DemoStack2/0363ce60-d8
b8ea-069f6d7e1780",
            "EventId": "MyFirstBucket-CREATE_FAILED-2019-09-16T19:41:52.005Z",
            "StackName": "DemoStack2",
            "LogicalResourceId": "MyFirstBucket",
            "PhysicalResourceId": "",
            "ResourceType": "AWS::S3::Bucket",
            "Timestamp": "2019-09-16T19:41:52.005Z",
            "ResourceStatus": "CREATE_FAILED",
            "ResourceStatusReason": "Bucket name should not contain '_'",
            "ResourceProperties": "{\"BucketName\":\"dem_for_scl_2019\"}"
        },
        {
            "StackId": "arn:aws:cloudformation:eu-west-1:374733882471:stack/DemoStack2/0363ce60-d8
b8ea-069f6d7e1780",
            "EventId": "MyFirstBucket-CREATE_IN_PROGRESS-2019-09-16T19:41:51.590Z",
            "StackName": "DemoStack2",
            "LogicalResourceId": "MyFirstBucket",
            "PhysicalResourceId": "",
            "ResourceType": "AWS::S3::Bucket",
            "Timestamp": "2019-09-16T19:41:51.590Z",
            "ResourceStatus": "CREATE_IN_PROGRESS",
```

I thought this was a talk
about CDK?

Using CDK to generate CloudFormation

```
import cdk = require('@aws-cdk/core');
import s3 = require('@aws-cdk/aws-s3');
```

```
import cdk = require('@aws-cdk/core');
import s3 = require('@aws-cdk/aws-s3');
```

```
    new s3.Bucket(this, 'MyFirstBucket', {
      bucketName: “demo_for_scl_2019",
    });
```

```
import cdk = require('@aws-cdk/core');
import s3 = require('@aws-cdk/aws-s3');

export class HelloCdkStack extends cdk.Stack {
  constructor(scope: cdk.App, id: string) {
    super(scope, id);

    new s3.Bucket(this, 'MyFirstBucket', {
      bucketName: “demo_for_scl_2019",
    });
  }
}
```

```
import cdk = require('@aws-cdk/core');
import s3 = require('@aws-cdk/aws-s3');

export class HelloCdkStack extends cdk.Stack {
  constructor(scope: cdk.App, id: string) {
    super(scope, id);

    new s3.Bucket(this, 'MyFirstBucket', {
      bucketName: “demo_for_scl_2019",
    });
  }
}

const app = new cdk.App();
new HelloCdkStack(app, 'StoreStack');
app.synth();
```

CDK synth

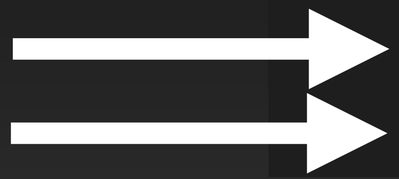
```
> cdk synth


@aws-cdk/aws-s3/lib/bucket.js:539
        throw new Error(`Invalid S3 bucket name (value: ${bucketName})${os_1.EOL}$
{errors.join(os_1.EOL)}`);

Error: Invalid S3 bucket name (value: demo_for_scl_2019)

Bucket name must only contain lowercase characters and the symbols, period (.) and
dash (-) (offset: 3)

    at ....
```

```
import cdk = require('@aws-cdk/core');
import s3 = require('@aws-cdk/aws-s3');

export class HelloCdkStack extends cdk.Stack {
  constructor(scope: cdk.App, id: string) {
    super(scope, id);

    new s3.Bucket(this, 'MyFirstBucket', {
      bucketName: 'demo_for_scl_2019',
    });
  }
}

const app = new cdk.App();
new HelloCdkStack(app, 'StoreStack');
app.synth();
```

```
import cdk = require('@aws-cdk/core');
import s3 = require('@aws-cdk/aws-s3');

export class HelloCdkStack extends cdk.Stack {
  constructor(scope: cdk.App, id: string) {
    super(scope, id);

    new s3.Bucket(this, 'MyFirstBucket', {
      bucketName: ‘demo-for-scl-2019’,
    });
  }
}

const app = new cdk.App();
new HelloCdkStack(app, 'StoreStack');
app.synth();
```

> cdk synth

```
Resources:
  MyFirstBucketB8884501:
    Type: AWS::S3::Bucket
    Properties:
      BucketName: demo-for-scl-2019
```



```yaml
Resources:
  MyFirstBucketB8884501:
    Type: AWS::S3::Bucket
    Properties:
      BucketName: demo-for-scl-2019
    UpdateReplacePolicy: Retain
    DeletionPolicy: Retain
```

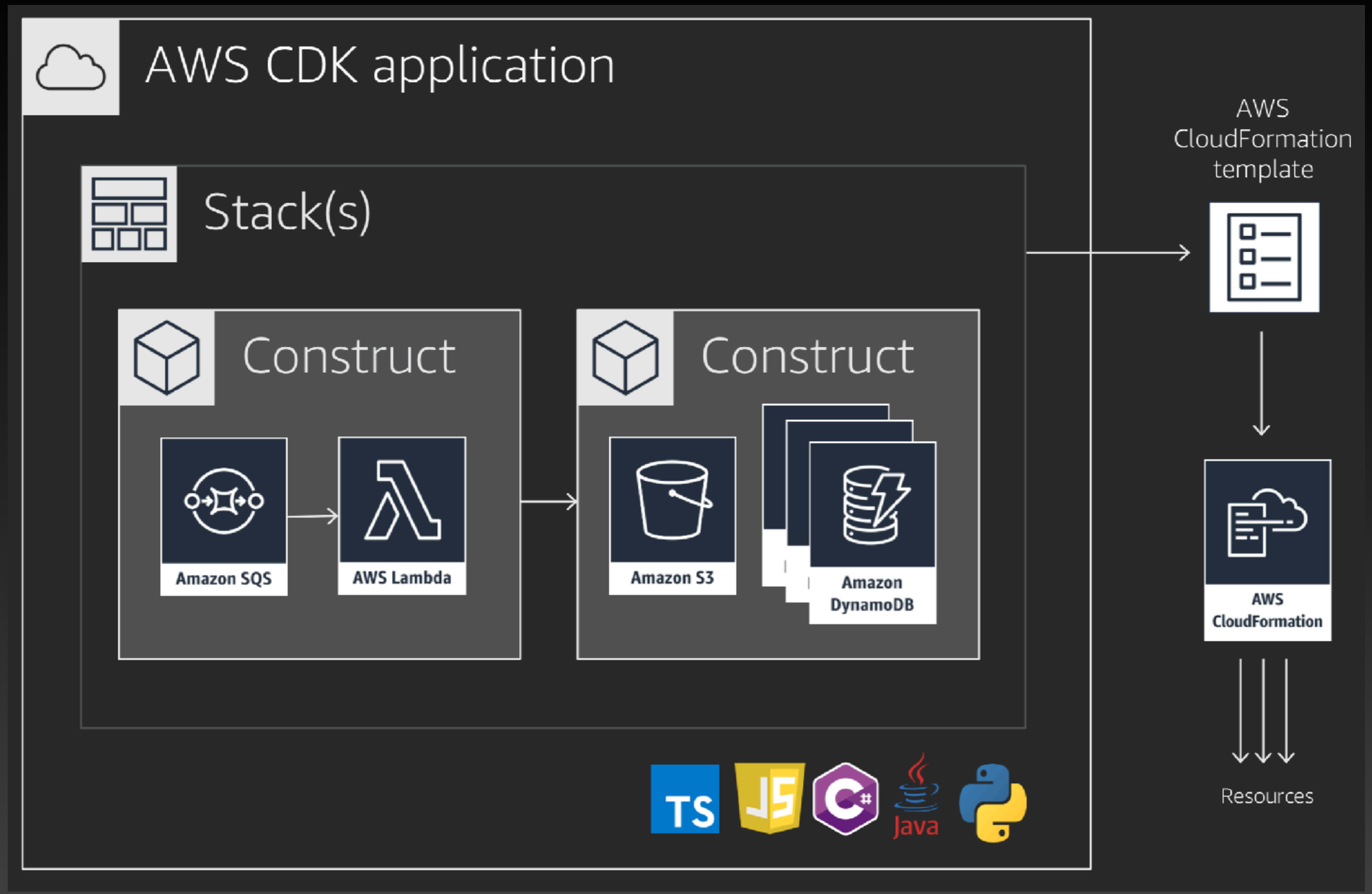
CDK synth

```
Resources:
  MyFirstBucketB8884501:
    Type: AWS::S3::Bucket
    Properties:
      BucketName: demo-for-scl-2019
    UpdateReplacePolicy: Retain
    DeletionPolicy: Retain
    Metadata:
      aws:cdk:path: StoreStack/MyFirstBucket/Resc
  CDKMetadata:
    Type: AWS::CDK::Metadata
    Properties: ……
```

CDK structure

(bottom up)

- CloudFormation (Cfn)
- Resource Constructs
- Constructs (reusable)
- Stacks
- Applications


AWS CDK application
Stack(s)
Construct
Amazon SQS
AWS Lambda
Construct
Amazon S3
Amazon DynamoDB
TS
Java
AWS CloudFormation template
AWS CloudFormation
Resources

Basic stack demo

CDK constructor interface (3 params)

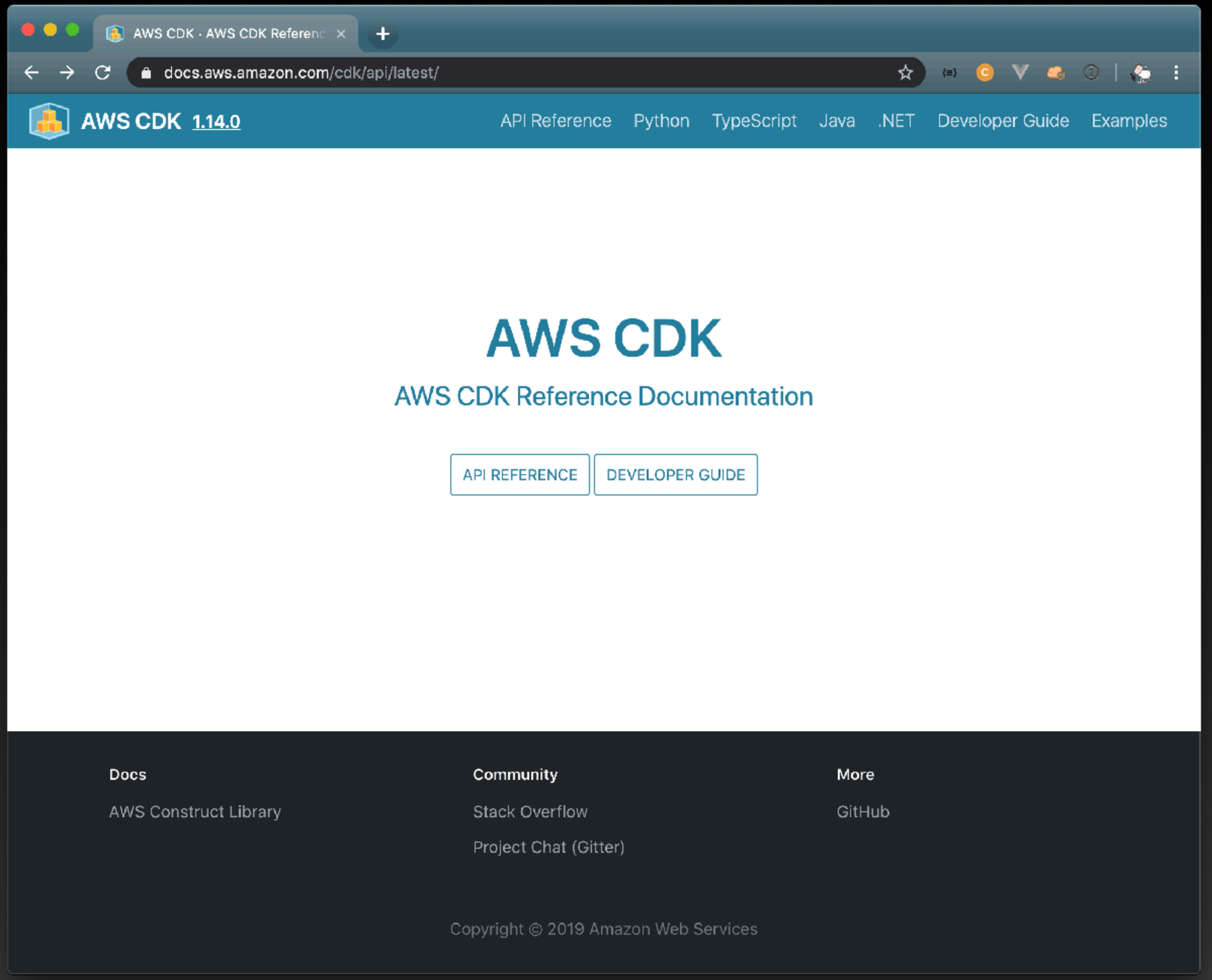
- Scope (***app*** for stacks, ***this*** for constructs)
- Id (unique within this scope)
- Properties (arguments)

```
export class HelloCdkStack extends cdk.Stack {
  constructor(
     scope: cdk.App,
     id: string,
     props?: props
  ) {
    super(scope, id);

    new s3.Bucket(
      this,
      'MyFirstBucket',
      {
        bucketName: "demo-for-scl-2019",
      }
    );
  }
}
```

Scope
Id
Properties

Scope
Id
Properties

API Reference
(https://docs.aws.amazon.com/cdk/api/latest/)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docs.aws.amazon.com/cdk/api/latest/
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DEVELOPER GUIDE
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Community
Stack Overflow
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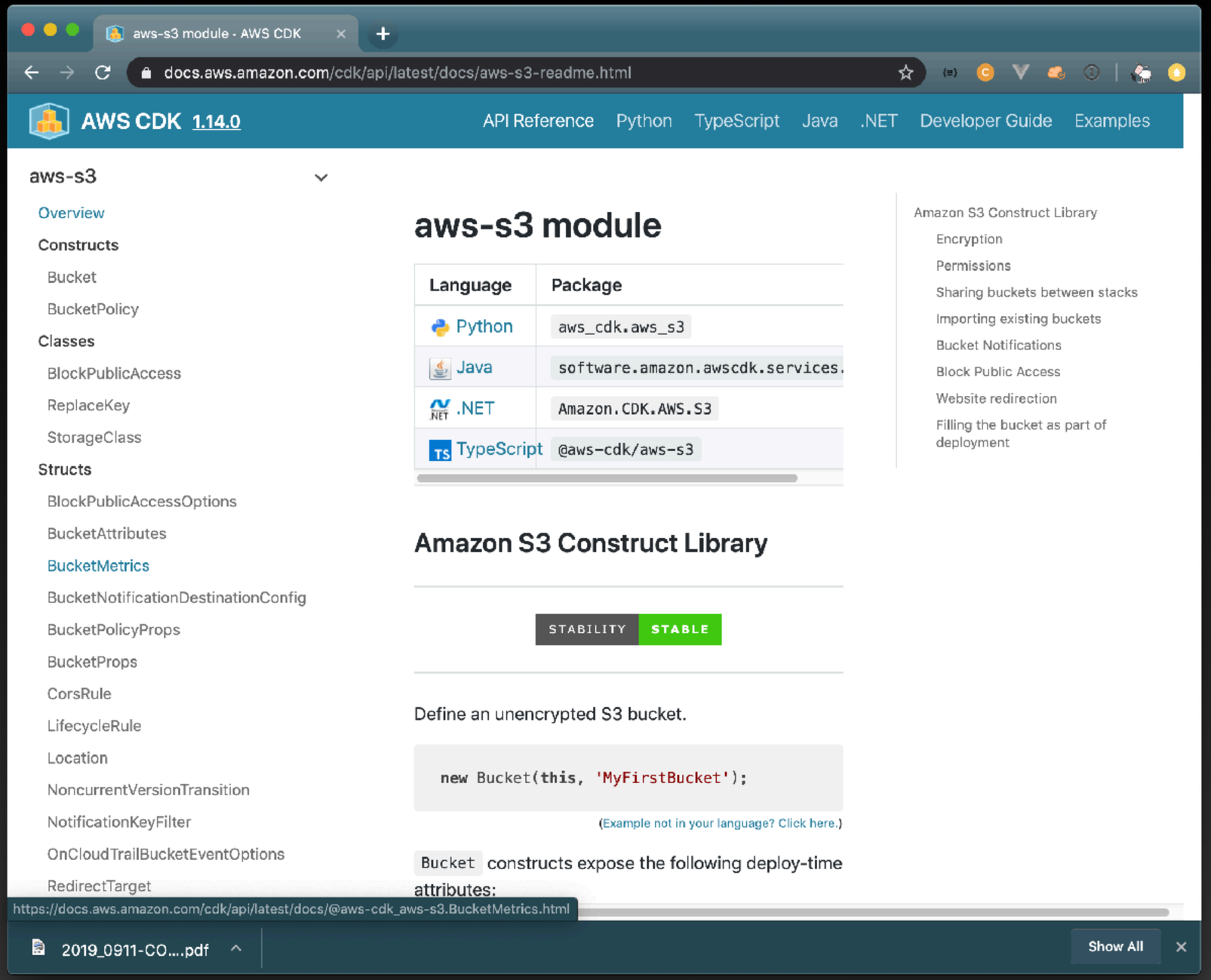
aws-s3 module - AWS CDK
docs.aws.amazon.com/cdk/api/latest/docs/aws-s3-readme.html
AWS CDK 1.14.0
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LifecycleRule
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NotificationKeyFilter
OnCloudTrailBucketEventOptions
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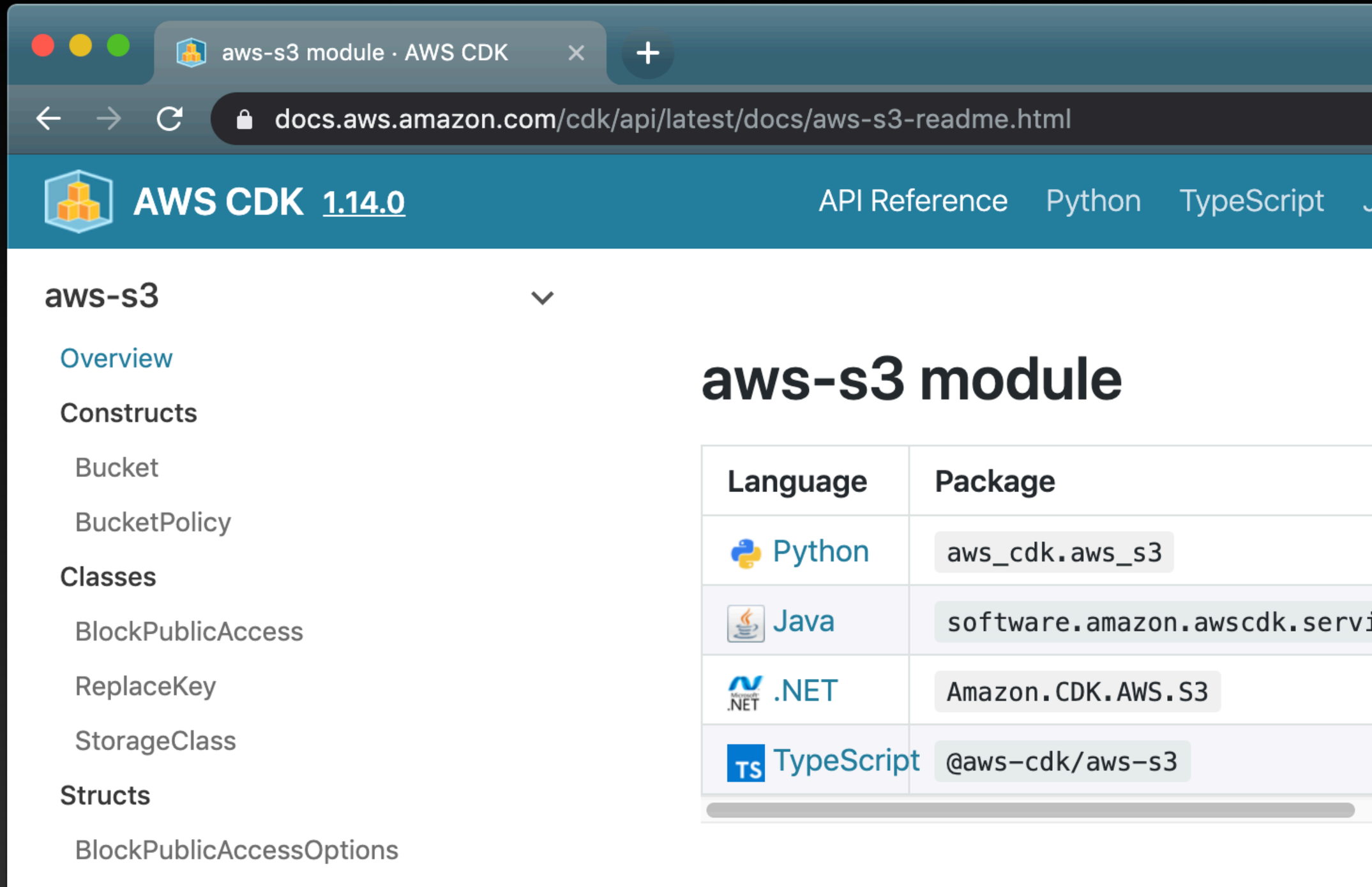
aws_cdk.aws_s3
Java
software.amazon.awscdk.services.
.NET
Amazon.CDK.AWS.S3
TypeScript
@aws-cdk/aws-s3
Amazon S3 Construct Library
STABILITY
STABLE
Define an unencrypted S3 bucket.
new Bucket(this, 'MyFirstBucket');
(Example not in your language? Click here.)
Bucket constructs expose the following deploy-time attributes:
Amazon S3 Construct Library
Encryption
Permissions
Sharing buckets between stacks
Importing existing buckets
Bucket Notifications
Block Public Access
Website redirection
Filling the bucket as part of deployment
https://docs.aws.amazon.com/cdk/api/latest/docs/@aws-cdk_aws-s3.BucketMetrics.html
2019_0911-CO....pdf
Show All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software.amazon.awscdk.servi
.NET
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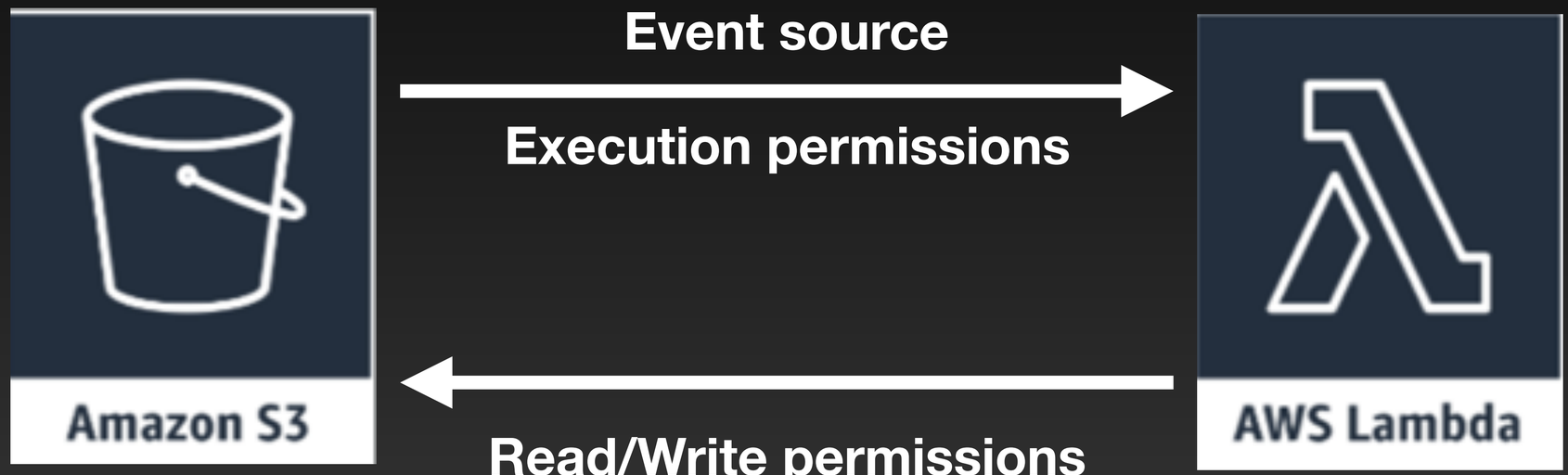
TypeScript
@aws-cdk/aws-s3

Events & Permissions

S3 event source



```
import cdk = require('@aws-cdk/core');
import s3 = require('@aws-cdk/aws-s3');
import lambda = require('@aws-cdk/aws-lambda');
import { S3EventSource } from '@aws-cdk/aws-lambda-event-sources';

export class EventS3LambdaStack extends cdk.Stack {
  constructor(scope: cdk.Construct, id: string, props?: cdk.StackProps) {
    super(scope, id, props);

    // object store
    const myBucket = new s3.Bucket(this, 'aBucket', {});

    // create an event source for new objects
    let bucketEvents = new S3EventSource(myBucket, {
      events: [ s3.EventType.OBJECT_CREATED],
    });

    // A function to process the S3 event
    const fn = new lambda.Function(this, 'EchoS3', {
      runtime: lambda.Runtime.NODEJS_8_10,
      handler: 'index.handler',
      code: lambda.Code.fromAsset('./lib/funcs/echo_s3/'),
      events: [bucketEvents],
    });

    // Remember to let the function read/write to the
    // bucket if it needs more than just the object key
    myBucket.grantReadWrite(fn);
  }
}
```

```
import cdk =
    require('@aws-cdk/core');

import s3 =
    require('@aws-cdk/aws-s3');

import lambda =
    require('@aws-cdk/aws-lambda');

import { S3EventSource }
    from
  '@aws-cdk/aws-lambda-event-sources';
```

```
// object store
const myBucket = new s3.Bucket(
    this,
    'aBucket',
    {}
);
```

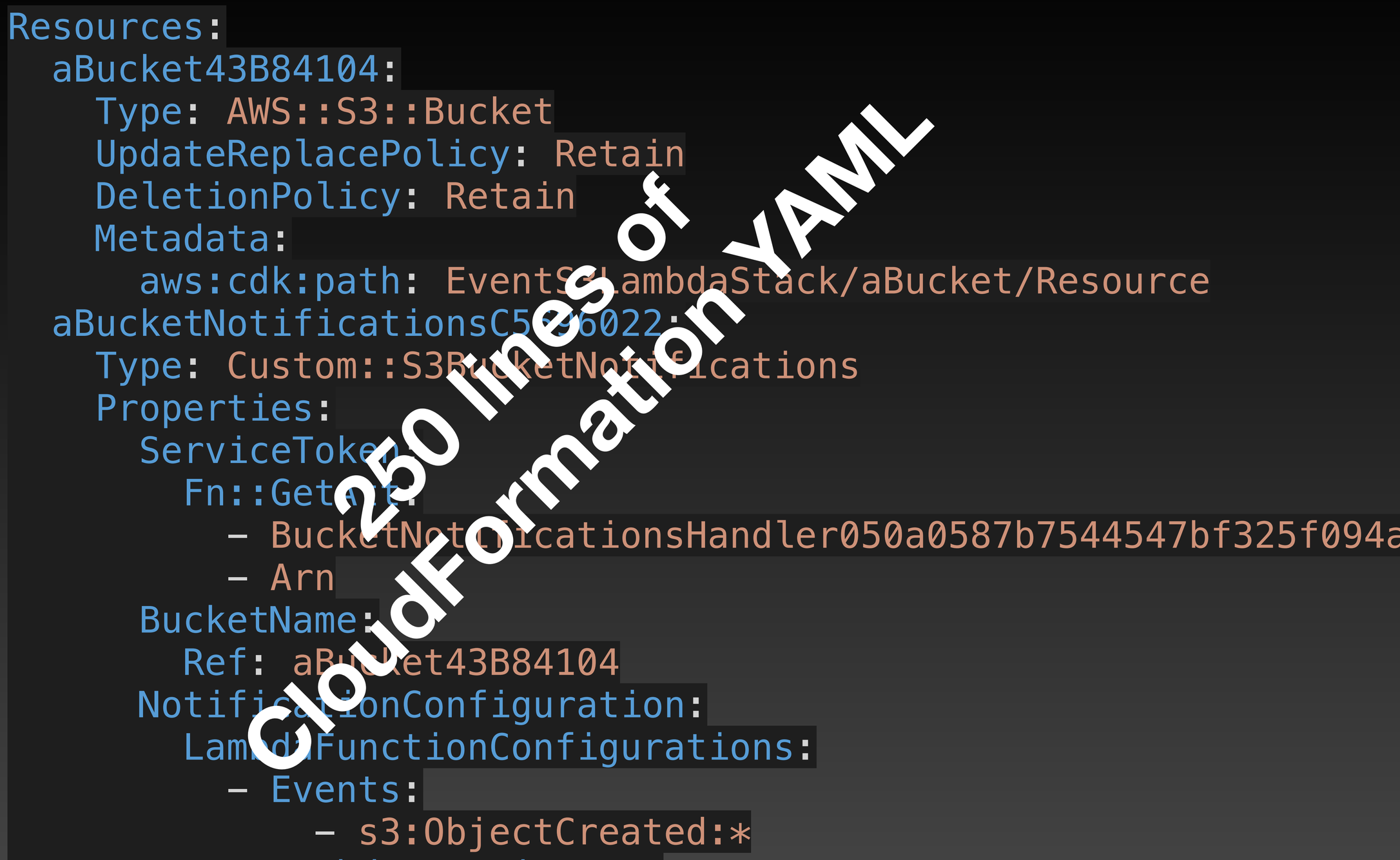
```
// create an event source
let bucketEvents = new S3EventSource(
    myBucket, {
      events: [
        s3.EventType.OBJECT_CREATED
      ],
    });
```

```
// A function to process the S3 event
const fn = new lambda.Function(
 this,
 ‘EchoS3',
 {
 runtime: lambda.Runtime.NODEJS_8_10,
 code: lambda.Code.fromAsset(
          './lib/funcs/echo_s3/'),
 handler: 'index.handler',
 events: [bucketEvents],
});

// Give function read/write to the
// bucket if it is needed
myBucket.grantReadWrite(fn);
```

```
import cdk = require('@aws-cdk/core');
import s3 = require('@aws-cdk/aws-s3');
import lambda = require('@aws-cdk/aws-lambda');
import { S3EventSource } from '@aws-cdk/aws-lambda-event-sources';

export class EventS3LambdaStack extends cdk.Stack {
  constructor(scope: cdk.Construct, id: string, props?: cdk.StackProps) {
    super(scope, id, props);

    // object store
    const myBucket = new s3.Bucket(this, 'MyBucket', {});

    // create an event source for new objects
    let bucketEvent = new S3EventSource(myBucket, {
      events: [ s3.EventType.OBJECT_CREATED],
    });

    // A function to process the S3 event
    const fn = new lambda.Function(this, 'EchoS3', {
      runtime: lambda.Runtime.NODEJS_8_10,
      handler: 'index.handler',
      code: lambda.Code.fromAsset('./lib/funcs/echo_s3/'),
      events: [bucketEvent],
    });

    // Remember to let the function read/write to the
    // bucket if it needs more than just the object key
    myBucket.grantReadWrite(fn);
  }
}
```

30 lines of code

CDK synth


Resources:
aBucket43B84104:
Type: AWS::S3::Bucket
UpdateReplacePolicy: Retain
DeletionPolicy: Retain
Metadata:
aws:cdk:path: EventS
LambdaStack/aBucket/Resource
aBucketNotificationsC5
6022:
Type: Custom::S3BucketNotifications
Properties:
ServiceToken:
Fn::Get
t:
- BucketNot
ificationsHandler050a0587b7544547bf325f094a
- Arn
BucketName:
Ref: aBu
ket43B84104
NotificationConfiguration:
LambdaFunctionConfigurations:
- Events:
- s3:ObjectCreated:*
250 lines of
CloudFormation YAML

Full s3/lambda demo

Other Lambda event sources?

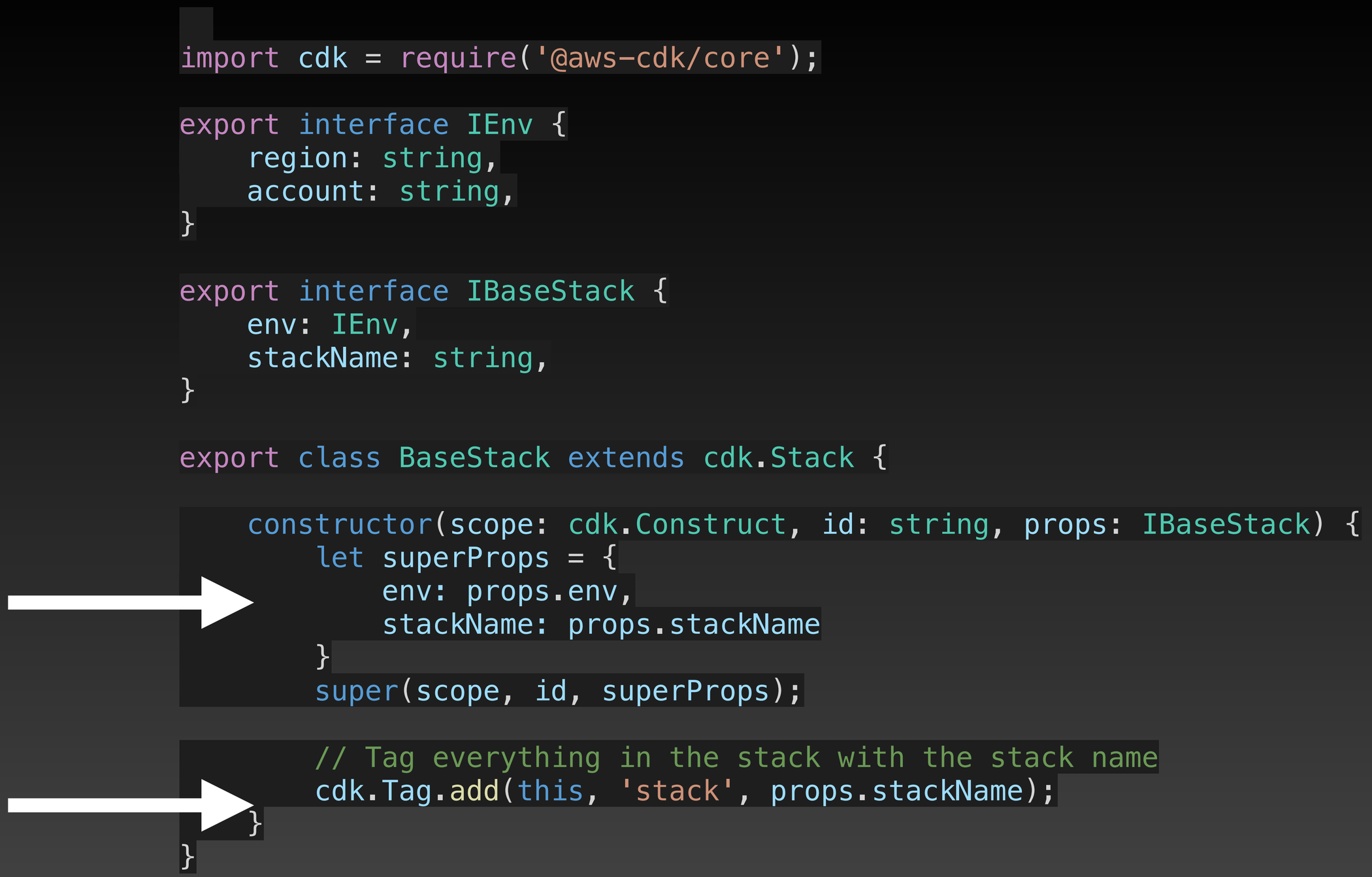
- SQS
- SNS
- DynamoDB Streams
- Kinesis
- More planned

HTTP event source with ApiGateway

```
const apigateway = require("@aws-cdk/aws-apigateway");

const api = new apigateway.RestApi(this, "itemsApi", {
  restApiName: "Items Service"
});

const items = api.root.addResource("items");

const lambdaIntergration
    = new apigateway.LambdaIntegration(aLambdaObject);

items.addMethod("GET", lambdaIntergration);
```

Tips & tricks

Stack base class


import cdk = require('@aws-cdk/core');
export interface IEnv {
region: string,
account: string,
}
export interface IBaseStack {
env: IEnv,
stackName: string,
}
export class BaseStack extends cdk.Stack {
constructor(scope: cdk.Construct, id: string, props: IBaseStack) {
let superProps = {
env: props.env,
stackName: props.stackName
}
super(scope, id, superProps);
// Tag everything in the stack with the stack name
cdk.Tag.add(this, 'stack', props.stackName);
}
}

Importing existing resources

```
const bucket = s3.Bucket.fromBucketAttributes(
    this,
    "ImportedBucket",
    {
     bucketArn: "arn:aws:s3:::my-bucket"
    }
);

// now you can just call methods on the bucket
bucket.grantReadWrite(lambdaFunction);
```

Misc

- **Stack.of(construct)** - access stack at any point (useful if you need stack.region)
- Do not edit *anything* through web UI

Local development (using SAM)

Serverless Application Model (SAM)

- Serverless YAML shortcuts for CloudFormation YAML (not as nice as CDK IMHO!)
- Local testing and debugging

Setup for local testing

- **cdk synth —no-staging > template.yaml**
- Find lambda resource name
- Create **payload.json (sam local generate-event s3)** and **env.json**
- **sam local invoke —env-var env.json —event payload.json lambdaResourceName**

Local invoke demo

Lambda Layers

Layer

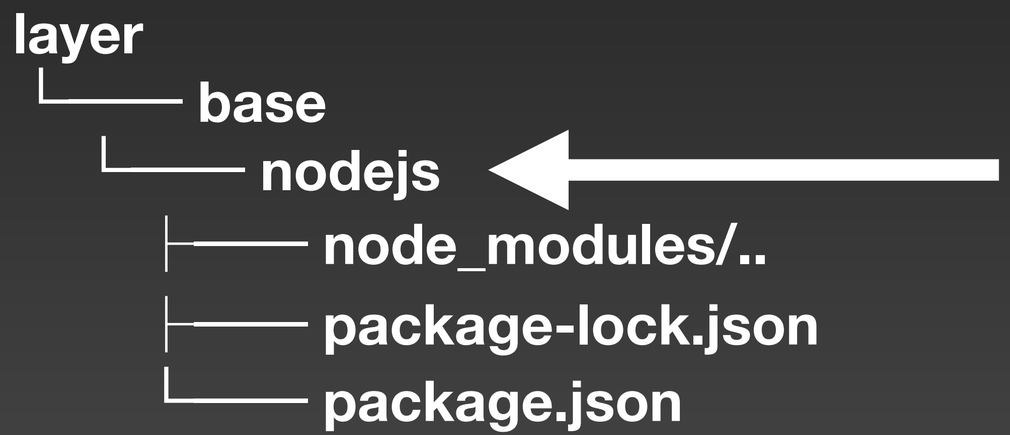
- Runtime (OS + Language)
- Your code (**with *all*** dependencies)

Layer

- Runtime (OS + Language)
- Shared dependencies (in a Layer)
- Your code

Creating a layer

```
// Create a layer
const baseLayer = new lambda.LayerVersion(
    this,
    'MyBaseLayer',
    {
        compatibleRuntimes: [
            lambda.Runtime.NODEJS_8_10
        ],
        code:
            lambda.Code.fromAsset('../layer/base')
    }
);
```



CDK: Chicken & Egg

- **Layer has ARN (Amazon Resource Name)**
- **Lambda depends on ARN**
- **CDK: Updating layer deletes old ARN… which breaks dependency across stacks**

ParamStore to the rescue

```
// Record the versionArn into SSM

const layerParamName =
    '/layers/baseLayer';


new ssm.StringParameter(
    this,
    'VersionArn',
    {
      parameterName: layerParamName,
      stringValue:
        baseLayer.layerVersionArn,
    });
```

```
import cdk = require('@aws-cdk/core');
import lambda = require('@aws-cdk/aws-lambda');
import ssm = require('@aws-cdk/aws-ssm');

const layerParamName = '/layers/baseLayer';

export class LayerEgStack extends cdk.Stack {
  constructor(scope: cdk.Construct, id: string, props?: cdk.StackProps) {
    super(scope, id, props);

    // Create a layer
    const baseLayer = new lambda.LayerVersion(
      this,
      'MyBaseLayer',
      {
        compatibleRuntimes: [
          lambda.Runtime.NODEJS_8_10
        ],
        code: lambda.Code.fromAsset('../layer/base')
      }
    );

    // Record the versionArn into SSM
    new ssm.StringParameter(this, 'VersionArn', {
      parameterName: layerParamName,
      stringValue: baseLayer.layerVersionArn,
    });
  }
```

Using the layer
(in another stack)

```
const layerParamName = "/layers/baseLayer";

// fetch the Arn from param store
const baseLayerArn =
  ssm.StringParameter.valueForStringParameter(
   this,
   layerParamName
);

// generate layer version from Arn
const layer1 =
  lambda.LayerVersion.fromLayerVersionArn(
   this,
   "BaseLayerFromArn",
   baseLayerArn
);
```

```
// Then supply when you create a lambda
new lambda.Function(this, "SomeName", {
    runtime: lambda.Runtime.NODEJS_8_10,
    code:
      lambda.Code.fromAsset(
        “../lambda/aFunction"),
    handler: "index.handler",
    layers: [layer1]
});
```

Ben Kehoe
@ben11kehoe

This is interesting CFN behavior. While there are paths to fixing it, I think it furthers the point that layers should only be used when their lifecycles are independent of the functions that use them. Deploying a function and a layer it uses in the same stack is a code smell.

Balance

Ben Kehoe @ben11kehoe · Oct 12

Not understanding the resource graph you are creating is a recipe for increased operations burden.

Ben Kehoe @ben11kehoe · Oct 25

Replying to @rchrdbyd and @thomasphorton

Before diving into the CDK, I would recommend watching my recent talk on why it is not the panacea it may appear to be. Approach it with a thoughtful mindset!

Serverlessconf New York 2019: YAML Is Better than ...

Serverless is service-full, which means you've got more complicated cloud infrastructure graphs to ...

acloud.guru

1 2 4

YAML Is Better than Your Favorite Language: Fightin' words about Infrastructure as code | Ben Kehoe

https://acloud.guru/series/serverlessconf-nyc-2019/view/yaml-better

Review

Review

- IaC: repeatable, versionable, speed of deploy
- CloudFormation: Infrastructure Graph Engine - learn to read it
- CDK: apps, stacks, constructs
- Local dev and Lambda Layers
- A bunch of other bits that I hope are useful

The end

- Slides online later
- Contact / follow: @leolapworth
- Thank you

Here to answer questions

Richard Boyd - AWS Developer Advocate
for developer tools