

AWS CloudFormation

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DevOps mentorship program

Sadržaj

- Infrastructure as code - IAC
- AWS CloudFormation
- Fizički i logički resursi
- Template Anatomy
- Parametri
- Funkcije
- Drift detection
- DEMO

Problemi ručnog kreiranja resursa

- Skaliranje
- Konzistentnost resursa
- Kontrola nad verzijama
- Roll back resursa u prethodno stanje

Infrastructure as code - IaC

- Kreiranje i upravljanje resursima pomoću *template* fajlova
- Kreiranje infrastrukture koja se može replicirati i *re-deploy*-ati
- Mogućnost *roll back*-a u prethodno (stabilno) stanje
- Olakšani *clean up* nepotrebnih resursa

AWS CloudFormation

- Jednostavniji način kreiranja i upravljanja AWS resursima
- Nema dodatnih troškova - plaćate samo za resurse koje kreirate
- Kreiranje, *update* i brisanje *stack*-ova
- *Version control* (GitHub, AWS CodeCommit etc)



AWS
CloudFormation

Fizički i logički resursi

- CloudFormation **Template** - JSON ili YAML dokument
 - Definiše logičke resurse – ono "ŠTA" kreiramo
- **Templates** se koriste za kreiranje **Stacks**
- **Stacks** se koriste za kreiranje fizičkih resursa iz logičkih
- Sve izmjene unutar **Templates** impliciraju izmjene unutar **Stacks**

JSON

vs.

YAML

```
35 "Resources": {
36   "MyDemoInstance": {
37     "Type": "AWS::EC2::Instance",
38     "Properties": {
39       "SubnetId": "subnet-1863e914",
40       "SecurityGroupIds": [
41         "sg-0dcdf3c6f2bed41b9"
42       ],
43       "ImageId": "ami-0715c1897453cabd1",
44       "InstanceType": "MyInstanceType",
45       "KeyName": "ab-mentorship-demo-key",
46       "Tags": [
47         {
48           "Key": "Stage",
49           "Value": "StageName"
50         },
51         {
52           "Key": "Stack",
53           "Value": "StackName"
54         },
55         {
56           "Key": "Name",
57           "Value": "InstanceName"
58         }
59       ]
60     }
61   }
62 }
```

```
30 Resources:
31   MyDemoInstance:
32     Type: 'AWS::EC2::Instance'
33     Properties:
34       SubnetId: "subnet-1863e914"
35       SecurityGroupIds:
36         - sg-0dcdf3c6f2bed41b9
37       ImageId: ami-0715c1897453cabd1
38       InstanceType: !Ref MyInstanceType
39       KeyName: ab-mentorship-demo-key
40       Tags:
41         - Key: Stage
42           Value: !Ref StageName
43         - Key: Stack
44           Value: !Ref StackName
45         - Key: Name
46           Value: !Ref InstanceName
```

Fizički i logički resursi

```
1 Resources:
2   MyFirstInstance:
3     Type: 'AWS::EC2::Instance'
4     Properties:
5       ImageId: !Ref AmiId
6       InstanceType: "t2.micro"
7       SubnetId: !Ref PrivateSubnet
```

Logički resurs – naziv i tip

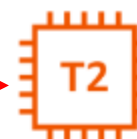
CloudFormation koristi **Properties** kada kreira odgovarajuće fizičke resurse



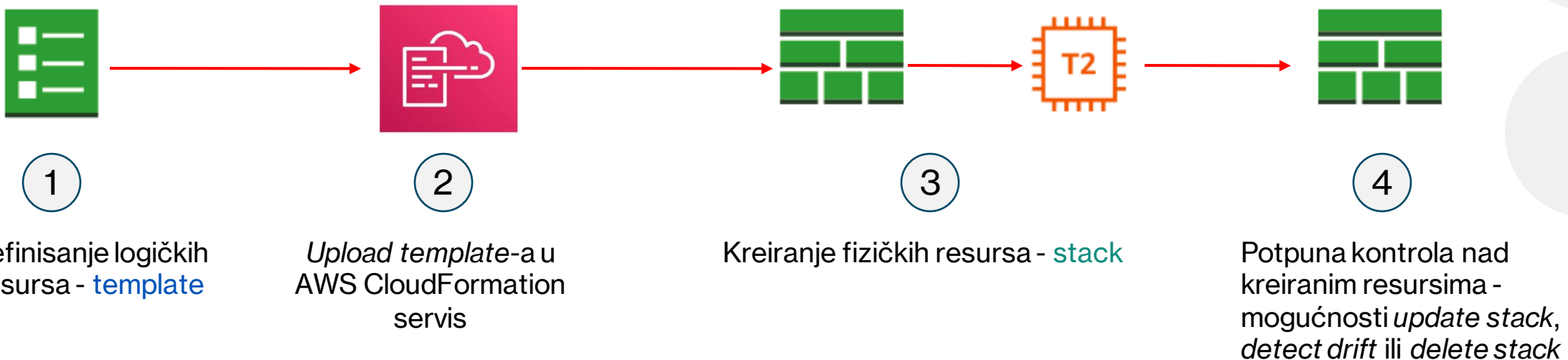
CloudFormation
Template



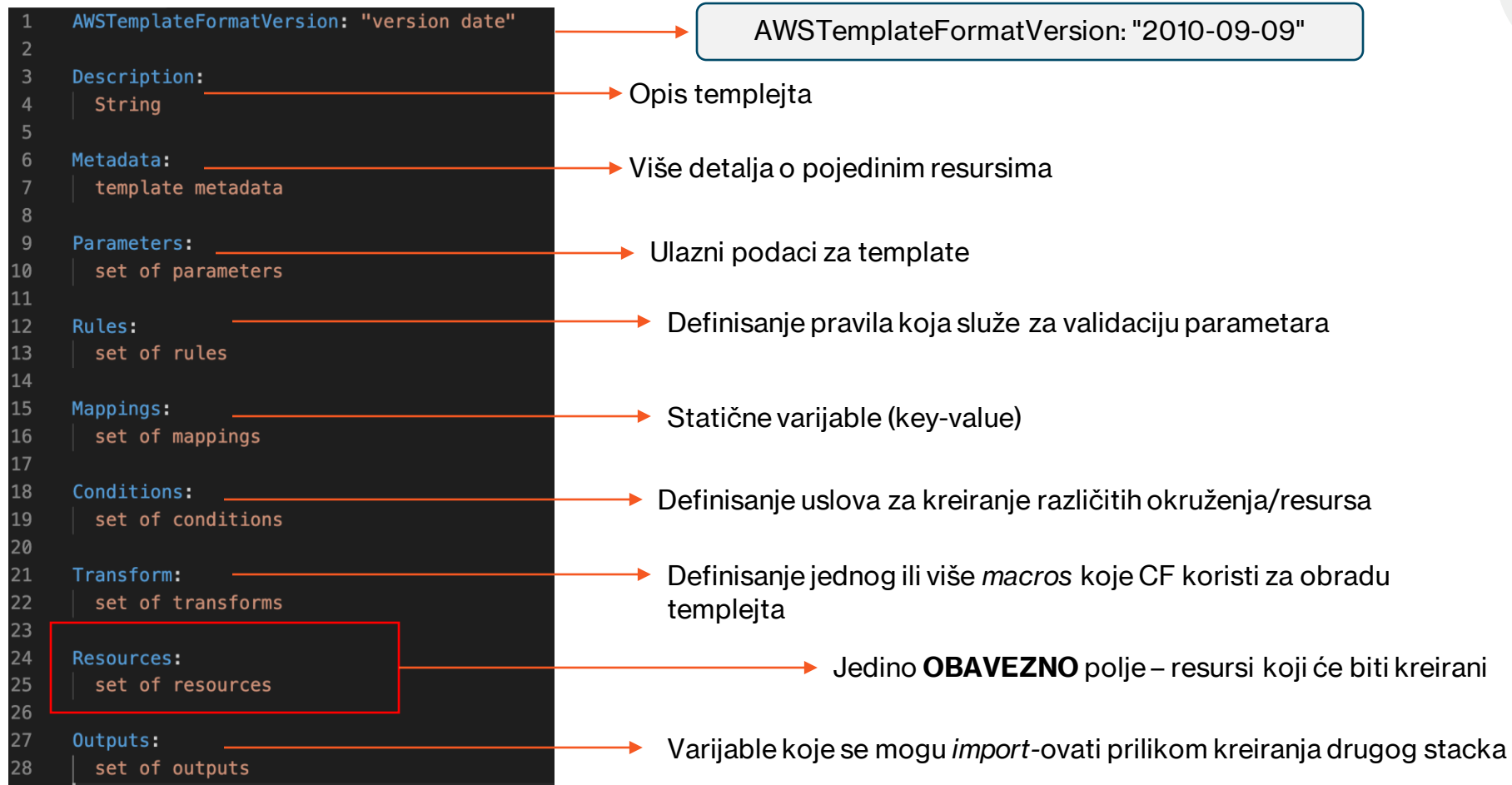
CloudFormation
Stack



Pregled AWS CloudFormation servisa



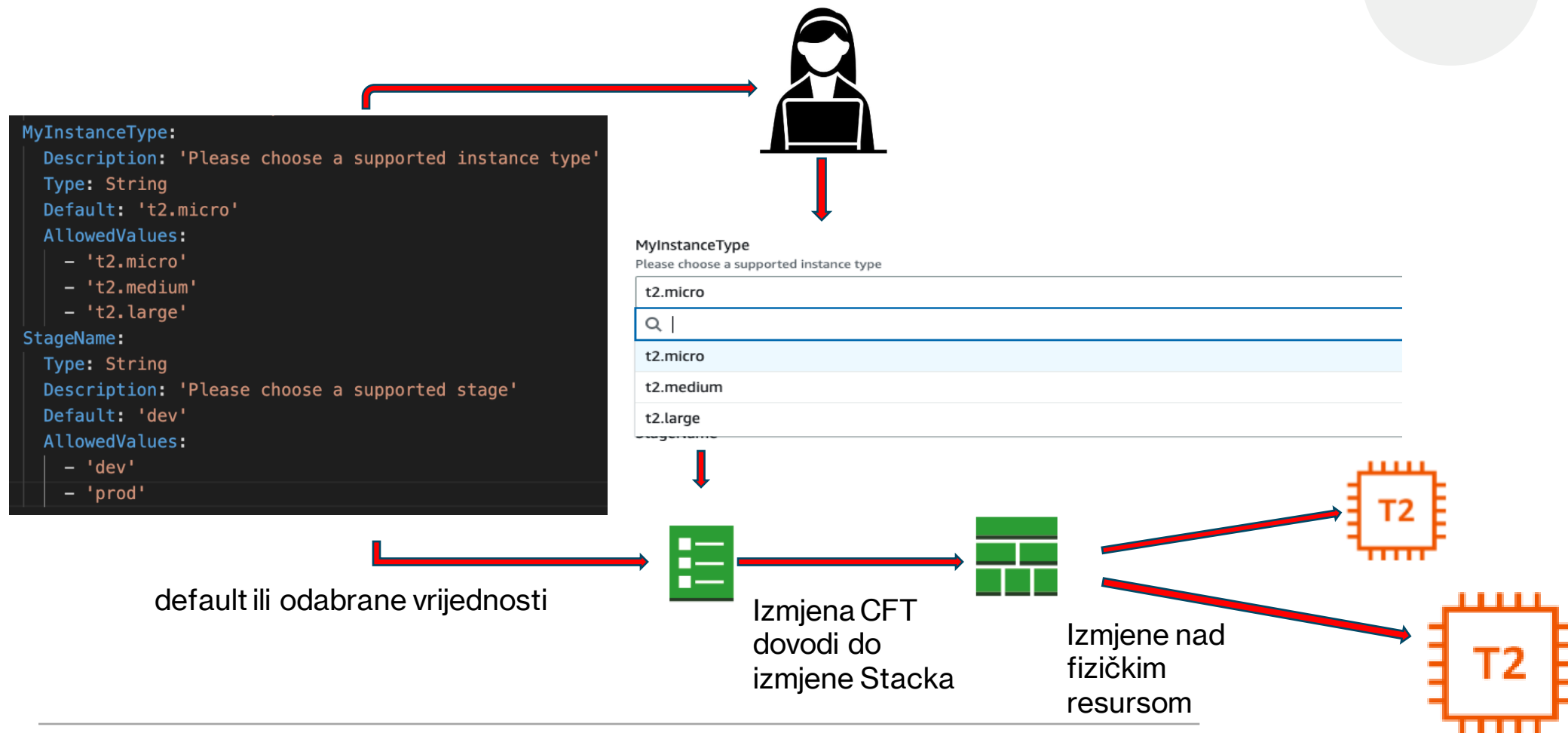
Template anatomy



Parametri

- **Template** parametri i **pseudo** parametri
- Prihvataju input – Console/CLI/API
- Koriste se prilikom kreiranja ili *update-a stack-a*
- Mogu se referencirati prilikom kreiranja logičkih resursa

Template parametri



Pseudo parametri

AWS::Region
AWS::AccountId
AWS::StackId
AWS::StackName



CloudFormation
Template



CloudFormation
Stack

Pseudo parametri su
upravljani od AWS
strane i zavise od
okruženja u kojem se
kreira Stack

Intrinsic Functions

Ref & Fn::GetAtt

Fn::Join &
Fn::Split

Fn::GetAZs &
Fn::Select

Fn::Base64 &
Fn::Sub

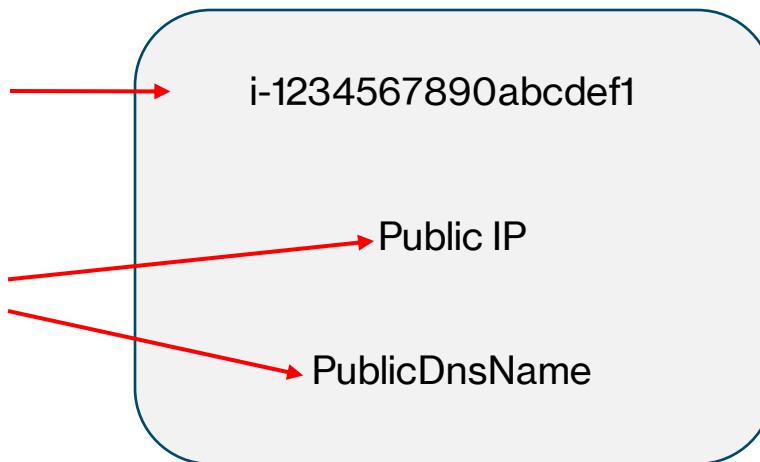
Conditions
(Fn::IF, And,
Equals, Not &
Or)

Fn::Cidr

Fn::ImportValue

Ref and Fn::GetAtt

`!Ref MyDemoInstance`



`!GetAtt MyDemoInstance.Attribute`

```
Resources:
  MyDemoInstance:
    Type: 'AWS::EC2::Instance'
    Properties:
      InstanceType: !Ref MyInstanceType
```

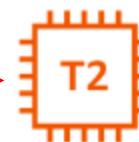
Logički resurs



Template



Stack



Fizički resurs

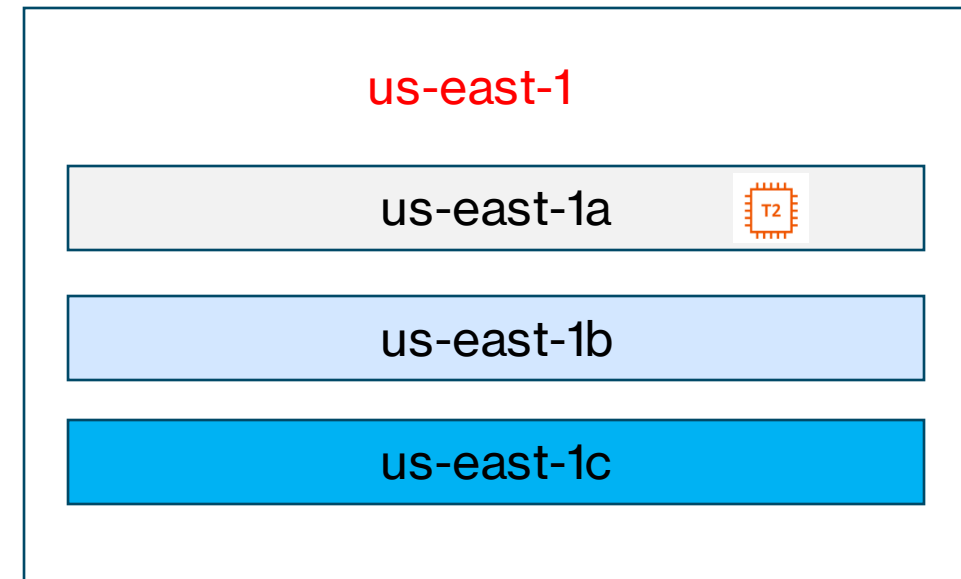
Fn::GetAZs and Fn::Select

!GetAZs - vraća listu AZs u navedenoj regiji ili u trenutnoj regiji

→ ["us-east-1a","us-east-1b", "us-east-1c"]

!Select - vraća objekat iz liste objekata (indeksiranje počinje od 0)

```
Resources:
  MyDemoInstance:
    Type: 'AWS::EC2::Instance'
    Properties:
      AvailabilityZone: !Select [ 0, !GetAZs '' ]
```



Fn::Base64 & Fn::Sub

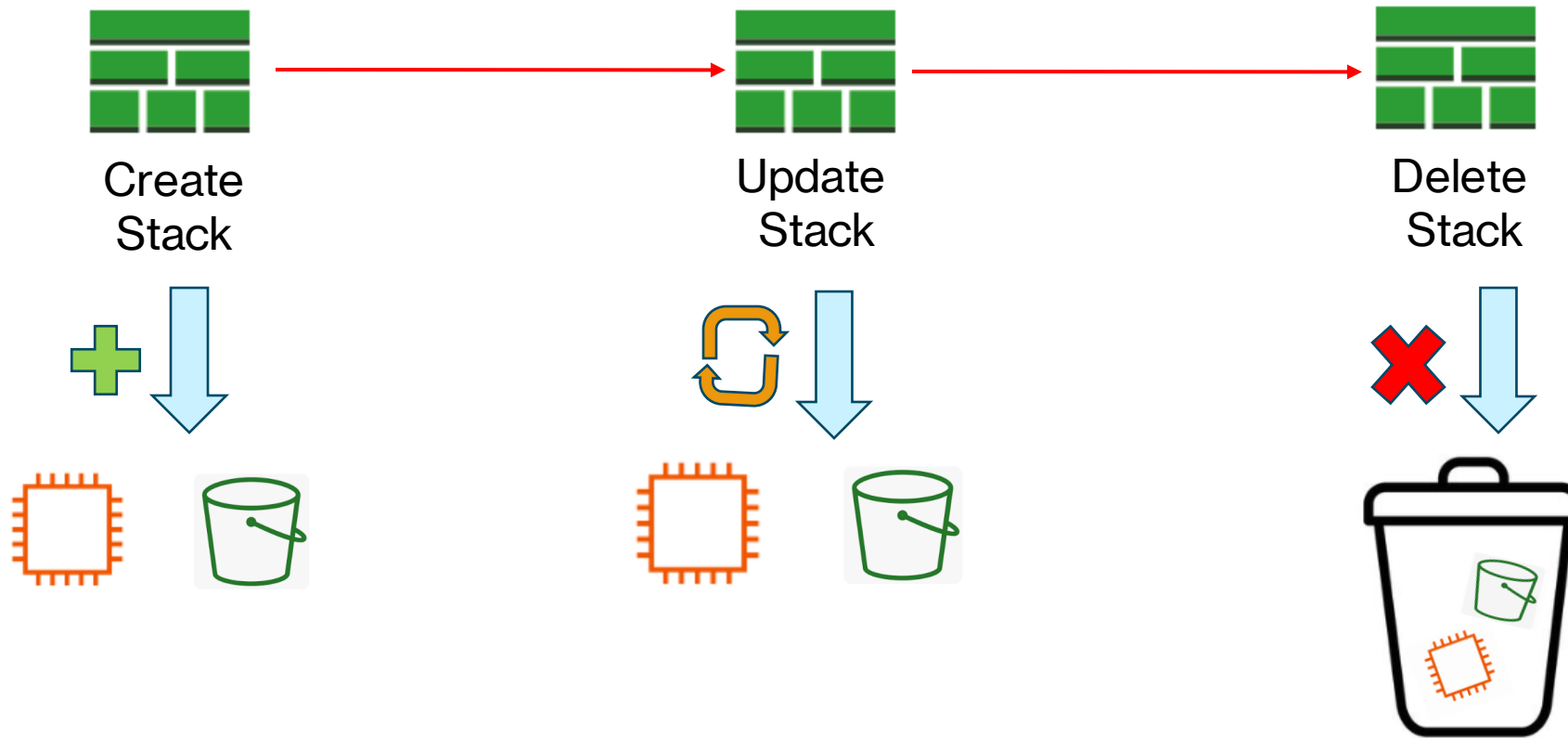
```
124  ✓  UserData:
125  ✓  Fn::Base64: !Sub |
126      #!/bin/bash -v
127      yum -y update
128      sleep 120
129      systemctl start nginx
```

➤ `UserData` zahtjeva base64 kodirani tekst

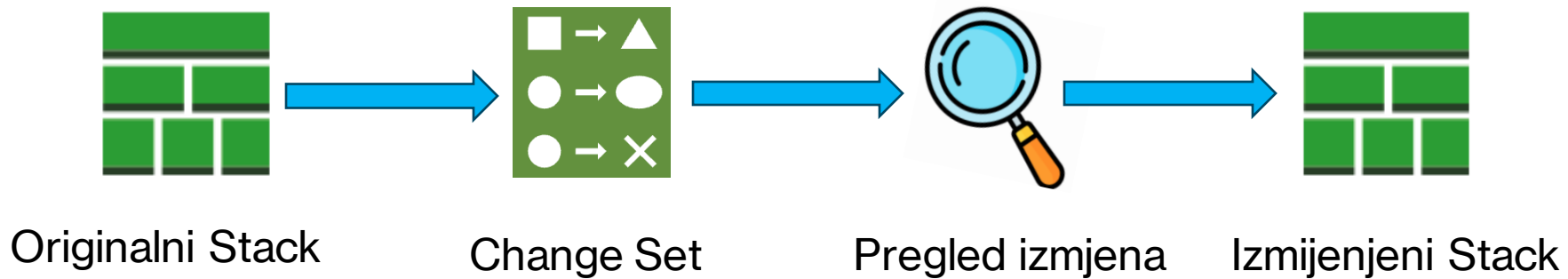
➤ `!Sub` mijenja vrijednost ulazne varijable sa stvarnom vrijednošću

```
- Key: Stack
  Value: !Sub '${AWS::StackName}'
- Key: Name
  Value: !Sub '${InstanceName}.${AWS::Region}.${StageName}.awsbosnia.com'
```

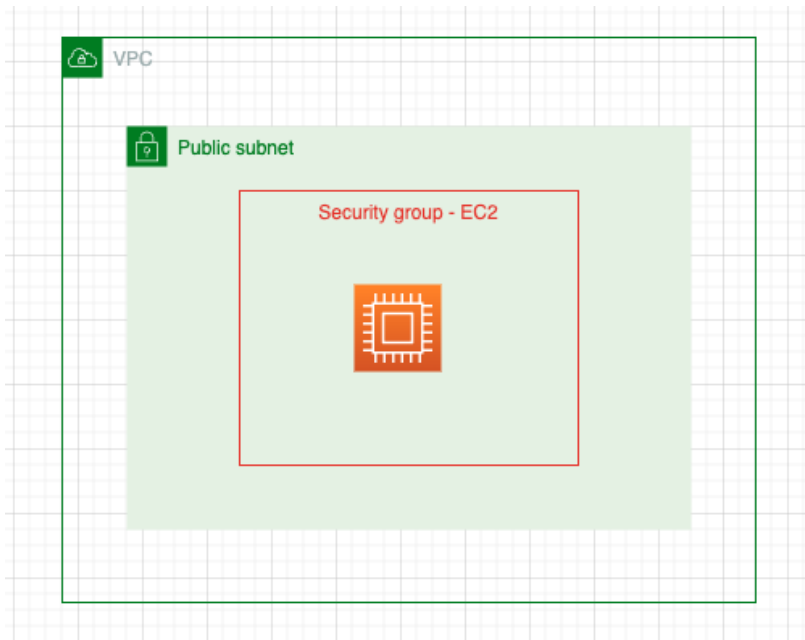
Create – update - delete stacks



AWS CloudFormation ChangeSet



Drift detection

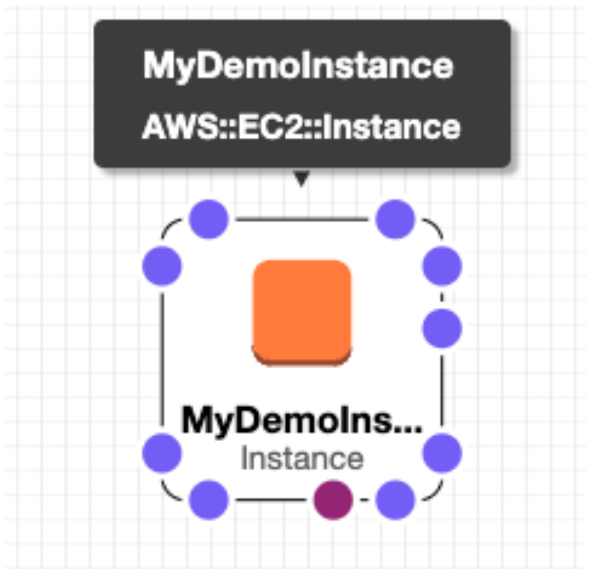



Scenario:

- Kreirana EC2 instanca i SG
- Manuelna izmjena (pravila unutar SG)
- Drift detection aktivna
- Svi resursi osim SG biti će u **IN_SYNC** statusu, dok će SG pokazivati status **MODIFIED**

AWS CloudFormation Designer

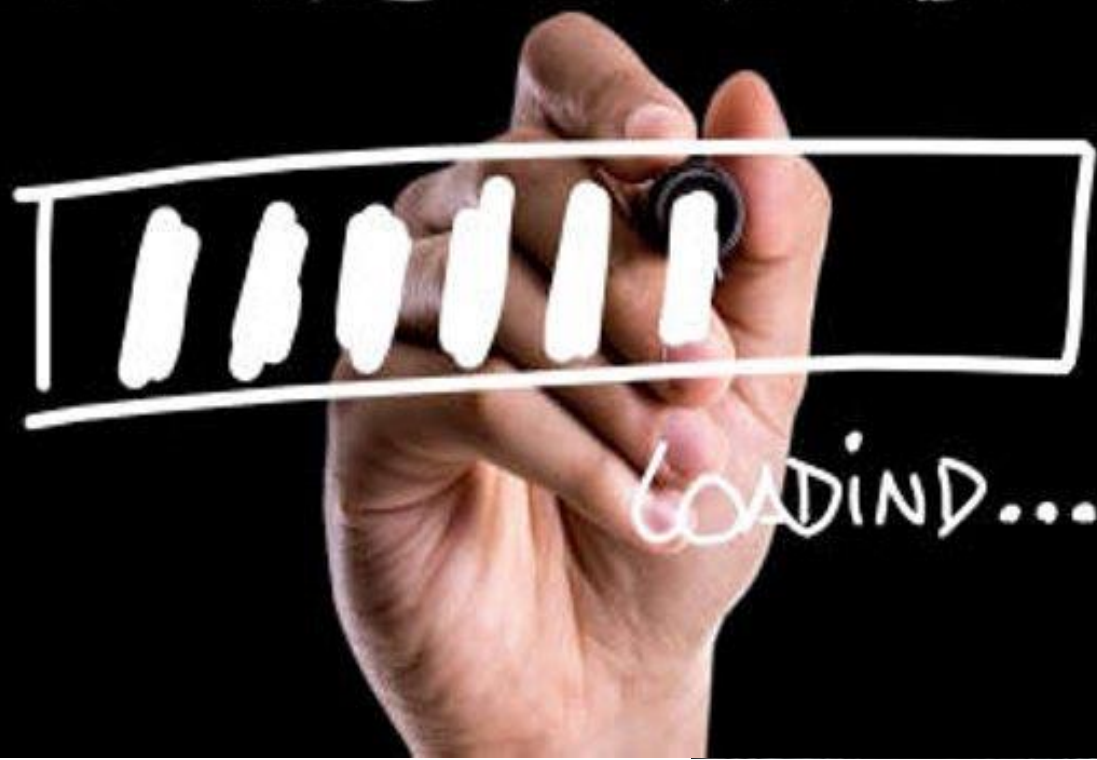
- Virtuelni alat koji omogućava kreiranje i modifikovanje AWS CloudFormation templejta koristeći *drag-and-drop interface*

AWS CloudFormation Designer	Third-party Tools
<div></div> <div><pre>template1 64 eu-central-1: 65 "ssh": "sg-0b933345b636b46b8" 66 KeyPairMap: 67 us-east-1: 68 "devkey": "ab-mentorship-demo-key" 69 eu-central-1: 70 "devkey": "ab-mentorship-demo-key-eu" 71 72 Resources: 73 MyDemoInstance: 74 Type: 'AWS::EC2::Instance' 75 Properties: 76 AvailabilityZone: !Select [0, !GetAZs ''] 77 SubnetId: !FindInMap [SubnetMap, !Ref "AWS::Region", private] 78 SecurityGroupIds: 79 - !FindInMap [SecurityGroupMap, !Ref "AWS::Region", ssh] 80 ImageId: !FindInMap [RegionAMIMap, !Ref "AWS::Region", dev] 81 InstanceType: !Ref MyInstanceType 82 KeyName: !FindInMap [KeyPairMap, !Ref "AWS::Region", devkey] 83 Tags: 84 - Key: Stage 85 Value: !Ref StageName 86 - Key: Stack 87 Value: !Sub '\${AWS::StackName}' 88 - Key: Name 89 #Value: !Sub '\${InstanceName}.\${AWS::Region}.\${StageName}.awsbosnia.com' 90 Value: !Ref InstanceName 91</pre></div>	<div></div>

Troubleshooting AWS CloudFormation

- AWS CloudFormation Troubleshooting Guide - [here](#)
- Error messages
- Log files

DEMO



Dive into

aws

