

Learning Outcomes

- Using the CloudFormation CLI
- Observe the JSON structure used in CloudFormation
- Observe the process of stack creation in CloudFormation

How to do it

- Download the file *CF1.json* and *CF2.json* provided along with this DIY
- Open the AWS Console and navigate to the VPC section
- Note down the ID of the default VPC already created

Name	VPC ID	State	IPv4 CIDR	IPv6 CIDR	DHCP options set	Main Route table
vpc-daa3c5a0	vpc-daa3c5a0	available	172.31.0.0/16	-	dopt-7724270c	rtb-4d2ac733

VPC: vpc-daa3c5a0

Description	CIDR Blocks	Flow Logs	Tags
VPC ID: vpc-daa3c5a0 State: available IPv4 CIDR: 172.31.0.0/16 IPv6 CIDR: - Network ACL: acl-c817deb5 DHCP options set: dopt-7724270c Route table: rtb-4d2ac733	Tenancy: default Default VPC: Yes Classic Link: Disabled DNS resolution: Enabled DNS hostnames: Enabled ClassicLink DNS Support: Disabled Owner: 511948551519		

- Navigate to the subnet section by clicking on “Subnets” on the left side.
- Note down the subnet ID of the default subnet already created for the default VPC

Name	Subnet ID	State	VPC	IPv4 CIDR	Available IPv4	IPv6 CIDR	Availability Zone
subnet-0ca9a503	available	vpc-daa3c5a0	172.31.64.0/20	4091	-	us-east-1f	

- Click on “Create Subnet” at the top of the screen
- Fill in the form as shown below and click on Create

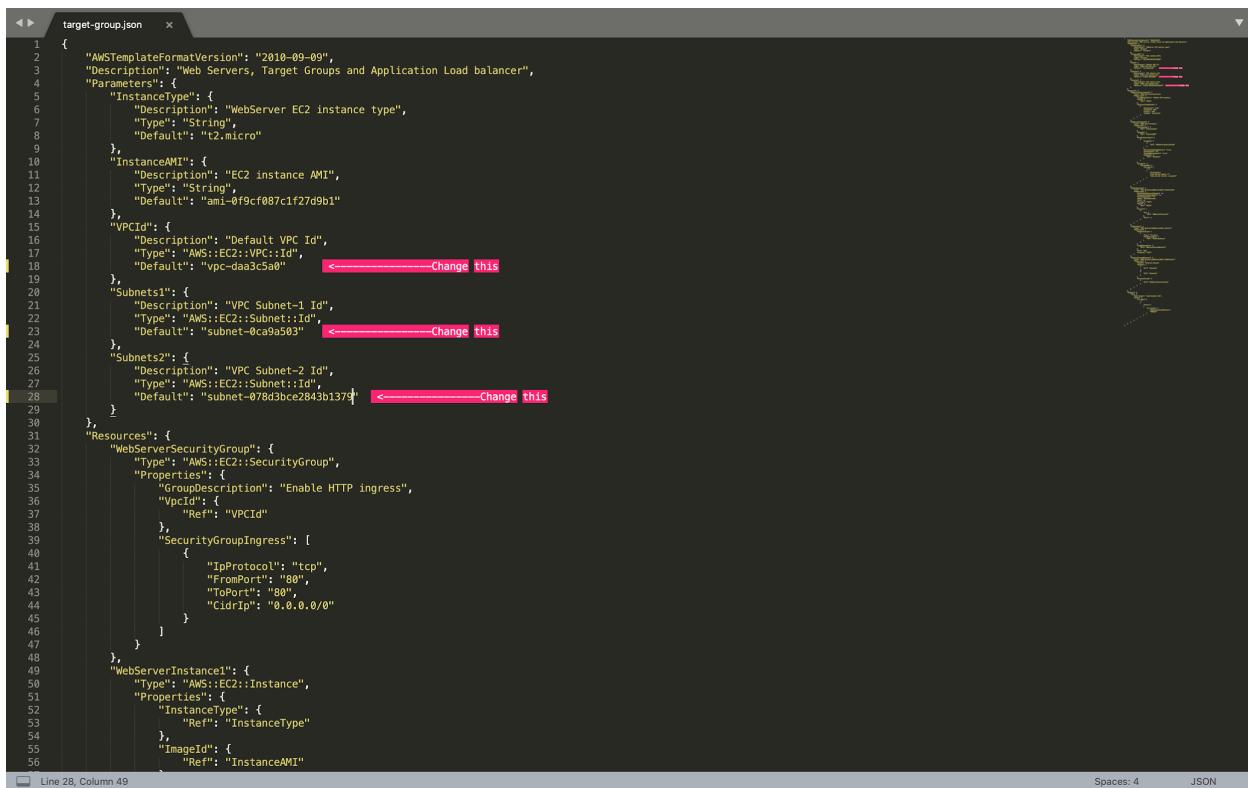
The screenshot shows the AWS VPC console interface for creating a new subnet. The URL in the browser is `console.aws.amazon.com/vpc/home?region=us-east-1#CreateSubnet:SubnetId=subnet-0ca9a503`. The page title is "Create subnet". The "Name tag" field contains "pb_subnet". The "VPC*" dropdown is set to "vpc-daa3c5a0". The "Availability Zone" dropdown is set to "us-east-1f". The "IPv4 CIDR block*" field contains "172.31.56.0/22". A table titled "VPC CIDRs" lists one entry: "CIDR" (172.31.0.0/16) and "Status" (associated). At the bottom, there are "Cancel" and "Create" buttons. A note at the bottom left says "* Required".

Make sure the IPv4 CIDR block is not being used by any subnet already created, and that the availability zone is a different one than that used by the default subnet.

- Note down the Subnet ID of the subnet just created.

Name	Subnet ID	State	VPC	IPv4 CIDR	Available IPv4	IPv6 CIDR	Availability Zone
pb_subnet	subnet-078d3bce2843b1379	available	vpc-daa3c5a0	172.31.56.0/22	1019	-	us-east-1f
	subnet-0ca9a503	available	vpc-daa3c5a0	172.31.64.0/20	4091	-	us-east-1f

- Open the CF1.json file in your preferred text editor
- Change the values marked below in lines 18,23 and 28, with the values of the default VPC ID, default subnet ID and the ID of the created subnet respectively
- Make the above changes in lines 18,23 and 28 for the file CF2.json as well after opening it in a text editor.



```

1 {
2     "AWSTemplateFormatVersion": "2010-09-09",
3     "Description": "Web Servers, Target Groups and Application Load balancer",
4     "Parameters": {
5         "InstanceType": {
6             "Description": "WebServer EC2 instance type",
7             "Type": "String",
8             "Default": "t2.micro"
9         },
10        "InstanceAMI": {
11            "Description": "EC2 instance AMI",
12            "Type": "String",
13            "Default": "ami-0fcf087c1f27d9b1"
14        },
15        "VPCId": {
16            "Description": "Default VPC Id",
17            "Type": "AWS::EC2::VPC::Id",
18            "Default": "vpc-daa3c5a0" ----- Change this -----
19        },
20        "Subnets1": {
21            "Description": "VPC Subnet-1 Id",
22            "Type": "AWS::EC2::Subnet::Id",
23            "Default": "subnet-0ca9a503" ----- Change this -----
24        },
25        "Subnets2": {
26            "Description": "VPC Subnet-2 Id",
27            "Type": "AWS::EC2::Subnet::Id",
28            "Default": "subnet-078d3bce2843b137" ----- Change this -----
29    }
30},
31 "Resources": {
32     "WebServerSecurityGroup": {
33         "Type": "AWS::EC2::SecurityGroup",
34         "Properties": {
35             "GroupDescription": "Enable HTTP ingress",
36             "VpcId": {
37                 "Ref": "VPCId"
38             },
39             "SecurityGroupIngress": [
40                 {
41                     "IpProtocol": "tcp",
42                     "FromPort": "80",
43                     "ToPort": "80",
44                     "CidrIp": "0.0.0.0/0"
45                 }
46             ]
47         }
48     },
49     "WebServerInstance1": {
50         "Type": "AWS::EC2::Instance",
51         "Properties": {
52             "InstanceType": {
53                 "Ref": "InstanceType"
54             },
55             "ImageId": {
56                 "Ref": "InstanceAMI"
57             }
58         }
59     }
60 }

```

Line 28, Column 49 Spaces: 4 JSON

- Save and close the file
- Open your terminal (assuming AWS CLI is already installed and configured)
- Navigate to the folder where the JSONs file are stored
- Enter the following command and press Enter
`aws cloudformation create-stack --stack-name gltest-stack --template-body file://CF1.json`

Whoops! You get the following error

An error occurred (ValidationError) when calling the CreateStack operation: Template format error: Unresolved resource dependencies [NoSecGroup] in the Resources block of the template

Let's open the file and navigate to line 183. As you can see, the security group for the Load Balancer has been set to "NoSecGroup". However, there is no security group as such created in the JSON file. If you navigate to line 32, you will see that the name of the security group created is "WebServerSecurityGroup".

- Go back to the terminal and type the command
`aws cloudformation create-stack --stack-name gltest-stack --template-body file://CF2.json`

If you open this file and check, you can see that the security group for the load balancer has been correctly set.

- Go back to the AWS console and navigate to CloudFormation

The screenshot shows the AWS CloudFormation Stacks page. At the top, there are buttons for Create, Delete, Update, Stack actions, and a prominent orange Create stack button. Below this is a search bar labeled 'Filter by stack name' and a dropdown menu set to 'Active'. A 'View nested' checkbox is also present. The main table lists one stack:

Stack name	Status	Created time	Description
gittest-stack	CREATE_IN_PROGRESS	2019-09-28 15:50:07 UTC+0530	Web Servers, Target Groups and Application Load balancer

- Click on the stack and follow the steps of its creation. Wait for a few minutes for stack

creation to finish.

The screenshot shows the AWS CloudFormation console with the URL console.aws.amazon.com/cloudformation/home?region=us-east-1#/stacks/stackinfo?filteringText=&filteringStatus=active&viewNested=.... The page displays the 'gltest-stack' details. The stack is currently in the 'CREATE_IN_PROGRESS' state, created on 2019-09-28 at 15:50:07 UTC+0530. The status reason is '-'.

Stack ID	Description
arn:aws:cloudformation:us-east-1:511948551519:stack/gltest-stack/8baaa500-e1d9-11e9-b154-0a182a3cd028	Web Servers, Target Groups and Application Load balancer

Overview

Status	Status reason
① CREATE_IN_PROGRESS	-

Root stack	Parent stack
-	-

Created time	Deleted time
2019-09-28 15:50:07 UTC+0530	-

Updated time	-
-	-

Drift status	Last drift check time
⊖ NOT_CHECKED	-

Termination protection	IAM role
Disabled	-

The screenshot shows the AWS CloudFormation console interface. At the top, there's a navigation bar with tabs like 'CloudFormation', 'Stacks', and 'gltest-stack'. Below this, the main area has a sidebar on the left with a 'Stacks (1)' section containing a single entry: 'gltest-stack' (status: CREATE_IN_PROGRESS). The main content area is titled 'gltest-stack' and has tabs for 'Events', 'Resources', 'Outputs', 'Parameters', 'Template', and 'Change sets'. The 'Events' tab is selected, displaying a table of events. The table columns are 'Timestamp', 'Logical ID', 'Status', and 'Status reason'. The events listed are:

Timestamp	Logical ID	Status	Status reason
2019-09-28 15:50:19 UTC+0530	WebServerInstance1	CREATE_IN_PROGRESS	Resource creation Initiated
2019-09-28 15:50:18 UTC+0530	ApplicationLoadBalancer	CREATE_IN_PROGRESS	Resource creation Initiated
2019-09-28 15:50:18 UTC+0530	WebServerInstance1	CREATE_IN_PROGRESS	-
2019-09-28 15:50:17 UTC+0530	ApplicationLoadBalancer	CREATE_IN_PROGRESS	-
2019-09-28 15:50:16 UTC+0530	WebServerSecurityGroup	CREATE_COMPLETE	-
2019-09-28 15:50:15 UTC+0530	WebServerSecurityGroup	CREATE_IN_PROGRESS	Resource creation Initiated
2019-09-28 15:50:10 UTC+0530	WebServerSecurityGroup	CREATE_IN_PROGRESS	-

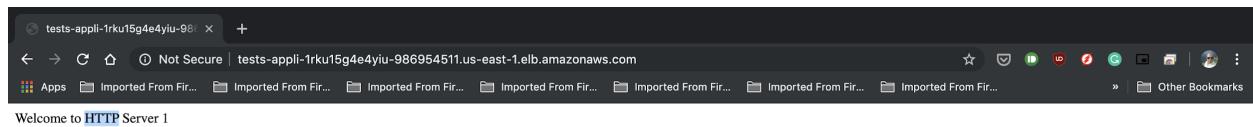
The screenshot is identical to the one above it, showing the 'Events' tab for the 'gltest-stack'.

- When stack creation is completed, navigate to the Outputs tab.

The screenshot shows the AWS CloudFormation console with the stack 'gltest-stack' selected. The 'Outputs' tab is active, showing a single output named 'URL' with the value 'http://gltes-appli-10BUJTJ6F4IO-16605831.us-east-1.elb.amazonaws.com'. The status of the stack is 'CREATE_COMPLETE'.

Key	Value	Description	Export name
URL	http://gltes-appli-10BUJTJ6F4IO-16605831.us-east-1.elb.amazonaws.com	Load Balancer URL	-

- Click on the URL value to confirm that Apache was installed and hence the load balancer was created successfully using the CloudFormation Template.



- Navigate back to the CloudFormation console, select the stack and click on Delete to delete the stack.

The screenshot shows the AWS CloudFormation console interface. On the left, there's a sidebar with navigation links: 'Stacks' (selected), 'Stack details', 'Drifts', 'StackSets', 'Exports', and 'Designer'. Below the sidebar are links for 'Previous console' and 'Feedback'. The main content area is titled 'CloudFormation > Stacks' and displays a table titled 'Stacks (1)'. The table has columns for 'Stack name', 'Status', 'Created time', and 'Description'. A single row is shown: 'gltest-stack' with status 'CREATE_COMPLETE', created on '2019-09-28 15:50:07 UTC+0530', and a description 'Web Servers, Target Groups an...'. At the top of the main content area, there are buttons for 'Create stack', 'Delete', 'Update', 'Stack actions', and a dropdown for 'Active'. There's also a 'View nested' button. The bottom of the page includes standard footer links: 'Feedback', 'English (US)', '© 2008 - 2019, Amazon Internet Services Private Ltd. or its affiliates. All rights reserved.', 'Privacy Policy', and 'Terms of Use'.