

Lab 1- AWS CloudFormation Overview

AWS CloudFormation – CloudFormation provides AWS users with a simple way to describe and provision infrastructure and resources within the AWS environment. By writing CloudFormation templates using YAML or JSON, users can create, modify, or destroy resources in an automated and secure manner that are required by your applications. Often referred to as Infrastructure as Code, CloudFormation can be used to codify your entire cloud environment without having to perform manual actions or write custom scripts for deploying applications. This also allows the user to standardize infrastructure components across accounts, regions, or business units.

Goal - Create the baseline infrastructure for subsequent labs using AWS CloudFormation.

Prerequisites - An active AWS account with a valid payment method.

1. Log in to the **AWS console** using the URL:

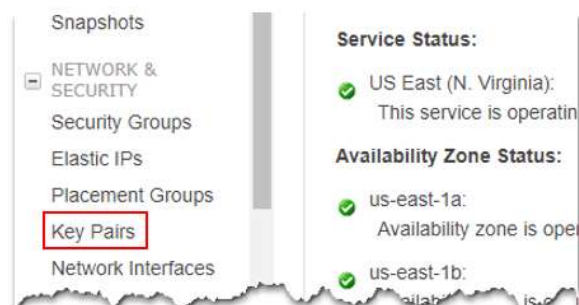
<https://console.aws.amazon.com/console/home>

***Note:** While the preferred method of managing day-to-day operations of an AWS account is the use of Federated roles and policies, meaning the use of an external Identify Provider to log onto the AWS platform, feel free to use an IAM account of your choice as long as the account to be used has been assigned the appropriate permissions.*

2. Once logged in, click on **Services** and select **EC2** under the Compute section:



3. On the left pane, select **Key Pairs** under the NETWORK & SECURITY section:



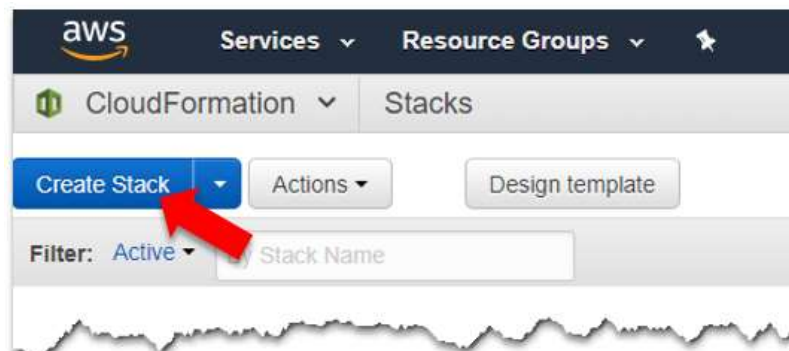
- Click **Create Key Pair** at the top of the console and provide a **Key pair name** in the pop-up box that appears (example: AHEAD-Key-Pair). This key will be used to encrypt and decrypt the local administrator/root password for the EC2 instances that will be using throughout the labs and will be needed to log in to the instances:



- Click **Create**.
- The .pem file** will be automatically download – stored it somewhere familiar, yet safe, as you'll need it for future labs.
- Now that you've created a new Key Pair, let's get started on deploying the initial CloudFormation template. Click on the Services menu at the top and select **CloudFormation** under the Management Tools section:

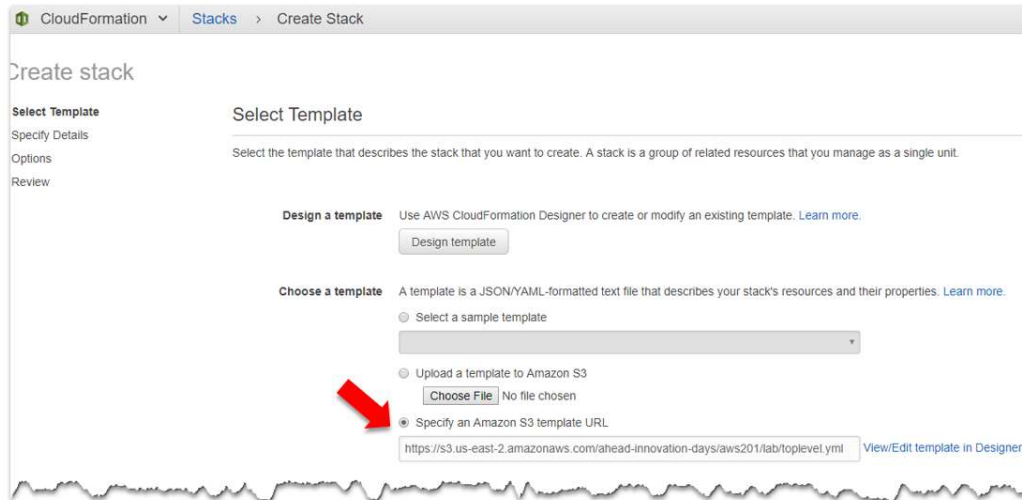


- Let's create a new stack using the supplied templates provided by **AHEAD**. The supplied template is written using nested stacks, in which CloudFormation will automatically create child stacks for each component when deploying the template. In the CloudFormation console, click **Create Stack**:



9. Under Choose a template, select the option **Specify an Amazon S3 template URL** and enter the following URL in the text box:

<https://s3.us-east-2.amazonaws.com/ahead-innovation-days/aws201/lab1/toplevel.yml>

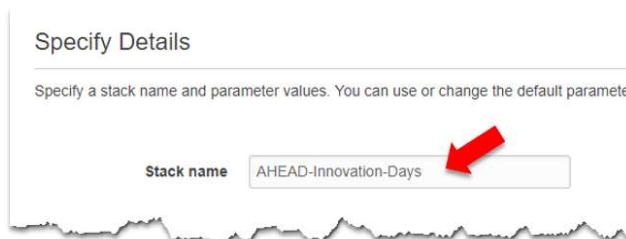


10. Click **Next** to proceed.

Note: CloudFormation will perform template validation before allowing you to continue. For example, if your template is formatted incorrectly, it will alert you to the error in which you must address to continue.

11. Give this stack a name - enter **AHEAD-Innovation-Days** as the Stack name.

Note: CloudFormation Stack names may only contain letters, numbers, and dashes. They cannot include a <space> and must start with an alpha character.



12. For this template, you will be using input Parameters to pass values to the template to properly create the desired resources. In this case, you're going to be entering several parameters here, including selecting the EC2 Key Pair created in previous steps. Select your **EC2 Key Pair** from the drop-down list, **type in your name**, and **select true or false** if AWS Config is already configured in your account:

Note: The selection of True/False for Config will dictate how CloudFormation will configure AWS Config. If Config is already setup, selecting True will not configure the AWS Config recorder but will still create new Config rules for this lab.

Parameters

AHEAD Innovation Day

Choose your EC2 key pair: MyKeyPair
Select the key pair created in the previous steps

What is your name?: username
Enter your first & last name to be appended for the creation of an S3 bucket (e.g., johnsmith)

Is AWS Config setup in your account?: false
Select true or false

13. The **Options** page allows us to add additional information to the stacks, such as Tags, Permissions, and other Advanced Options at the bottom. For this lab, you'll leave all the defaults as they are and **click Next**.

***Note:** While you are not making changes on the Options Page, feel free to review some of the options available. The template will create a few tags for you but additional tags may be added here, if desired. Some of the other important options include "Termination Protection" and "Rollback on failure" options.*

14. Review the selections on the **Review** page and make sure everything is correct. If you need to make changes, click **Previous** to go back and make the desired changes:

aws Services Resource Groups

CloudFormation Stacks Create Stack

Create stack

Select Template
Specify Details
Options
Review

Review

Template

Template URL: https://s3.us-east-2.amazonaws.com/ahead-innovation-days/aws201/lab1/toplevel.yml
Description: AHEAD Innovation Days: Top level Stack - Lab 1
Estimate cost: Cost

Details

Stack name: AHEAD-Innovation-Days
EC2KeyPair: EC2KeyPair

15. **Click the checkbox** below the blue notification which acknowledges that this template will create IAM resources in your account.

Capabilities

The following resource(s) require capabilities: [AWS::CloudFormation::Stack]
This template contains Identity and Access Management (IAM) resources. Check that you want to create IAM resources. Check that the custom names are unique within your AWS account. [Learn more](#).

☒ I acknowledge that AWS CloudFormation might create IAM resources with custom names.

Quick Create Stack (Create stacks similar to this one in most cases)

Important: If the above checkbox is not acknowledged, the template will proceed to execute, but you'll get an error during the deployment – if this happens, delete the stack and recreate it:

Status	Type	Logical ID	Status Reason
ROLLBACK_IN_PROGRESS	AWS::CloudFormation::Stack	InnovationDays	The following resource(s) failed to create: [VPC, IAMComponents]. Rollback requested by user.
CREATE_FAILED	AWS::CloudFormation::Stack	VPC	Resource creation cancelled
CREATE_FAILED	AWS::CloudFormation::Stack	IAMComponents	Requires capabilities : [CAPABILITY_NAMED_IAM]
CREATE_IN_PROGRESS	AWS::CloudFormation::Stack	VPC	
CREATE_IN_PROGRESS	AWS::CloudFormation::Stack	IAMComponents	
CREATE_IN_PROGRESS	AWS::CloudFormation::Stack	InnovationDays	User Initiated

16. If everything looks correct, let's create the stack. **Click Create.**

Important: As mentioned above, this template is using nested stacks which break different AWS components into their own "child stack," such as networking, security components, and compute resources. This strategy allows the use of CloudFormation while still allowing different IT teams to own and manage their respective areas of expertise within the AWS deployment.

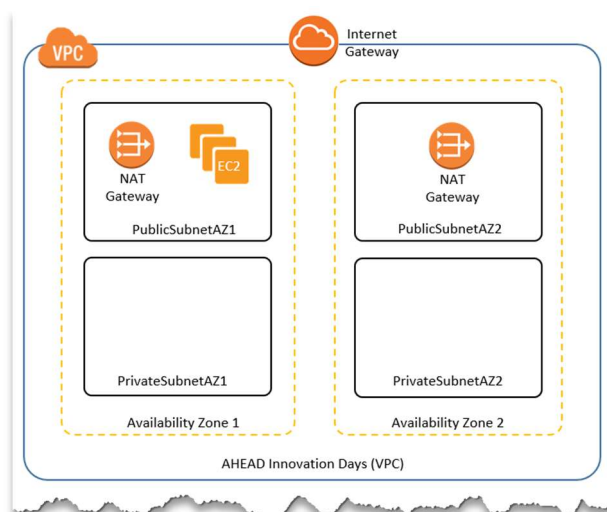
17. Once back in the CloudFormation console, you may see many different stacks deployed, each with a **NESTED** label, noting that they are a child stack beneath a top-level stack. If the deployment was successful, the console should look similar to the following screenshot:

Stack Name	Create...	Status	Description
AHEAD-Innovation-Days-VP... NESTED	2018-03...	CREATE_COMPLETE	AHEAD Innovation Days: VPC Configuration
AHEAD-Innovation-Days-Inst... NESTED	2018-03...	CREATE_COMPLETE	AHEAD Innovation Days: Deploy Instances used for Labs
AHEAD-Innovation-Days-Sub... NESTED	2018-03...	CREATE_COMPLETE	AHEAD Innovation Days: Subnets, & Route Tables
AHEAD-Innovation-Days-VP... NESTED	2018-03...	CREATE_COMPLETE	AHEAD Innovation Days: VPC Creation
AHEAD-Innovation-Days	2018-03...	CREATE_COMPLETE	AHEAD Innovation Days: Top level Stack - Lab 1

18. Now that the stack has successfully deployed let's take a look at what was deployed. Feel free to click in the console to view the different resources that were created. These include:

- VPC Creation
- Four Subnets, an Internet Gateway, two NAT Gateways
- Routing Tables and default routes
- EC2 Instances for use in subsequent labs
- Lambda functions
- SNS topics
- AWS Config Rules

For reference, the drawing below represents the VPC that was deployed using the CloudFormation template. The deployment is a standard VPC configuration using two (2) public subnets, two (2) private subnets, both of which span two Availability Zones to provide physical redundancy for applications. In addition to the VPC and subnets, two (2) NAT Gateways have been implemented to provide the Internet access for any workloads residing in the private subnets.



That's it. You've completed this lab.

Conclusion: In this lab, participants deployed a nested CloudFormation stack, which created and configured some AWS resources for the proceeding labs.

Note: Don't delete the stack. All these resources will be used in the next few labs.