

Parameters

In this lab, we are learning to use AWS CloudFormation parameters to create and manage EC2 instances with different configurations. The end goal is to understand how to automate and streamline the creation of AWS resources using CloudFormation templates with customizable parameters such as key pairs, availability zones, and instance types.

Here's a summary of the steps and objectives:

1. Parameters and Key Pairs:

- Define a parameter to select key pairs.
- Create key pairs in EC2 and obtain the AMI ID for Amazon Linux 2023.
- Use CloudFormation to create a stack with a template that allows selecting a key pair.
- Verify the EC2 instance is running and log in using the key pair.
- Delete the stack once done.

2. Availability Zone:

- Add a parameter for the availability zone in the template.
- Create a new stack in CloudFormation with the updated template.
- Choose the key pair and availability zone during stack creation.
- Verify the instance is up and running.
- Delete the stack once done.

3. Instance Type:

- Add a parameter for instance type in the template.
- Create a stack with the updated template.
- Choose the availability zone, instance type, and key pair during stack creation.
- Verify the instance type matches the selected type (e.g., t2.small).
- Delete the stack once done.

By completing these steps, we gain hands-on experience with CloudFormation, parameterized templates, and the flexibility they offer for AWS resource management.

To begin with the lab

Keypair

1. Now in this lab we are going to make use of Parameters. So, below is the template which we are going to use.
2. In this code we have defined a Parameter to select Key pairs. So, create some keypairs in EC2.
3. Also take the AMI ID of Amazon Linux 2023. You can get these templates from GitHub.

```

1 AWSTemplateFormatVersion: 2010-09-09
2 Description: KeyName Parameter demo
3
4 Parameters:
5   MyKeyName:
6     Description: Select the key name from the list
7     Type: AWS::EC2::KeyPair::KeyName
8
9 Resources:
10  DevEC2Instance:
11    Type: 'AWS::EC2::Instance'
12    Properties:
13      ImageId: ami-0cd3dfa4e37921605
14      InstanceType: t2.micro
15      KeyName: !Ref MyKeyName
16    SecurityGroups:
17      - default
18      - !Ref SSHSecurityGroup
19  SSHSecurityGroup:
20    Type: 'AWS::EC2::SecurityGroup'
21    Properties:
22      GroupDescription: my new SSH security group
23    SecurityGroupIngress:
24      - IpProtocol: tcp
25        FromPort: '22'
26        ToPort: '22'
27        CidrIp: 0.0.0.0/0

```

4. Now we need to go to the cloud formation in AWS Console and create a stack. Then you need to click on Choose an existing template, and after that click on upload a template file. Choose the template file from your laptop and then upload it.

Create stack

Prerequisite - Prepare template

Prepare template

Every stack is based on a template. A template is a JSON or YAML file that contains configuration information about the AWS resources you want to include in the stack.

Choose an existing template

Upload or choose an existing template.

Use a sample template

Choose from our sample template library.

Build from Application Composer

Create a template using a visual builder.

Specify template Info

A template is a JSON or YAML file that describes your stack's resources and properties.

Template source

Selecting a template generates an Amazon S3 URL where it will be stored.

Amazon S3 URL

Provide an Amazon S3 URL to your template.

Upload a template file

Upload your template directly to the console.

Sync from Git - new

Sync a template from your Git repository.

Upload a template file

Choose file

- Then give your stack a name and you will see that you have a new section of parameters from here you can choose your key pair. Then move to the review page and create your stack.

Specify stack details

Provide a stack name

Stack name

Stack-Parameter-KeyPair

Stack name must be 1 to 128 characters, start with a letter, and only contain alphanumeric characters. Character count: 23/128.

Parameters

Parameters are defined in your template and allow you to input custom values when you create or update a stack.

MyKeyName

Select the key name from the list

CFKeyPair

Cancel

Previous

Next

- And from the events you can see that our stack has been created successfully.

Stack-Parameter-KeyPair

Stacks Delete Update Stack actions ▾ Create stack ▾

Stack info

Events

Resources

Outputs

Parameters

Template

Change sets

Git sync - new

Events (10)

Search events

Timestamp	Logical ID	Status	Detailed status	Status reason
2024-07-18 16:45:24 UTC+0530	Stack-Parameter-KeyPair	CREATE_COMPLETE	-	-
2024-07-18 16:45:23 UTC+0530	DevEC2Instance	CREATE_COMPLETE	-	-
2024-07-18 16:45:04 UTC+0530	Stack-Parameter-KeyPair	CREATE_IN_PROGRESS	CONFIGURATION_COMPLETE	Eventual consistency check initiated
2024-07-18 16:45:04 UTC+0530	DevEC2Instance	CREATE_IN_PROGRESS	CONFIGURATION_COMPLETE	Eventual consistency check initiated
2024-07-18 16:44:52 UTC+0530	DevEC2Instance	CREATE_IN_PROGRESS	-	Resource creation Initiated
2024-07-18 16:44:50 UTC+0530	DevEC2Instance	CREATE_IN_PROGRESS	-	-
2024-07-18 16:44:49 UTC+0530	SSHSecurityGroup	CREATE_COMPLETE	-	-
2024-07-18 16:44:49 UTC+0530	SSHSecurityGroup	CREATE_IN_PROGRESS	-	Resource creation Initiated
2024-07-18 16:44:46 UTC+0530	SSHSecurityGroup	CREATE_IN_PROGRESS	-	-
2024-07-18 16:44:44 UTC+0530	Stack-Parameter-KeyPair	CREATE_IN_PROGRESS	-	User Initiated

- Also, you can see that you have the EC2 instance running. Now just to make things more promising you can also login to your instance using the key pair.

The screenshot shows the AWS CloudFormation console with the stack 'MyFirstStack' selected. The 'Outputs' tab is active, showing one output:

Output Name	Description	Value
MyFirstOutput	The ARN of the EC2 instance created by the stack.	arn:aws:ec2:ap-southeast-1:123456789012:instance/i-04b5891c641992a2b

- Below you can see that we have successfully logged in to our instance.

```
The authenticity of host 'ec2-54-169-193-24.ap-southeast-1.compute.amazonaws.com (64:ff9b::36a9:c118)' can't be established.
ED25519 key fingerprint is SHA256:TBro/a2YynsQxPtVClcY39AKud+55d0yE5DBC41ultQ.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'ec2-54-169-193-24.ap-southeast-1.compute.amazonaws.com' (ED25519) to the list of known hosts.
'__#_          Amazon Linux 2023
~~\_\#\#\#\_
~~ \#\#\#\_
~~ \#\#\#
~~ \#/ ___ https://aws.amazon.com/linux/amazon-linux-2023
~~ V~' '-->
~~ /_/
~~ /_/
[ec2-user@ip-172-31-20-212 ~]$
```

- Once you are done delete your stack.

😊 Availability Zone

- Now we are going to add a parameter for the Availability zone. Below is the code where you can see that in the parameters, we have added a section for the availability zone.

```

1  AWSTemplateFormatVersion: 2010-09-09
2  Description: AZ Parameter demo
3
4  Parameters:
5    MyKeyName:
6      Description: Select the key name from the list
7      Type: AWS::EC2::KeyPair::KeyName
8    MyAvailabilityZone:
9      Description: Select the AZ
10     Type: String
11     Default: ap-southeast-1
12    AllowedValues:
13      - ap-southeast-1a
14      - ap-southeast-1b
15      - ap-southeast-1c
16

```

2. Now go to the console and create a new stack in cloud formation. Then upload your template.
3. In step 2 you will see that you can give your template a name and with that, you can choose your key pair and the availability zone.
4. After that just move to the review page and create your stack.

Specify stack details

Provide a stack name

Stack name

Stack name must be 1 to 128 characters, start with a letter, and only contain alphanumeric characters. Character count: 18/128.

Parameters

Parameters are defined in your template and allow you to input custom values when you create or update a stack.

MyAvailabilityZone Select the AZ	<input type="text" value="ap-southeast-1a"/>
MyKeyName Select the key name from the list	<input type="text" value="CFKeyPair"/>

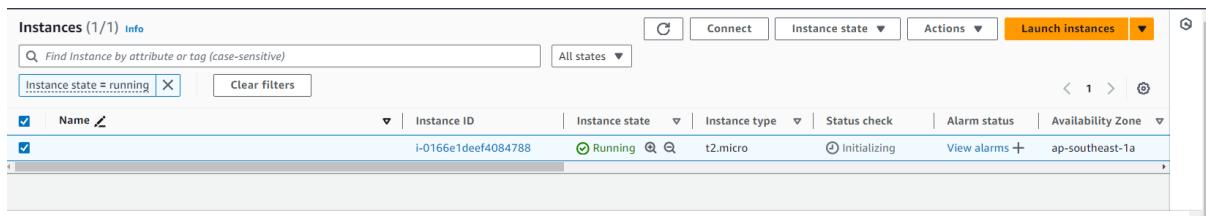
Cancel
Previous
Next

5. In the events you can check the whole process.

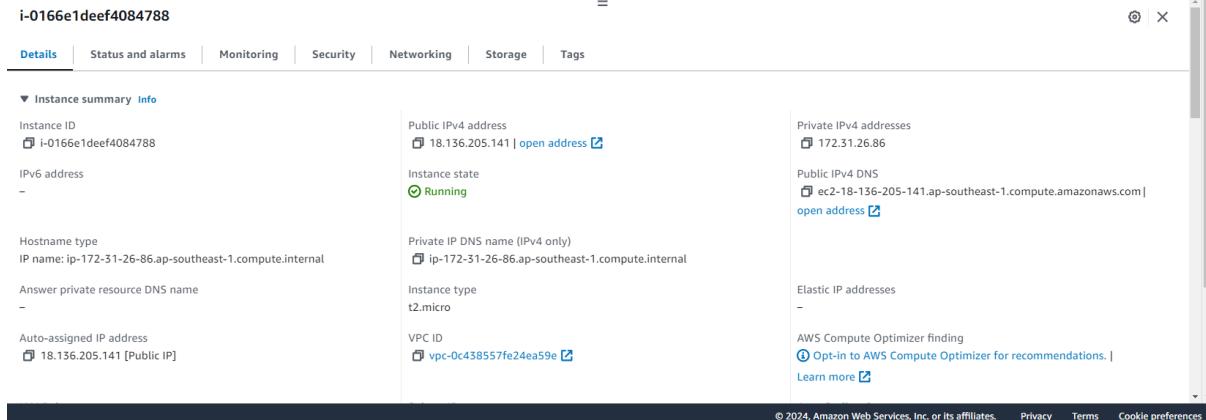
Events (10)					
Timestamp		Logical ID	Status	Detailed status	Status reason
2024-07-18 17:13:57 UTC+0530		Stack-Parameter-AZ	CREATE_COMPLETE	-	-
2024-07-18 17:13:56 UTC+0530		DevEC2Instance	CREATE_COMPLETE	-	-
2024-07-18 17:13:46 UTC+0530		Stack-Parameter-AZ	CREATE_IN_PROGRESS	CONFIGURATION_COMPLETE	Eventual consistency check initiated
2024-07-18 17:13:46 UTC+0530		DevEC2Instance	CREATE_IN_PROGRESS	CONFIGURATION_COMPLETE	Eventual consistency check initiated
2024-07-18 17:13:35 UTC+0530		DevEC2Instance	CREATE_IN_PROGRESS	-	Resource creation Initiated
2024-07-18 17:13:33 UTC+0530		DevEC2Instance	CREATE_IN_PROGRESS	-	-
2024-07-18 17:13:33 UTC+0530		SSHSecurityGroup	CREATE_COMPLETE	-	-
2024-07-18 17:13:32 UTC+0530		SSHSecurityGroup	CREATE_IN_PROGRESS	-	Resource creation Initiated
2024-07-18 17:13:30 UTC+0530		SSHSecurityGroup	CREATE_IN_PROGRESS	-	-
2024-07-18 17:13:27 UTC+0530		Stack-Parameter-AZ	CREATE_IN_PROGRESS	-	User Initiated

6. In EC2 you can see your instance is up and running.

The screenshot shows the AWS CloudFormation Events page. At the top, there are tabs for Stack info, Events (selected), Resources, Outputs, Parameters, Template, Change sets, and Git sync - new. Below the tabs, a search bar is present. The main table has columns for Timestamp, Logical ID, Status, Detailed status, and Status reason. The events listed are related to the creation of various resources like Stack-Parameter-AZ, DevEC2Instance, and SSHSecurityGroup, showing statuses like CREATE_COMPLETE, CREATE_IN_PROGRESS, and CONFIGURATION_COMPLETE.



The screenshot shows the AWS EC2 Instances page. It displays a single instance named "i-0166e1deef4084788" which is currently running. The instance is of type t2.micro and is located in the ap-southeast-1a availability zone. The page includes filters for Name, Instance ID, Instance state, Instance type, Status check, Alarm status, and Availability Zone. Below the instance details, there are tabs for Details, Status and alarms, Monitoring, Security, Networking, Storage, and Tags.



This screenshot shows the detailed view of the EC2 instance "i-0166e1deef4084788". It provides specific information such as the Public IPv4 address (18.136.205.141), Private IPv4 address (172.31.26.86), and Private IP DNS name (ip-172-31-26-86.ap-southeast-1.compute.internal). It also shows the instance type (t2.micro), VPC ID (vpc-0c438557fe24ea59e), and the fact that it is part of the AWS Compute Optimizer. The page also includes sections for Instance summary, Networking, and Storage.

7. Once you are done just delete your stack.

😊 Instance type

- Now we are going to add a parameter for instance type. By this we'll have the option to choose between the instance type.

```

1 AWSTemplateFormatVersion: 2010-09-09
2 Description: AZ Parameter demo
3
4 < Parameters:
5   MyKeyName:
6     Description: Select the key name from the list
7     Type: AWS::EC2::KeyPair::KeyName
8   MyAvailabilityZone:
9     Description: Select the AZ
10    Type: String
11    Default: ap-southeast-1a
12   AllowedValues:
13     - ap-southeast-1a
14     - ap-southeast-1b
15     - ap-southeast-1c
16   MyInstanceType:
17     Description: Select the ec2 instance type from list
18     Type: String
19     Default: t2.micro
20   AllowedValues:
21     - t2.micro
22     - t2.small
23
24 < Resources:
25   DevEC2Instance:
26     Type: 'AWS::EC2::Instance'
27   Properties:
28     ImageId: ami-0e97ea97a2f374e3d
29     InstanceType: !Ref MyInstanceType
30     KeyName: !Ref MyKeyName
31   SecurityGroups:
32     - !Ref SSHSecurityGroup
33     - default
34     AvailabilityZone: !Ref MyAvailabilityZone
35
36   SSHSecurityGroup:
37     Type: 'AWS::EC2::SecurityGroup'
38   Properties:
39     GroupDescription: my new SSH security group
40   SecurityGroupIngress:
41     - IpProtocol: tcp
42     FromPort: '22'
43     ToPort: '22'
44     CidrIp: 0.0.0.0/0
45
46

```

2. So, go to your cloud formation and create a stack, then choose your template and move forward to the next page.
3. Now you need to give your stack a name and choose your Availability zone then choose the instance type, after that choose your key pair.

4. Then just move to the review page and create your stack.

Specify stack details

Provide a stack name

Stack name
Stack-Parameter-InstanceType
Stack name must be 1 to 128 characters, start with a letter, and only contain alphanumeric characters. Character count: 28/128.

Parameters

MyAvailabilityZone
Select the AZ
ap-southeast-1a

MyInstanceType
Select the ec2 instance type from list
t2.small

MyKeyName
Select the key name from the list
CFKeyPair

Cancel Previous Next

5. Below you can see that in the events our stack got created successfully.

Stack-Parameter-InstanceType						<input checked="" type="checkbox"/> Stacks	Delete	Update	Stack actions ▾	Create stack ▾				
Stack info	Events	Resources	Outputs	Parameters	Template	Change sets	Git sync - new							
Events (10)														
<input type="button" value="Search events"/>														
Timestamp	Logical ID		Status		Detailed status		Status reason							
2024-07-18 17:20:46 UTC+0530	Stack-Parameter-InstanceType		CREATE_COMPLETE		-		-							
2024-07-18 17:20:46 UTC+0530	DevEC2Instance		CREATE_COMPLETE		-		-							
2024-07-18 17:20:26 UTC+0530	Stack-Parameter-InstanceType		CREATE_IN_PROGRESS		CONFIGURATION_COMPLETE		Eventual consistency check initiated							
2024-07-18 17:20:26 UTC+0530	DevEC2Instance		CREATE_IN_PROGRESS		CONFIGURATION_COMPLETE		Eventual consistency check initiated							
2024-07-18 17:20:15 UTC+0530	DevEC2Instance		CREATE_IN_PROGRESS		-		Resource creation Initiated							
2024-07-18 17:20:13 UTC+0530	DevEC2Instance		CREATE_IN_PROGRESS		-		-							
2024-07-18 17:20:13 UTC+0530	SSHSecurityGroup		CREATE_COMPLETE		-		-							
2024-07-18 17:20:12 UTC+0530	SSHSecurityGroup		CREATE_IN_PROGRESS		-		Resource creation Initiated							
2024-07-18 17:20:09 UTC+0530	SSHSecurityGroup		CREATE_IN_PROGRESS		-		-							
2024-07-18 17:20:07 UTC+0530	Stack-Parameter-InstanceType		CREATE_IN_PROGRESS		-		User Initiated							

6. Then we went to see our instance and its type is t2.small which we choose earlier.

The screenshot shows the AWS CloudFormation Instances page. At the top, there is a search bar with placeholder text "Find Instance by attribute or tag (case-sensitive)" and a dropdown menu set to "All states". Below the search bar are buttons for "Connect", "Instance state", "Actions", and "Launch instances". A "Clear filters" button is also present. The main table lists one instance:

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone
i-0ed8fa63fb5fed1d9	i-0ed8fa63fb5fed1d9	Running	t2.small	2/2 checks passed	View alarms	ap-southeast-1a

Below the table, the instance details are shown in a modal window titled "i-0ed8fa63fb5fed1d9". The "Details" tab is selected, showing the following information:

- Instance summary**
 - Instance ID: i-0ed8fa63fb5fed1d9
 - IPv6 address: -
 - Hostname type: IP name: ip-172-31-25-139.ap-southeast-1.compute.internal
 - Answer private resource DNS name: -
 - Auto-assigned IP address: 54.179.123.96 [Public IP]
- Public IPv4 address**: 54.179.123.96 | [open address](#)
- Private IPv4 addresses**: 172.31.25.139
- Public IPv4 DNS**: ec2-54-179-123-96.ap-southeast-1.compute.amazonaws.com | [open address](#)
- Private IP DNS name (IPv4 only)**: ip-172-31-25-139.ap-southeast-1.compute.internal
- Instance type**: t2.small
- VPC ID**: vpc-0c438557fe24ea59e
- Elastic IP addresses**: -
- AWS Compute Optimizer finding**: Opt-in to AWS Compute Optimizer for recommendations. | [Learn more](#)

At the bottom of the modal, there are links for "© 2024, Amazon Web Services, Inc. or its affiliates.", "Privacy", "Terms", and "Cookie preferences".

7. Once you are done delete your stack.