



Infrastructure as Code deep dive

Darko Meszaros
Developer Advocate

-  @darkosubotica
-  In/darko-meszaros
-  twitch.tv/ruptwelve

\$ (whoami)



Darko Mesaroš / Darko Meszaros /
Дарко Месарош

RS → CZ → MT → IE → DE

Berlin DE

-  [@darkosubotica](https://twitter.com/darkosubotica)
-  ln/darko-mesaros
-  twitch.tv/ruptwelve

Session 300

I will not talk about

Infrastructure as Click

Why laC?

How to do IaC?

I will not compare IaC tools

	AWS CLI	AWS CFN	CDK	Terraform	SAM	Serverless
Vendor	AWS	AWS	AWS	HashiCorp	AWS	Serverless
Language	Shell	YAML	TypeScript, Python, Java	DSL	YAML	YAML
Backend	API	API	CFN	API	CFN	API
Drift	No	Yes	No	Yes	No	No
CRUD	No	Yes	Yes	Yes	Yes	Yes
Multi Accounts	No*	Yes	No*	Yes	No*	No
Import	No	Yes	No	Yes	No	No
Infra	Anything	Anything	Anything	Anything	Serverless	Serverless

So what will we talk about then?

Here is a story about a person ...

Making our engineer's life better

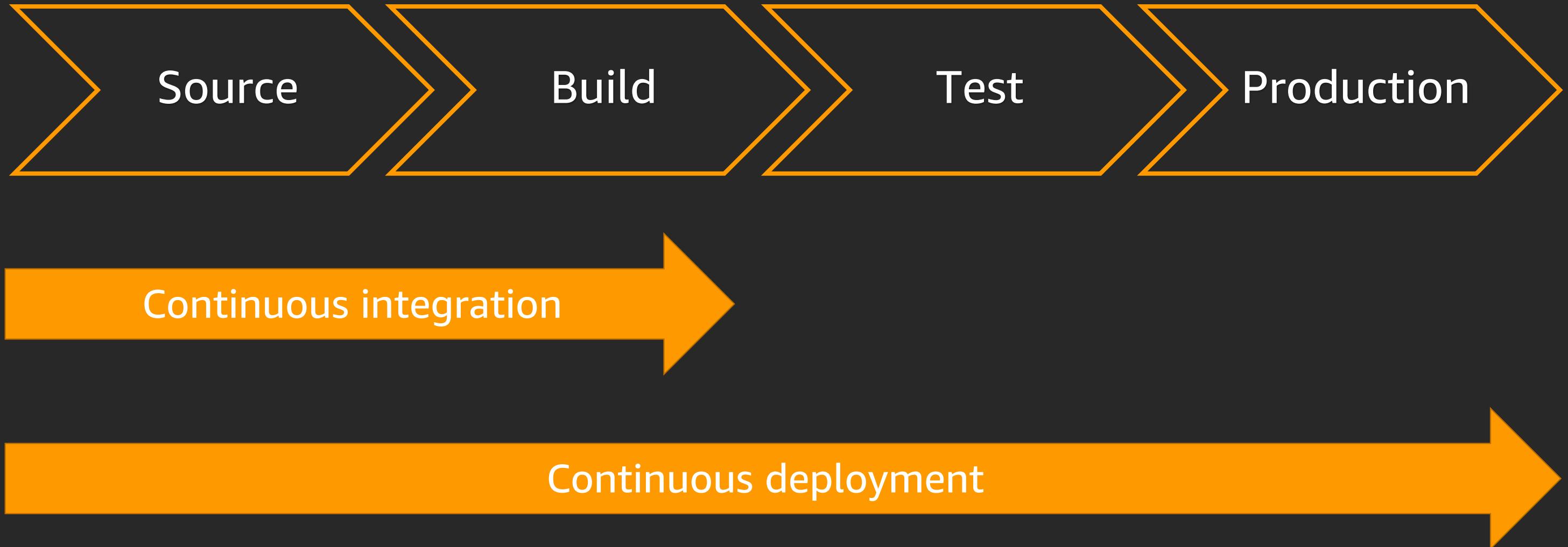


```
1 import cdk = require('@aws-cdk/core');
2 import ec2 = require('@aws-cdk/aws-ec2');
3 import lambda = require('@aws-cdk/aws-lambda');
4 import iam = require('@aws-cdk/aws-iam');
5 import elbv2 = require('@aws-cdk/aws-elasticloadbalancingv2');
6 import elbv2Targets = require('@aws-cdk/aws-elasticloadbalancingv2-targets');
7
8
9 export class AlbGoingGlobalWithServerlessStack extends cdk.Stack {
10   constructor(scope: cdk.Construct, id: string, props?: cdk.StackProps) {
11     super(scope, id, props);
12
13     // The code that defines your stack goes here
14
15     // VPC
16     const vpc = new ec2.Vpc(this, 'VPC');
17
18     // The code that defines your stack goes here
19     const getGlobalALB = new lambda.Function(this, 'getGlobalALB', {
20       runtime: lambda.Runtime.NODEJS_8_10,
21       code: lambda.Code.asset('lambda'),
22       handler: 'getStuff.handler',
23       environment: {
24         'STATUS':'200'
25       }
26     );
27
28     // IAM Policy
29     const lambdaDynamoDbStatement = new iam.PolicyStatement();
30     lambdaDynamoDbStatement.addActions('*');
```

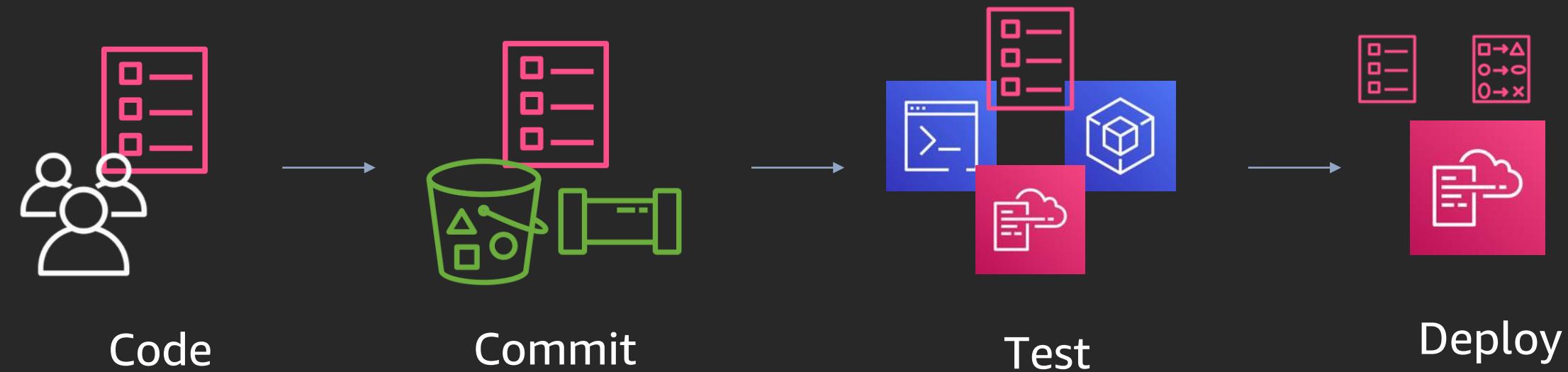
Piece of code

```
AwSTemplateFormatVersion: "2010-09-09"
Description: A CodeCommit Repo and Cloud9 Environment
Resources:
  MyRepo:
    Type: "AWS::CodeCommit::Repository"
    Properties:
      RepositoryName: MyRepo
      RepositoryDescription: Sample Repository for Demo
  MyC9Environment:
    Type: "AWS::Cloud9::EnvironmentEC2"
    Properties:
      Repositories:
        - PathComponent: /cfn
          RepositoryUrl: !GetAtt MyRepo.CloneUrlHttp
      InstanceType: t2.micro
```

Take it through a pipeline



Workflow



Repeat

Delivery of CloudFormation



So what is AWS CloudFormation?



Code in YAML or JSON directly
or use sample templates

Upload local files or
files from an Amazon S3 bucket

Create stack using
console, API, or CLI

Stacks and resources
are provisioned

Sample AWS CloudFormation code

- Code is written in files called templates
- A stack is generated from a template
- Templates primarily define resources for an application
- AWS CloudFormation can create over 490 types of resources
- Each resource is configured based on its available properties
- Dependencies can be explicitly declared or implicitly discovered

```
AWSTemplateFormatVersion: "2010-09-09"
Description: A CodeCommit Repo and Cloud9 Environment
Resources:
  MyRepo:
    Type: "AWS::CodeCommit::Repository"
    Properties:
      RepositoryName: MyRepo
      RepositoryDescription: Sample Repository for Demo
  MyC9Environment:
    Type: "AWS::Cloud9::EnvironmentEC2"
    Properties:
      Repositories:
        - PathComponent: /cfn
          RepositoryUrl: !GetAtt MyRepo.CloneUrlHttp
      InstanceType: t2.micro
```

Best practices start in the code editor

```
66 DestinationCidrBlock: '0.0.0.0/0'  
67 GatewayId: !Ref IGW  
68  
69 (W40) Security Groups egress with an IpProtocol of -1 found (W40)  
70 (W5) Security Groups found with cidr open to world on egress (W5)  
71 (W9) Security Groups found with ingress cidr that is not /32 (W9)  
72  
73 (W2) Security Groups found with cidr open to world on ingress. This should never  
74 be true on instance. Permissible on ELB (W2)  
75  
76 (W36) Security group rules without a description obscure their purpose and may lead  
77 to bad practices in ensuring they only allow traffic from the ports and  
78 sources/destinations required. (W36)  
79  
80 Peek Problem No quick fixes available  
81 SG:  
82   Type: "AWS::EC2::SecurityGroup"  
83   Properties:  
84     GroupDescription: "SSH and HTTP"  
85     VpcId: !Ref VPC  
86     SecurityGroupIngress:  
87       -  
88         CidrIp: "0.0.0.0/0"  
89         IpProtocol: "tcp"  
90         FromPort: 22  
91         ToPort: 22  
92       -  
93         SourceSecurityGroupId: !Ref LBSG  
94         IpProtocol: "tcp"  
95         FromPort: 80  
96         ToPort: 80
```

- Use a good (best) editor! ☕
- Make use of the plugins/tools out there
- Use the AWS Toolkit/Cloudformation plugins for added features.

- ⚠ (W33) EC2 Subnet should not have MapPublicIpOnLaunch set to true (W33) [18, 3]
- ⚠ (W33) EC2 Subnet should not have MapPublicIpOnLaunch set to true (W33) [29, 3]
- ⚠ (W40) Security Groups egress with an IpProtocol of -1 found (W40) [81, 3]
- ⚠ (W5) Security Groups found with cidr open to world on egress (W5) [81, 3]
- ⚠ (W9) Security Groups found with ingress cidr that is not /32 (W9) [81, 3]
- ⚠ (W2) Security Groups found with cidr open to world on ingress. This should never be true on instance. Permissible on ELB (W2) [81, 3]
- ⚠ (W36) Security group rules without a description obscure their purpose and may lead to bad practices in ensuring they only allow traffic from the ports and sources/destinations required. (W36) [81, 3]
- ⚠ (W40) Security Groups egress with an IpProtocol of -1 found (W40) [105, 3]

The tool behind it – cfn-nag

```
| FAIL F2
|
| Resources: ["InstanceRole"]
| Line Numbers: [215]
|
| IAM role should not allow * action on its trust policy
-----
| WARN W9
|
| Resources: ["SG", "LBSG"]
| Line Numbers: [82, 106]
|
| Security Groups found with ingress cidr that is not /32
-----
| WARN W36
|
| Resources: ["SG", "LBSG"]
| Line Numbers: [82, 106]
|
| Security group rules without a description obscure their purpose and
the ports and sources/destinations required.

Failures count: 1
Warnings count: 8
```

- Patterns that indicate insecure infrastructure
- Bring your own rules
- Run against multiple templates
- github.com/stelligent/cfn_nag

```
gem install cfn_nag --user
rved.
```



Command line linting with cfn-lint

- Code linter for CloudFormation templates
- Can lint against different regions
- Can be configure directly within cloudformation templates
- github.com/aws-cloudformation/cfn-python-lint



```
pip3 install cfn-lint --user
```

Lint twice, deploy once!

```
→ cfn-infra-workshop git:(master)
→ cfn-infra-workshop git:(master) cfn-lint nodes-asg-cfn.yml
```

W3010 Don't hardcode eu-west-1a for AvailabilityZones
nodes-asg-cfn.yml:23:7

W3010 Don't hardcode eu-west-1b for AvailabilityZones
nodes-asg-cfn.yml:34:7

```
→ cfn-infra-workshop git:(master) cfn-lint nodes-asg-cfn.yml --regions eu-north-1
```

W3010 Don't hardcode eu-west-1a for AvailabilityZones
nodes-asg-cfn.yml:23:7

W3010 Don't hardcode eu-west-1b for AvailabilityZones
nodes-asg-cfn.yml:34:7

E3030 You must specify a valid value for InstanceType (t2.micro).

Valid values are ["c5.12xlarge", "c5.18xlarge", "c5.24xlarge", "c5.2xlarge", "c5.4xlarge", "c5.9xlarge", "c5.large", "c5.metal", "c5.xlarge", "c5d.12xlarge", "c5d.18xlarge", "c5d.24xlarge", "c5d.2xlarge", "c5d.4xlarge", "c5d.9xlarge", "c5d.large", "c5d.metal", "c5d.xlarge", "d2.2xlarge", "d2.4xlarge", "d2.8xlarge", "d2.xlarge", "g4dn.12xlarge", "g4dn.16xlarge", "g4dn.2xlarge", "g4dn.4xlarge", "g4dn.8xlarge", "g4dn.xlarge", "i3.16xlarge", "i3.2xlarge", "i3.4xlarge", "i3.8xlarge", "i3.large", "i3.metal", "i3.xlarge", "m5.12xlarge", "m5.16xlarge", "m5.24xlarge", "m5.2xlarge", "m5.4xlarge", "m5.8xlarge", "m5.large", "m5.metal", "m5.xlarge", "m5d.12xlarge", "m5d.16xlarge", "m5d.24xlarge", "m5d.2xlarge", "m5d.4xlarge", "m5d.8xlarge", "m5d.large", "m5d.metal", "m5d.xlarge", "r5.12xlarge", "r5.16xlarge", "r5.24xlarge", "r5.2xlarge", "r5.4xlarge", "r5.8xlarge", "r5.large", "r5.metal", "r5.xlarge", "r5d.12xlarge", "r5d.16xlarge", "r5d.24xlarge", "r5d.2xlarge", "r5d.4xlarge", "r5d.8xlarge", "r5d.large", "r5d.metal", "r5d.xlarge", "t3.2xlarge", "t3.large", "t3.medium", "t3.micro", "t3.nano", "t3.small", "t3.xlarge"]
nodes-asg-cfn.yml:153:7

```
→ cfn-infra-workshop git:(master)
```

Test at scale with Taskcat

- Tests AWS Cloudformation templates by deploying them
- Uses cfn-lint out of the box for linting
- Deploys to multiple regions with different parameter sets
- Provides report generation and log collection
- Ability to build and package lambda functions
- github.com/aws-quickstart/taskcat



```
pip3 install taskcat --user
```

Taskcat tests

```
1 project:
2   name: iac-deepdive
3   regions:
4     - us-west-2
5     - eu-north-1
6 tests:
7   us-west-2:
8     parameters:
9       Key: darko-us-west-2
10      InstanceType: t2.micro
11      AMI: ami-079f731edfe27c29c
12     regions:
13       - us-west-2
14     template: ./tester-template.yml
15   eu-north-1:
16     parameters:
17       Key: darko-eu-north-1
18       InstanceType: t3.micro
19       AMI: ami-01a7a49829bda9d79
20     regions:
21       - eu-north-1
22     template: ./tester-template.yml
```

~

~

1 | .taskcat.yml

- Regions
- Blacklisted AZs
- Parameter Sets
- Tags

taskcat test run

```
➔ IaC-DeepDive git:(master) ✘ taskcat test run
```



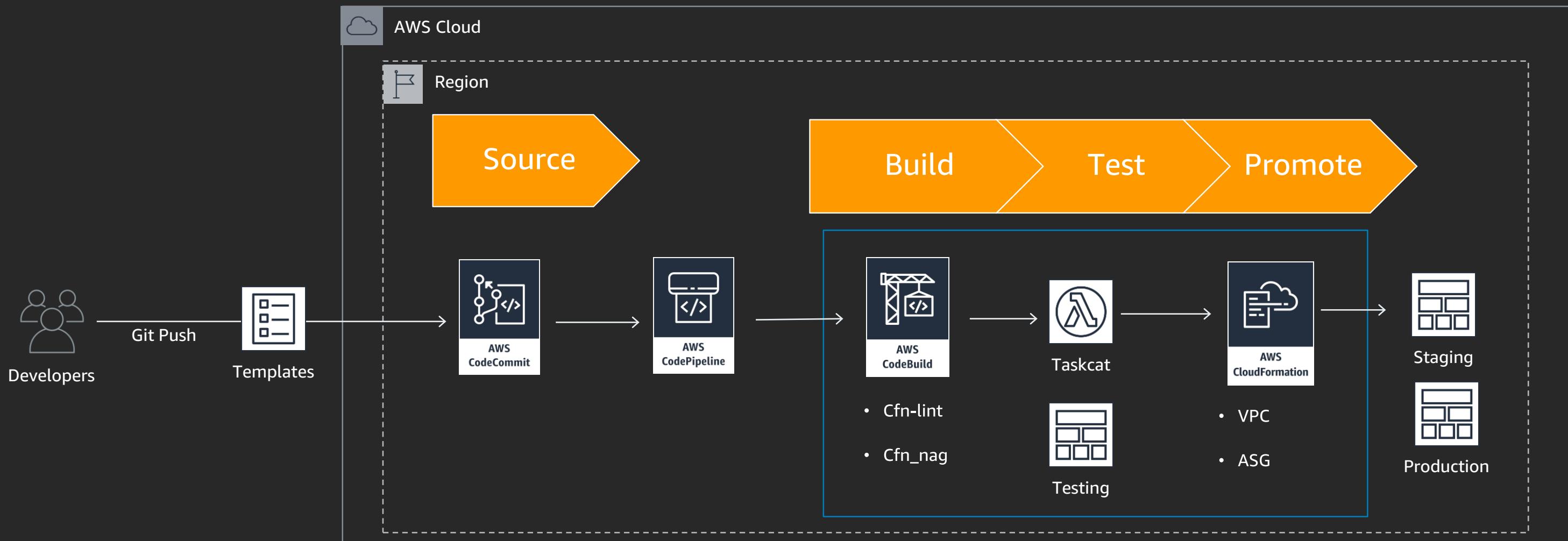
```
version 0.9.13
```

```
[INFO    ] : Lint passed for test us-west-2 on template /Users/dmeszaro/workspace/repos/IaC-DeepDive/tester-template.yml
[INFO    ] : Lint passed for test eu-north-1 on template /Users/dmeszaro/workspace/repos/IaC-DeepDive/tester-template.yml
[S3: -> ] s3://tcat-iac-deepdive-f7tjn6pk/iac-deepdive/tester-template.yml
  stack ⑩tCaT-iac-deepdive-eu-north-1-762869d6831c4a51a13ab38d44037073
    region: eu-north-1
    status: CREATE_IN_PROGRESS
  stack ⑩tCaT-iac-deepdive-us-west-2-762869d6831c4a51a13ab38d44037073
    region: us-west-2
    status: CREATE_IN_PROGRESS
```

Show it off

GitHub Repo: https://github.com/aws-quickstart/taskcat Documentation: http://taskcat.io Tested on: Wednesday - Feb,26,2020 @ 17:44:15					taskcat
Test Name	Tested Region	Stack Name	Tested Results	Test Logs	
eu-north-1	eu-north-1	tCaT-iac-deepdive-eu-north-	CREATE COMPLETE	View Logs	
<hr/> <p>Region: eu-north-1 StackName: tCaT-iac-deepdive-eu-north-1-762869d6831c4a51a13ab38d44037073 ***** ResourceStatusReason: Stack launch was successful ***** Events: Time Stamp Resource Status Resource Type Logical Resource ID Resource Status Reason</p>					
2020-02-26 16:43:26.924000+00:00	CREATE_COMPLETE	AWS::CloudFormation::Stack	tCaT-iac-deepdive-eu-north-1-762869d6831c4a51a13ab38d44037073		
2020-02-26 16:43:25.016000+00:00	CREATE_COMPLETE	AWS::AutoScaling::AutoScalingGroup	ASG		
2020-02-26 16:43:17.226000+00:00	CREATE_COMPLETE	AWS::ElasticLoadBalancingV2::Listener	ALBLListener		
2020-02-26 16:43:16.702000+00:00	CREATE_IN_PROGRESS	AWS::ElasticLoadBalancingV2::Listener	ALBLListener	Resource creation Initiated	
2020-02-26 16:43:16.353000+00:00	CREATE_IN_PROGRESS	AWS::ElasticLoadBalancingV2::Listener	ALBLListener		
2020-02-26 16:43:14.143000+00:00	CREATE_COMPLETE	AWS::ElasticLoadBalancingV2::LoadBalancer	ALB		
2020-02-26 16:42:32.189000+00:00	CREATE_IN_PROGRESS	AWS::AutoScaling::AutoScalingGroup	ASG	Resource creation Initiated	
2020-02-26 16:42:31.431000+00:00	CREATE_IN_PROGRESS	AWS::AutoScaling::AutoScalingGroup	ASG		
2020-02-26 16:42:28.969000+00:00	CREATE_COMPLETE	AWS::AutoScaling::LaunchConfiguration	LaunchConfig		
2020-02-26 16:42:28.624000+00:00	CREATE_IN_PROGRESS	AWS::AutoScaling::LaunchConfiguration	LaunchConfig	Resource creation Initiated	
2020-02-26 16:42:28.094000+00:00	CREATE_IN_PROGRESS	AWS::AutoScaling::LaunchConfiguration	LaunchConfig		
2020-02-26 16:42:26.007000+00:00	CREATE_COMPLETE	AWS::IAM::InstanceProfile	InstanceProfile		
2020-02-26 16:40:58.049000+00:00	CREATE_COMPLETE	AWS::EC2::SubnetRouteTableAssociation	SubnetRouteTableAssoc		
2020-02-26 16:40:57.795000+00:00	CREATE_COMPLETE	AWS::EC2::SubnetRouteTableAssociation	SubnetRouteTableAssocB		
2020-02-26 16:40:56.765000+00:00	CREATE_COMPLETE	AWS::EC2::Route	Route		
2020-02-26 16:40:42.719000+00:00	CREATE_IN_PROGRESS	AWS::EC2::SubnetRouteTableAssociation	SubnetRouteTableAssoc	Resource creation Initiated	
2020-02-26 16:40:42.696000+00:00	CREATE_IN_PROGRESS	AWS::ElasticLoadBalancingV2::LoadBalancer	ALB	Resource creation Initiated	
2020-02-26 16:40:42.436000+00:00	CREATE_IN_PROGRESS	AWS::EC2::SubnetRouteTableAssociation	SubnetRouteTableAssocB	Resource creation Initiated	
2020-02-26 16:40:42.108000+00:00	CREATE_IN_PROGRESS	AWS::EC2::SubnetRouteTableAssociation	SubnetRouteTableAssoc		
2020-02-26 16:40:41.941000+00:00	CREATE_IN_PROGRESS	AWS::ElasticLoadBalancingV2::LoadBalancer	ALB		
2020-02-26 16:40:41.751000+00:00	CREATE_IN_PROGRESS	AWS::EC2::SubnetRouteTableAssociation	SubnetRouteTableAssocB		
2020-02-26 16:40:41.428000+00:00	CREATE_IN_PROGRESS	AWS::EC2::Route	Route	Resource creation Initiated	
2020-02-26 16:40:40.875000+00:00	CREATE_IN_PROGRESS	AWS::EC2::Route	Route		
2020-02-26 16:40:39.690000+00:00	CREATE_COMPLETE	AWS::EC2::Subnet	Subnet		
2020-02-26 16:40:39.492000+00:00	CREATE_COMPLETE	AWS::EC2::Subnet	SubnetB		
2020-02-26 16:40:38.726000+00:00	CREATE_COMPLETE	AWS::EC2::VPCCAttachment	Attachment		

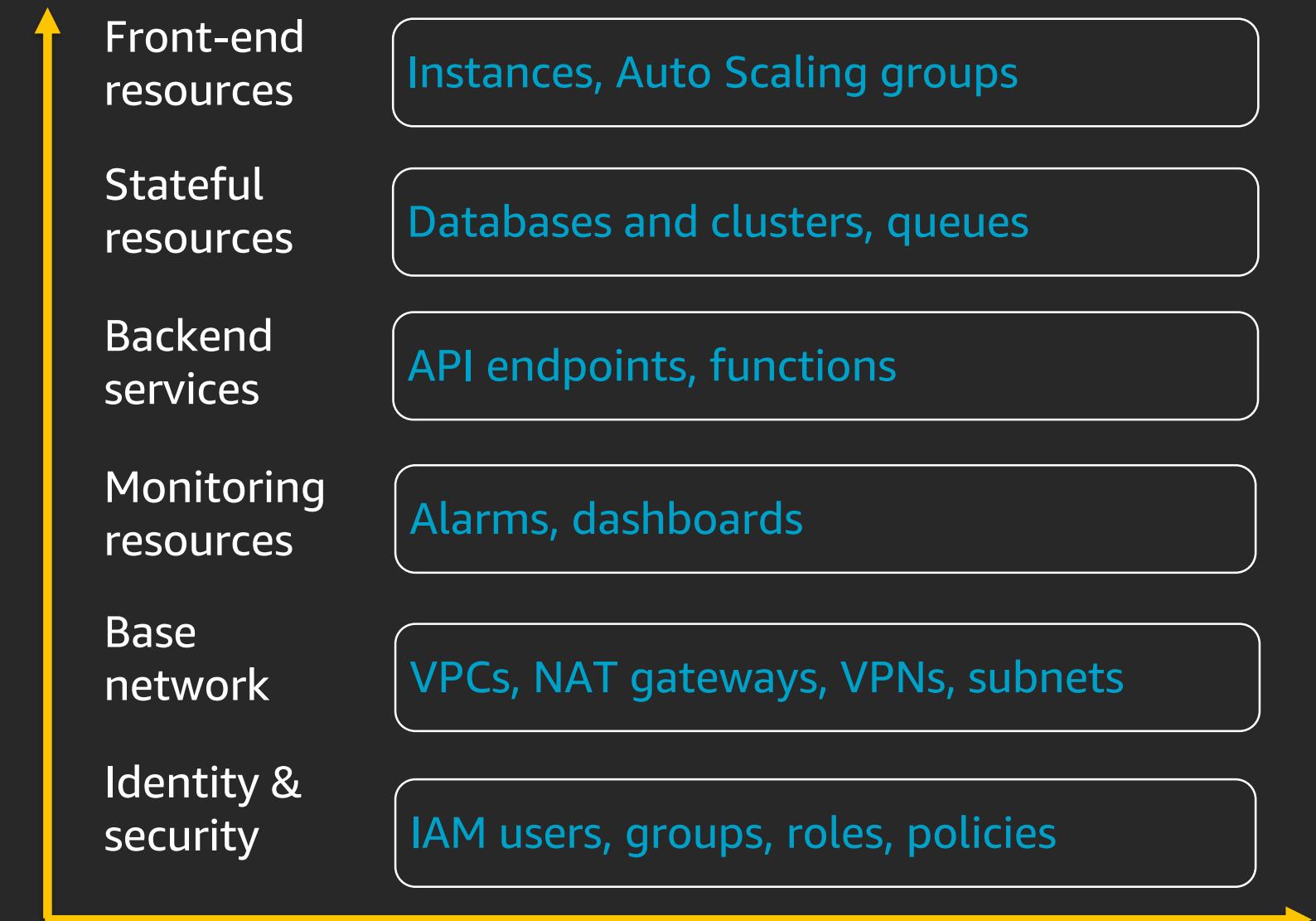
CloudFormation – Infrastructure CI/CD



```
2
3 def test_network(string = ""):
4     if(string == '0'):
5         return 0
6     if(string == '1'):
7         return 1
8     if(string == '2'):
9         return 2
10    if(string == '3'):
11        return 3
12    if(string == '4'):
13        return 4
14    if(string == '5'):
15        return 5
16    if(string == '6'):
17        return 6
18    else:
19        return -1
```

Best practices (1/3)

- Layer your application to reduce blast radius when updating resources
- Use multiple, isolated environments for testing, production, development, staging, etc.
- Smaller files are easier to write, test, and troubleshoot



Best practices (2/3)

- Resource import for stack refactoring
 - Drift detection to prevent issues that may cause stack update operations to fail
 - Use resource import to fix drift

Best practices (3/3)

Resources:

MyRDSDB:

```
Type: "AWS::RDS::DBInstance"
Properties:
  DBInstanceClass: db.t2.medium
  AllocatedStorage: '20'
  Engine: mariadb
  Engineversion: '10.2'
  MasterUsername: appadmin
  MasterUserPassword: '{{resolve:ssm-secure:ssbRDSSecret1:1}}'
```

- Parameters and Mappings
- Secrets Manager and SSM Parameter store
- Do not hardcode sensitive information

Delivery of CDK

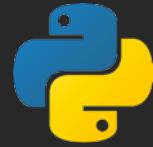
{ JSON }

yaml:
aint:
- markup
- language



AWS Cloud Development Kit (AWS CDK)

A multi-language development framework for modeling infrastructure as reusable components



```
class UrlShortener extends Stack {
  constructor(scope: App, id: string, props?: UrlShortenerProps) {
    super(scope, id, props);

    const vpc = new ec2.Vpc(this, 'vpc', { maxAzs: 2 });
    const cluster = new ecs.Cluster(this, 'cluster', { vpc: vpc });
    const service = new patterns.NetworkLoadBalancedFargateService(this, 'sample-app', {
      cluster,
      taskImageOptions: {
        image: ecs.ContainerImage.fromAsset('ping'),
      },
      dom
    });
    domainName
    domainZone
  }

  // Setup AutoScaling policy
  const scaling = service.service.autoScaleTask
  scaling.scaleOnCpuUtilization('CpuScaling',
    targetUtilizationPercent: 50,
    scaleInCooldown: Duration.seconds(60),
    scaleOutCooldown: Duration.seconds(60)
  );
}
```

(property) patterns.NetworkLoadBalancedServiceBaseProps.domainName?: string | undefined
The domain name for the service, e.g. "api.example.com."
@default
- No domain name.





Alma Media

Alma Media creates growth together. Today and tomorrow.

Alma Media is a dynamic multi-channel media company based in Finland

- Over 750 million monthly pageviews
- 100+ websites and apps
- 2 billion Lambda function invocations a month

The Challenge

- Alma Media Developers build Serverless event driven systems with AWS Lambda and various AWS Managed Services.
- Wanted even better Developer Experience while writing Infrastructure as Code to support those systems using real programming languages
 - Alma had been using for many years already declarative infrastructure orchestration like CloudFormation and Terraform.
 - They wanted a tool that also provides helpers on handling Lambda function deployments



Alma Media

Alma Media creates growth together. Today and tomorrow.

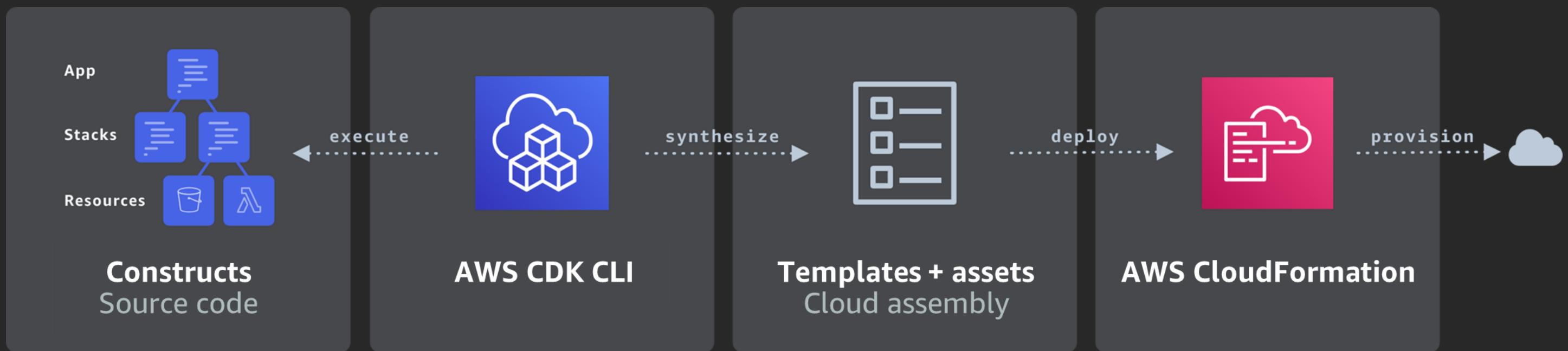
Alma Media develops with AWS Cloud Development Kit (CDK) their Serverless projects

- Improved Developer Experience regarding Infrastructure Orchestration
- Possibility of share and publish high level abstractions
- Using Software Development best practices in their Infrastructure Code
- Easier to define infrastructure that has multiple different environments

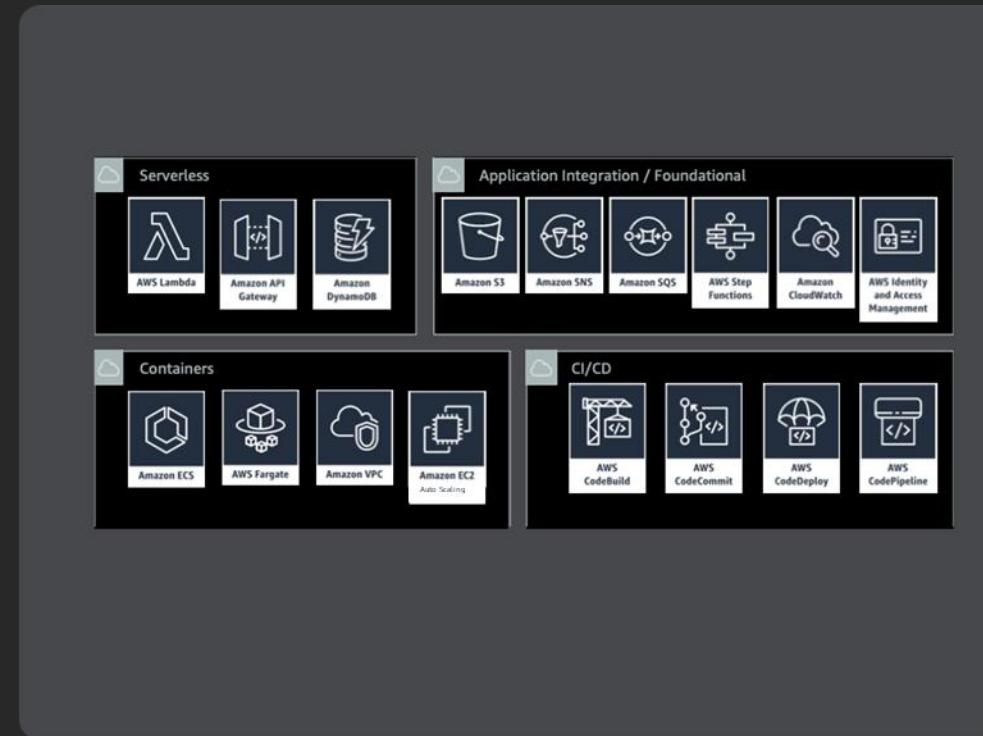
The Future

- Share more broadly within the company defined high level abstractions
 - Moreover, they wanted a tool that provides helpers on handling Lambda function deployments
 - Porting existing TypeScript building blocks to other programming languages

From constructs to the cloud



AWS CDK main components



```
> cdk diff hello-cdk-1
Stack hello-cdk-1
Resources
[~] AWS::SNS::Topic MyFirstTopic MyFirstTopic0ED1F8A4
  [-] DisplayName
    [-] My First Topic Yeah
    [+]- Hello, CDK!

~/hello-cdk master* 6s
> cdk deploy hello-cdk-1

hello-cdk-1: deploying...
hello-cdk-1: creating CloudFormation changeset...
0/3 | 12:25:30 PM | UPDATE_IN_PROGRESS | AWS::CDK::Metadata | CDKMetadata
0/3 | 12:25:30 PM | UPDATE_IN_PROGRESS | AWS::SNS::Topic | MyFirstTopic (MyFirstTopic0ED1F8A4)
1/3 | 12:25:31 PM | UPDATE_COMPLETE | AWS::SNS::Topic | MyFirstTopic (MyFirstTopic0ED1F8A4)
2/3 | 12:25:32 PM | UPDATE_COMPLETE | AWS::CDK::Metadata | CDKMetadata
2/3 | 12:25:35 PM | UPDATE_COMPLETE_CLEA | AWS::CloudFormation::Stack | hello-cdk-1
3/3 | 12:25:36 PM | UPDATE_COMPLETE | AWS::CloudFormation::Stack | hello-cdk-1

✓ hello-cdk-1

Stack ARN:
arn:aws:cloudformation:us-east-1:585695036304:stack/hello-cdk-1/b9da27f0-fafe-11e9-b7b3-12f2c8f206e2

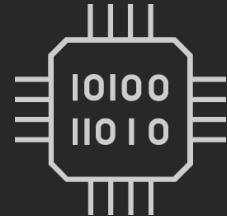
~/hello-cdk master* 33s
>
```

Core framework

AWS Construct Library

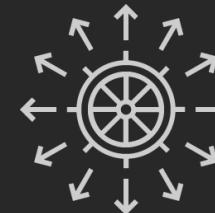
AWS CDK CLI

AWS CDK Constructs



CloudFormation*

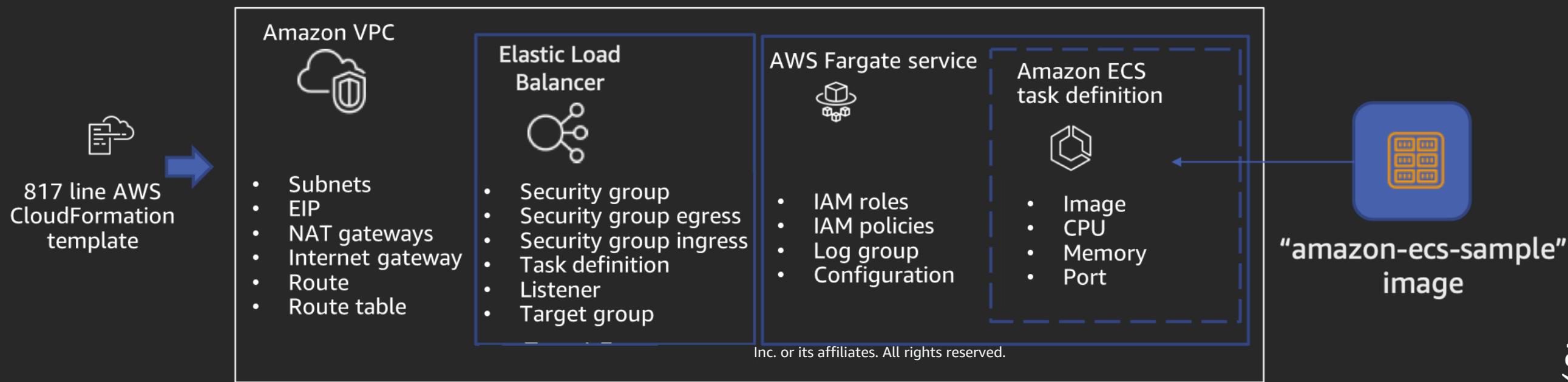
```
new patterns.ApplicationLoadBalancedFargateService(stack, 'MyFargateService', {  
    taskImageOptions: {  
        image: ecs.ContainerImage.fromRegistry("amazon/amazon-ecs-sample")  
    }  
});
```



AWS Services



Design Patterns



CloudFormation Resource Constructs

```
1 import * as cdk from '@aws-cdk/core';
2 import * as ec2 from '@aws-cdk/aws-ec2';
3 
4 export class IacCdkCfnconstructsAppStack extends cdk.Stack {
5   constructor(scope: cdk.Construct, id: string, props?: cdk.StackProps) {
6     super(scope, id, props);
7 
8     // Wait - I thought this was CDK!
9     new ec2.CfnVPC(this, "MyCFNVP", {
10       cidrBlock: "10.0.0.0/16",
11     });
12   }
13 }
```

~
~
~
~
~
~
~
~
~
~
~

] | ~/workspace/repos/IaC-DeepDive/iac-cdk-cfnconstructs-app/lib/iac-cdk-cfnconstructs-app-stack.ts | 3,0-1 All
:set invnumber



CloudFormation Resource Constructs

```
zsh_tmux_plugin_run attach-session -t IaC
→ iac-cdk-cfnconstructs-app git:(master) ✘
→ iac-cdk-cfnconstructs-app git:(master) ✘
→ iac-cdk-cfnconstructs-app git:(master) ✘
→ iac-cdk-cfnconstructs-app git:(master) ✘ cdk deploy
IacCdkCfnconstructsAppStack: deploying...
IacCdkCfnconstructsAppStack: creating CloudFormation changeset...
0/3 | 8:07:15 PM | CREATE_IN_PROGRESS | AWS::CDK::Metadata | CDKMetadata
0/3 | 8:07:15 PM | CREATE_IN_PROGRESS | AWS::EC2::VPC | MyCFNVP
0/3 | 8:07:15 PM | CREATE_IN_PROGRESS | AWS::EC2::VPC | MyCFNVP Resource creation Initiated
0/3 | 8:07:17 PM | CREATE_IN_PROGRESS | AWS::CDK::Metadata | CDKMetadata Resource creation Initiated
1/3 | 8:07:17 PM | CREATE_COMPLETE | AWS::CDK::Metadata | CDKMetadata
IaC :<-lint 4:cfn-taskcat 5:cdk-patterns 6:cdk-constructs- 7:cdk-cfnconstructs*Berlin: ⛅+3°C : Wed, Feb 26 - 20:07 | aws
```

Constructs

```
1 import * as cdk from '@aws-cdk/core';
2 import * as ec2 from '@aws-cdk/aws-ec2';
3 
4 export class IacCdkConstructsAppStack extends cdk.Stack {
5   constructor(scope: cdk.Construct, id: string, props?: cdk.StackProps) {
6     super(scope, id, props);
7 
8     // Constructs be here
9     new ec2.Vpc(this, "MyVPC", {
10       cidr: "10.0.0.0/16",
11     });
12   }
13 }
```

~
~
~
~
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~
~
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~

<script> | ~/workspace/repos/IaC-DeepDive/iac-cdk-constructs-app/lib/iac-cdk-constructs-app-stack.ts | 3,0-1 All
:set invnumber
IaC :<zsh 2:cfn-nag 3:cfn-lint 4:cfn-taskcat 5:cdk-patterns- 6:cdk-constructs*ZBerlin: +3°C : Wed, Feb 26 - 19:58



Constructs

```
zsh_tmux_plugin_run attach-session -t IaC
→ iac-cdk-constructs-app git:(master) ✘ cdk deploy
IacCdkConstructsAppStack: deploying...
IacCdkConstructsAppStack: creating CloudFormation changeset...
0/25 | 8:10:15 PM | CREATE_IN_PROGRESS | AWS::CDK::Metadata | CDKMetadata
0/25 | 8:10:15 PM | CREATE_IN_PROGRESS | AWS::EC2::InternetGateway | MyVPC/IGW (MyVPCIGW30AB6DD6)
0/25 | 8:10:15 PM | CREATE_IN_PROGRESS | AWS::EC2::VPC | MyVPC (MyVPCAFB07A31)
0/25 | 8:10:15 PM | CREATE_IN_PROGRESS | AWS::EC2::EIP | MyVPC/PublicSubnet1/EIP (MyVPCPublic
Subnet1EIP5EB6147D)
0/25 | 8:10:15 PM | CREATE_IN_PROGRESS | AWS::EC2::EIP | MyVPC/PublicSubnet2/EIP (MyVPCPublic
Subnet2EIP6F364C5D)
0/25 | 8:10:15 PM | CREATE_IN_PROGRESS | AWS::EC2::InternetGateway | MyVPC/IGW (MyVPCIGW30AB6DD6) Resource
e creation Initiated
0/25 | 8:10:15 PM | CREATE_IN_PROGRESS | AWS::EC2::EIP | MyVPC/PublicSubnet2/EIP (MyVPCPublic
Subnet2EIP6F364C5D) Resource creation Initiated
0/25 | 8:10:15 PM | CREATE_IN_PROGRESS | AWS::EC2::EIP | MyVPC/PublicSubnet1/EIP (MyVPCPublic
Subnet1EIP5EB6147D) Resource creation Initiated
0/25 | 8:10:15 PM | CREATE_IN_PROGRESS | AWS::EC2::VPC | MyVPC (MyVPCAFB07A31) Resource creat
ion Initiated
0/25 | 8:10:17 PM | CREATE_IN_PROGRESS | AWS::CDK::Metadata | CDKMetadata Resource creation Initia
ted
1/25 | 8:10:17 PM | CREATE_COMPLETE | AWS::CDK::Metadata | CDKMetadata
```

IaC :<-lint 4:cfn-taskcat 5:cdk-patterns 6:cdk-constructs* 7:cdk-cfnconstructs-Berlin: ⛅+3°C : Wed, Feb 26 - 20:10



Patterns

```
 1 import * as cdk from '@aws-cdk/core';
 2 import * as ecsPatterns from '@aws-cdk/aws-ecs-patterns';
 3 import * as ecs from '@aws-cdk/aws-ecs';
 4 
 5 export class IacCdkAppStack extends cdk.Stack {
 6   constructor(scope: cdk.Construct, id: string, props?: cdk.StackProps) {
 7     super(scope, id, props);
 8 
 9     // Here be patterns
10    const loadBalancedFargateService = new ecsPatterns.ApplicationLoadBalancedFargateService(this, 'Service', {
11      memoryLimitMiB: 1024,
12      cpu: 512,
13      taskImageOptions: {
14        image: ecs.ContainerImage.fromRegistry("amazon/amazon-ecs-sample"),
15      },
16    });
17  }
18 }

~
~
~
~
~
~
<dk-app-stack.ts [typescript] | ~/workspace/repos/IaC-DeepDive/iac-cdk-app/lib/iac-cdk-app-stack.ts | 4,0-1          All
IaC :1:[tmux] 2:cfn-nag 3:cfn-lint 4:cfn-taskcat- 5:cdk-patterns*                                Berlin: +3°C | Wed, Feb 26 - 19:47 | aws
```

Patterns

```
_zsh_tmux_plugin_run attach-session -t IaC

privateSubnet2/DefaultRoute (EcsDefaultClusterMnL3mNNYNVpcPrivateSubnet2DefaultRoute20CE2D89)
35/39 Currently in progress: ServiceLBE9A1ADBC
 36/39 | 8:27:43 PM | CREATE_COMPLETE      | AWS::ElasticLoadBalancingV2::LoadBalancer | Service/LB (ServiceLBE9A1ADBC)
 36/39 | 8:27:46 PM | CREATE_IN_PROGRESS   | AWS::ElasticLoadBalancingV2::Listener    | Service/LB/PublicListener (ServiceLBPublicListener46709EAA)
 36/39 | 8:27:46 PM | CREATE_IN_PROGRESS   | AWS::ElasticLoadBalancingV2::Listener    | Service/LB/PublicListener (ServiceLBPublicListener46709EAA) Resource creation Initiated
 37/39 | 8:27:46 PM | CREATE_COMPLETE      | AWS::ElasticLoadBalancingV2::Listener    | Service/LB/PublicListener (ServiceLBPublicListener46709EAA)
 37/39 | 8:27:49 PM | CREATE_IN_PROGRESS   | AWS::ECS::Service                      | Service/Service/Service (Service9571FDD8)
 37/39 | 8:27:50 PM | CREATE_IN_PROGRESS   | AWS::ECS::Service                      | Service/Service/Service (Service9571FDD8) Resource creation Initiated
37/39 Currently in progress: Service9571FDD8
 38/39 | 8:28:51 PM | CREATE_COMPLETE      | AWS::ECS::Service                      | Service/Service/Service (Service9571FDD8)
 39/39 | 8:28:53 PM | CREATE_COMPLETE      | AWS::CloudFormation::Stack             | IacCdkAppStack

IacCdkAppStack

Outputs:
IacCdkAppStack.ServiceServiceURL250C0FB6 = http://IacCd-Servi-1668XUAN3EREL-1553285855.us-east-1.elb.amazonaws.com
IacCdkAppStack.ServiceLoadBalancerDNSEC5B149E = IacCd-Servi-1668XUAN3EREL-1553285855.us-east-1.elb.amazonaws.com

Stack ARN:
arn:aws:cloudformation:us-east-1:824852318651:stack/IacCdkAppStack/78993d30-58cd-11ea-a10f-0a5af1032bb
→ iac-cdk-app git:(master) ✘
IaC :<g 3:cfn-lint 4:cfn-taskcat 5:cdk-patterns* 6:cdk-constructs- 7:cdk-cfnco>Berlin: ⛅+3°C : Wed, Feb 26 - 20:32 | aws
```

→ iac-cdk-cfnconstructs-app git:(master) ✘ cdk deploy

IacCdkCfnconstructsAppStack: deploying...

IacCdkCfnconstructsAppStack: creating CloudFormation changeset...

0/3 | 3:08:32 PM | CREATE_IN_PROGRESS | AWS::CDK::Metadata | CDKMetadata

0/3 | 3:08:32 PM | CREATE_IN_PROGRESS | AWS::EC2::VPC | MyCFNVPCC

1/3 | 3:08:32 PM | CREATE_FAILED | AWS::EC2::VPC | MyCFNVPCC Value (10.0.0.0/

dParameterValue; Request ID: 0b3d7680-1e5d-4f78-8340-6c716137d8da)

```
new IacCdkCfnconstructsAppStack (/Users/dmeszaro/workspace/repos/IaC-DeepDive/iac-cdk-cfnconstructs-app/index.js:1:1)
  \_ Object.<anonymous> (/Users/dmeszaro/workspace/repos/IaC-DeepDive/iac-cdk-cfnconstructs-app/index.js:1:1)
    \_ Module._compile (internal/modules/cjs/loader.js:701:30)
      \_ Module.m._compile (/Users/dmeszaro/workspace/repos/IaC-DeepDive/iac-cdk-cfnconstructs-app/index.js:1:1)
        \_ Module._extensions..js (internal/modules/cjs/loader.js:712:10)
          \_ Object.require.extensions.(anonymous function) [as .ts] (/Users/dmeszaro/workspace/repos/IaC-DeepDive/iac-cdk-cfnconstructs-app/index.js:1:1)
            \_ Module.load (internal/modules/cjs/loader.js:600:32)
              \_ tryModuleLoad (internal/modules/cjs/loader.js:539:12)
                \_ Function.Module._load (internal/modules/cjs/loader.js:531:3)
                  \_ Function.Module.runMain (internal/modules/cjs/loader.js:754:12)
                    \_ main (/Users/dmeszaro/workspace/repos/IaC-DeepDive/iac-cdk-cfnconstructs-app/index.js:1:1)
                      \_ Object.<anonymous> (/Users/dmeszaro/workspace/repos/IaC-DeepDive/iac-cdk-cfnconstructs-app/index.js:1:1)
                        \_ Module._compile (internal/modules/cjs/loader.js:701:30)
                          \_ Object.Module._extensions..js (internal/modules/cjs/loader.js:712:10)
                            \_ Module.load (internal/modules/cjs/loader.js:600:32)
```

How do we do testing with CDK?

- Snapshot tests
- Fine-grained assertions
- Validation tests



```
npm install --save-dev jest @types/jest @aws-cdk/assert
```

Snapshots

Match my snapshot

```
zsh_tmux_plugin_run attach-session -t IaC
1 import { SynthUtils } from '@aws-cdk/assert';
2 import { Stack } from '@aws-cdk/core';
3
4 import dlq = require('../lib/dead-letter-queue');
5
6 test('dlq creates an alarm', () => {
7   const stack = new Stack();
8
9   new dlq.DeadLetterQueue(stack, 'DLQ');
10
11 // This expects that the cdk synth output matches the template
12 expect(SynthUtils.toCloudFormation(stack)).toMatchSnapshot();
13
14 });
15
~
~
~
~
~
~
~
~
<ace/repos/IaC-DeepDive/iac-cdk-testing-lib/test/dead-letter-queue.test.ts | 5,0-1      All
IaC :<6:cdk-constructs 7:cdk-cfnconstructs- 8:cdk-test*Berlin: ☁ +6°C : Thu, Feb 27 - 15:38
aws
```

How's my snapshot?

```
iac-cdk-testing-lib git:(master) ✘ npm test

> iac-cdk-testing-lib@0.1.0 test /Users/dmeszaro/workspace/repos/IaC-DeepDive/iac-cdk-testing-lib
> jest

  PASS  test/dead-letter-queue.test.ts
    > 1 snapshot written.
  PASS  test/iac-cdk-testing-lib.test.ts

Snapshot Summary
  > 1 snapshot written from 1 test suite.

Test Suites: 2 passed, 2 total
Tests:       3 passed, 3 total
Snapshots:   1 written, 1 total
Time:        2.044s
Ran all test suites.
iac-cdk-testing-lib git:(master) ✘
```

How's my snapshot?

```
// Jest Snapshot v1, https://goo.gl/fbAQLP
|
exports[`dlq creates an alarm 1`] = `

Object {
  "Resources": Object {
    "DLQ581697C4": Object {
      "Type": "AWS::SQS::Queue",
    },
    "DLQAlarm008FBE3A": Object {
      "Properties": Object {
        "AlarmDescription": "There are messages in the Dead Letter Queue",
        "ComparisonOperator": "GreaterThanOrEqualToThreshold",
        "Dimensions": Array [
          Object {
            "Name": "QueueName",
            "Value": Object {
              "Fn::GetAtt": Array [
                "DLQ581697C4",
                "QueueName",
              ],
            },
          },
        ],
        "EvaluationPeriods": 1,
        "MetricName": "ApproximateNumberOfMessagesVisible",
        "Namespace": "AWS/SQS",
        "Period": 300,
        "Statistic": "Maximum",
        "Threshold": 1,
      },
      "Type": "AWS::CloudWatch::Alarm",
    },
  }
}

<snap | ~/workspace/repos/IaC-DeepDive/iac-cdk-testing-lib/test/__snapshots__/dead-letter-queue.test.ts.snap | 2,0-1 Top

IaC :<int 4:cfn-taskcat 5:cdk-patterns 6:cdk-constructs 7:cdk-cfnconstructs- 8:cdk-test*Berlin: +6°C : Thu, Feb 27 - 15:43
```



Not matching a snapshot

```
_zsh_tmux_plugin_run attach-session -t laC

        "Threshold": 1,
    },
    "Type": "AWS::CloudWatch::Alarm",
},

10 |
11 |     // This expects that the cdk synth output matches the template
> 12 |     expect(SynthUtils.toCloudFormation(stack)).toMatchSnapshot();
          ^
13 |
14 | );
15 |

at Object.<anonymous>.test (test/dead-letter-queue.test.ts:12:46)

> 1 snapshot failed.
PASS test/iac-cdk-testing-lib.test.ts

Snapshot Summary
> 1 snapshot failed from 1 test suite. Inspect your code changes or run `npm test -- -u` to update them.

Test Suites: 1 failed, 1 passed, 2 total
Tests:       1 failed, 2 passed, 3 total
Snapshots:   1 failed, 1 total
Time:        2.665s
Ran all test suites.
npm ERR! Test failed. See above for more details.
→ iac-cdk-testing-lib git:(master) ✘
IaC :<kcat 5:cdk-patterns 6:cdk-constructs 7:cdk-cfnconstructs- 8:cdk-test*Berlin: +5°C ; Fri, Feb 28 - 13:08
```



But I want to have more fine grained control!

I expect to have this ...

```
zsh_tmux_plugin_run attach-session -t IaC
1 import '@aws-cdk/assert/jest';
2 import { SynthUtils } from '@aws-cdk/assert';
3 import { Stack } from '@aws-cdk/core';
4
5 import dlq = require('../lib/dead-letter-queue');
6
7 test('dlq creates an alarm', () => {
8     const stack = new Stack();
9
10    new dlq.DeadLetterQueue(stack, 'DLQ');
11
12    expect(stack).toHaveResource('AWS::CloudWatch::Alarm', {
13        MetricName: "ApproximateNumberOfMessagesVisible",
14        Namespace: "AWS/SQS",
15        Dimensions: [
16            {
17                Name: "QueueName",
18                Value: { "Fn::GetAtt": [ "DLQ581697C4", "QueueName" ] }
19            }
20        ],
21    });
22 });
23
24
<t> | ~/workspace/repos/IaC-DeepDive/iac-cdk-testing-lib/test/dead-letter-queue.test.ts | 8,1          All
"test/dead-letter-queue.test.ts" 24L, 560C written
IaC :<dk-patterns 6:cdk-constructs 7:cdk-cfnconstructs- 8:cdk-test*Berlin: 🌐 +6°C : Fri, Feb 28 - 13:49
```



And this

```
39
40
41 // Check that the DLQ has a max retention period
42 test('dlq has maximum retention period', () => {
43   const stack = new Stack();
44
45   new dlq.DeadLetterQueue(stack, 'DLQ');
46
47   expect(stack).toHaveResource('AWS::SQS::Queue', {
48     MessageRetentionPeriod: 1209600
49   });
50 });
51
52
53
54
55
56
57
58
59
60
61
62
<t> | ~/workspace/repos/IaC-DeepDive/iac-cdk-testing-lib/test/dead-letter-queue.test.ts | 52,0-1      97%
IaC :<dk-patterns 6:cdk-constructs 7:cdk-cfnconstructs- 8:cdk-test*Berlin: 🌡 +6°C : Fri, Feb 28 - 13:46
```



Then I fail my specific test

```
tmux new-session -s IaC 731
"MessageRetentionPeriod": 1209600
}.
- Object type mismatch in:
{
  "Type": "AWS::SQS::Queue"
}

27 |   new dlq.DeadLetterQueue(stack, 'DLQ');
28 |
> 29 |   expect(stack).toHaveResource('AWS::SQS::Queue', {
|     ^
30 |     MessageRetentionPeriod: 1209600
31 |   });
32 | });

at Object.<anonymous>.test (test/dead-letter-queue.test.ts:29:17)

PASS  test/iac-cdk-testing-lib.test.ts

Test Suites: 1 failed, 1 passed, 2 total
Tests:       1 failed, 3 passed, 4 total
Snapshots:   0 total
Time:        1.992s, estimated 3s
Ran all test suites.
npm ERR! Test failed. See above for more details.
→ iac-cdk-testing-lib git:(master) ✘ IaC 1:zsh* Berlin: 🌃 +14°C | Thu, Mar 19 - 13:22
```



CloudFormation Registry

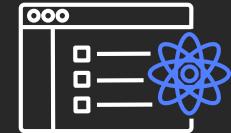
I use resources outside of AWS!

Introducing the AWS CloudFormation registry

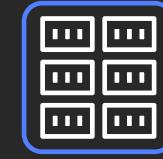
An open approach to managing external resources



Open
providers



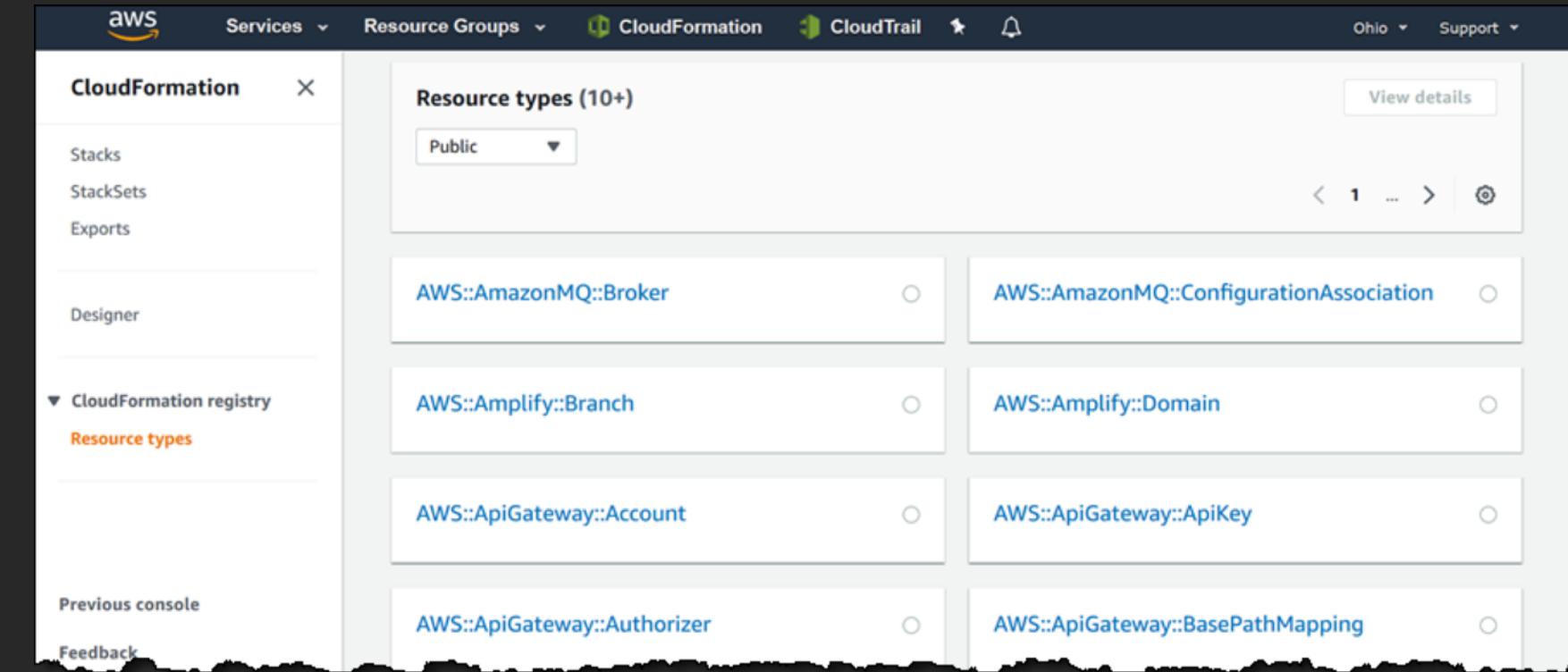
Open
CLI



CloudFormation
registry

AWS CloudFormation registry and CLI

- Allows AWS CloudFormation to support native and non-AWS resources while inheriting many core benefits like rollbacks
- Use the AWS CloudFormation CLI tool to create resource providers using JSON schema-driven development, generating many of the code assets for you
- Use third-party resource providers as you would use native AWS resource types



There are few things we need for this

Cloudformation CLI

```
tmux new-session -s laC ⚡
→ go git:(master) ✘ pip3 install --user --upgrade cloudformation-cli-go-plugin
→ go git:(master) ✘ pip3 install --user --upgrade cloudformation-cli-java-plugin
→ go git:(master) ✘ pip install git+https://github.com/aws-cloudformation/aws-cloudformation-rpdk-python-plugin.
git#egg=cloudformation-cli-python-plugin

→ go git:(master) ✘ █
```

IaC | 1:zsh* Berlin: 🌃 +13°C | Thu, Mar 19 - 16:12



Make sure to pick the correct plugin out there

| Available Language Plugins | | | |
|----------------------------|----------------------|--|--|
| Language | Plugin Status | GitHub Location | PyPI Installation |
| Go | General Availability | cloudformation-cli-go-plugin | cloudformation-cli-go-plugin |
| Java | General Availability | cloudformation-cli-java-plugin | cloudformation-cli-java-plugin |
| Python | Developer Preview | cloudformation-cli-python-plugin | N/A |

Model your new resource

Model your resource – set it's properties

```
tmux new-session -s IaC
```

```
1 {
2     "typeName": "Darko::Unicorn::Factory",
3     "description": "Unicorns for the Masses",
4     "sourceUrl": "https://github.com/aws-cloudformation/aws-cloudformation-rpdk.git",
5     "properties": {
6         "UID": {
7             "description": "The ID given to the Unicorn",
8             "type": "string"
9         },
10        "Name": {
11            "description": "Name of the Unicorn",
12            "type": "string",
13            "minLength": 3,
14            "maxLength": 250
15        },
16        "Superpower": {
17            "description": "Unicorn Superpower",
18            "type": "string",
19            "minLength": 3,
20            "maxLength": 250
21        },
22        "Family": {
23            "description": "Unicorn family in the form of family.size - eg. u3.glorious",
24            "type": "string",
25            "minLength": 3,
<factory.json [json] | ~/workspace/repos/IaC-DeepDive/registry/go/darko-unicorn-factory.json | 3,1          Top
IaC :1:vim*
```

Berlin: ☀ +14°C | Thu, Mar 19 - 13:51



... and handlers

```
tmux new-session -s IaC
```

```
33  ],
34  "readOnlyProperties": [
35    "/properties/UID"
36  ],
37  "primaryIdentifier": [
38    "/properties/UID"
39  ],
40  "handlers": {
41    "create": {
42      "permissions": □
43    },
44    "read": {
45      "permissions": □
46    },
47    "update": {
48      "permissions": □
49    },
50    "delete": {
51      "permissions": □
52    },
53    "list": {
54      "permissions": □
55    }
56  }
57 ]
```

```
<factory.json [json] | ~/workspace/repos/IaC-DeepDive/registry/go/darko-unicorn-factory.json | 57,1 Bot
```

```
IaC :1:vim*
```

```
Berlin: ☁ +14°C | Thu, Mar 19 - 13:51
```



Time to work on those handlers

Our Create handler

```
Model *Model
}

// Create handles the Create event from the Cloudformation service.
func Create(req handler.Request, prevModel *Model, currentModel *Model) (handler.ProgressEvent, error) {
    if err := validateInput(req, currentModel); err != nil {
        return handler.ProgressEvent{
            OperationStatus: handler.Failed,
            Message:         err.Error(),
            HandlerErrorCode: cloudformation.HandlerErrorCodeInvalidRequest,
        }, nil
    }
    reqBody, err := marshal(currentModel)
    if err != nil {
        return handler.ProgressEvent{}, err
    }
    response := makeRequest(&RequestInput{
        Method: "POST",
        URL:    APIEndpoint,
        Body:   bytes.NewBuffer(reqBody),
        Action: "Create",
    })
    return response, nil
}

<rce/resource.go [go] | ~workspace/repos/IaC-DeepDive/registry/go/cmd/resource/resource.go | 45,0-1      17%
IaC :1:vim*
```

Berlin: ☀ +13°C | Thu, Mar 19 - 14:56



Did someone mention tests?

We can also test our resources with sam local

```
tmux new-session -s IaC
F
{
  "credentials": {
    "accessKeyId": "<access key here>",
    "secretAccessKey": "<secretAccess key here>",
    "sessionToken": "<session token here>"
  },
  "action": "CREATE",
  "request": {
    "clientRequestToken": "4b90a7e4-b790-456b-a937-0cfdfa211dfe",
    "desiredResourceState": {
      "Name": "SuperSaKaramelom",
      "Superpower": "Rainbow maker"
    },
    "logicalResourceId": "MyUnicorn"
  },
  "callbackContext": null
}
~
~
~
~
~
~
~
~
tests/create.json [json] | ~/workspace/repos/IaC-DeepDive/registry/go/sam-tests/create.json | 1,1          All
"sam-tests/create.json" 17L, 500C
IaC | 1:zsh*
```



Executing the test

```
tmux new-session -s IaC
→ go git:(master) ✘ sam local invoke TestEntrypoint --event sam-tests/create.json
Invoking handler (go1.x)

Fetching lambci/lambda:go1.x Docker container image.....
Mounting /Users/dmeszaro/workspace/repos/IaC-DeepDive/registry/go/bin as /var/task:ro,delegated inside runtime container
2020/03/19 14:59:17 Handler starting in test mode
START RequestId: 55609f2a-8fe8-1fd4-0ca0-42f9a8e15827 Version: $LATEST
2020/03/19 14:59:17 Creating request:
Prev body:
Curr body: {
    "Name": "SuperSaKaramelom",
    "Superpower": "Rainbow maker"
}
END RequestId: 55609f2a-8fe8-1fd4-0ca0-42f9a8e15827
REPORT RequestId: 55609f2a-8fe8-1fd4-0ca0-42f9a8e15827 Init Duration: 202.83 ms          Duration: 181.97 ms      B
filled Duration: 200 ms   Memory Size: 128 MB   Max Memory Used: 31 MB

{"status": "SUCCESS", "message": "Create Complete", "resourceModel": {"UID": "5e7388c5e6280703e8ec1c96", "Name": "SuperSaKaramelom", "Superpower": "Rainbow maker", "Family": ""}}
→ go git:(master) ✘
```

IaC :1:python3.7* </html> | Thu, Mar 19 - 15:59



Now what? Well let's upload!

Uploading the resource

```
tmux new-session -s IaC
drwxr-xr-x 3 dmeszaro 1896053708 96B Mar 19 15:30 bin
drwxr-xr-x@ 4 dmeszaro 1896053708 128B Mar 19 15:30 cmd
-rw xr-xr-x@ 1 dmeszaro 1896053708 1.4K Mar 19 15:29 darko-unicorn-factory.json
-rw xr-xr-x@ 1 dmeszaro 1896053708 230B Feb 29 12:51 go.mod
-rw xr-xr-x@ 1 dmeszaro 1896053708 2.6K Feb 29 12:51 go.sum
-rw xr-xr-x@ 1 dmeszaro 1896053708 864B Mar 19 15:30 resource-role.yaml
-rw r--r-- 1 dmeszaro 1896053708 23K Mar 19 15:30 rpdk.log
drwxr-xr-x 3 dmeszaro 1896053708 96B Mar 19 15:31 sam-tests
-rw xr-xr-x@ 1 dmeszaro 1896053708 581B Feb 29 12:51 template.yml
➔ go git:(master) ✘ cfн submit -v
Validating your resource specification...
Packaging Go project
Creating darko-unicorn-factory-role-stack
darko-unicorn-factory-role-stack stack was successfully created
Creating CloudFormationManagedUploadInfrastructure
CloudFormationManagedUploadInfrastructure already exists. Attempting to update
CloudFormationManagedUploadInfrastructure stack is up to date
Successfully submitted type. Waiting for registration with token 'e48d5b17-99e8-4732-969b-7203322f25dd' to complete.
Registration complete.
{'ProgressStatus': 'COMPLETE', 'Description': 'Deployment is currently in DEPLOY_STAGE of status COMPLETED; ', 'TypeArn': 'arn:aws:cloudformation:eu-west-1:824852318651:type/resource/Darko-Unicorn-Factory', 'TypeVersionArn': 'arn:aws:cloudformation:eu-west-1:824852318651:type/resource/Darko-Unicorn-Factory/00000001', 'ResponseMetadata': {'RequestId': 'e68fa4ce-85dc-4aed-9561-681cfa959352', 'HTTPStatusCode': 200, 'HTTPHeaders': {'x-amzn-requestid': 'e68fa4ce-85dc-4aed-9561-681cfa959352', 'content-type': 'text/xml', 'content-length': '681', 'date': 'Thu, 19 Mar 2020 14:35:51 GMT'}, 'RetryAttempts': 0}}
➔ go git:(master) ✘
IaC :1:zsh*
```

Berlin: ☁ +14°C | Thu, Mar 19 - 15:37



Voila!

The screenshot shows the AWS CloudFormation Resource Types page. The top navigation bar includes the AWS logo, 'Services' dropdown, 'Resource Groups' dropdown, and a star icon. The left sidebar has a 'CloudFormation' heading with links for 'Stacks', 'StackSets', 'Exports', and 'Designer'. Under 'CloudFormation registry', there is a 'Resource types' link. The main content area shows the title 'Resource types' and a sub-section 'Resource types (2)'. A dropdown menu labeled 'Private' is open. Below it, a card displays a custom resource type: 'Darko::Unicorn::Factory' with the description 'Uncorns for the Masses'.

CloudFormation

Services ▾ Resource Groups ▾

CloudFormation > CloudFormation registry: Reso

Resource types

Discover the new AWS, third-party, and organization

More resource types will be available as they

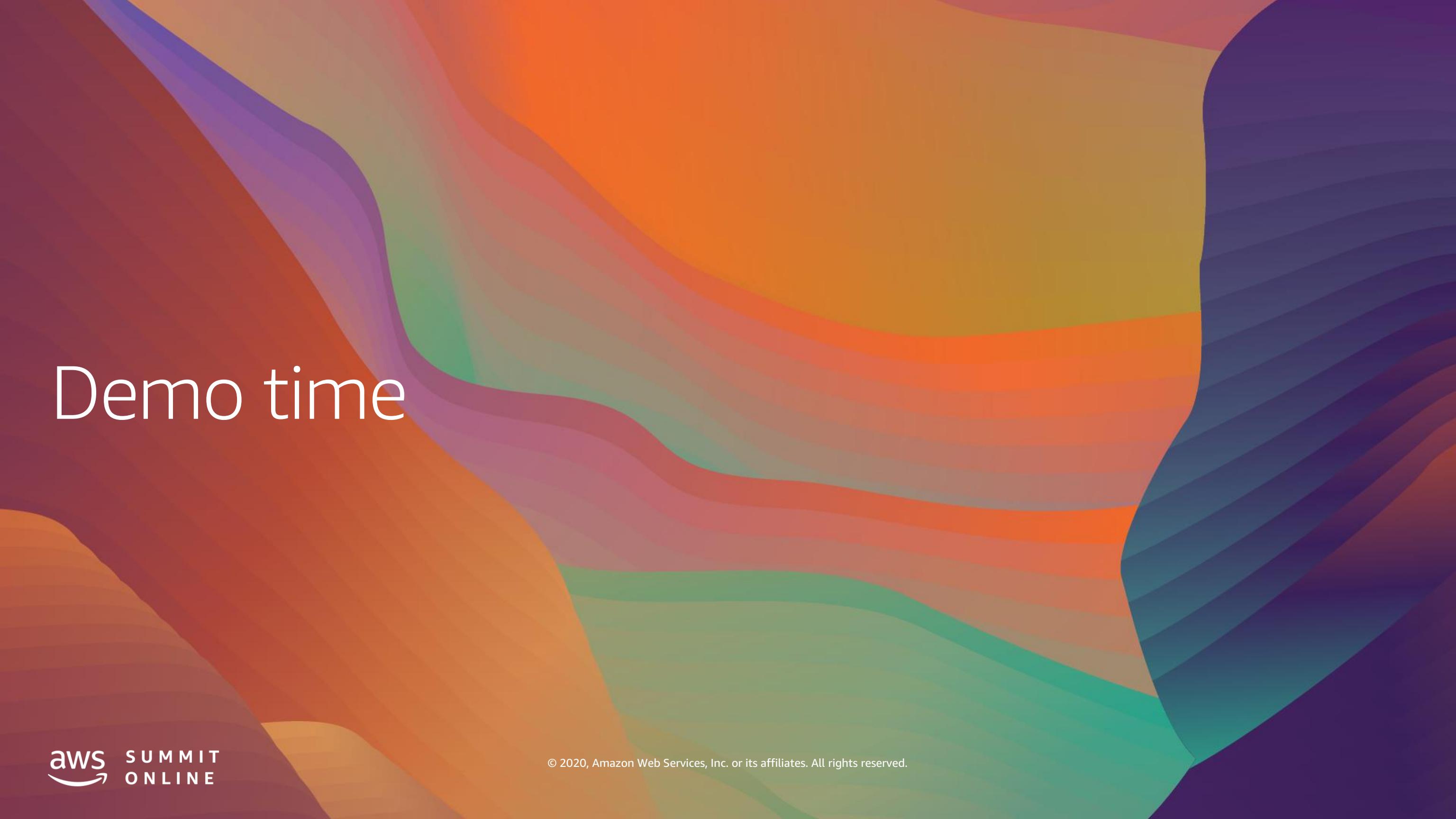
Resource types (2)

Private

Darko::Unicorn::Factory

Uncorns for the Masses

Previous console



Demo time

Takeaways

Takeaways

Best practices start with the editor! Use proper tools and plugins! ☈

Treat Infrastructure code as any other code.

Use testing tools for any framework you write your infrastructure in. ✘

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Thank you!

Darko Meszaros

 @darkosubotica

 In/darko-mesaros

 twitch.tv/ruptwelve