



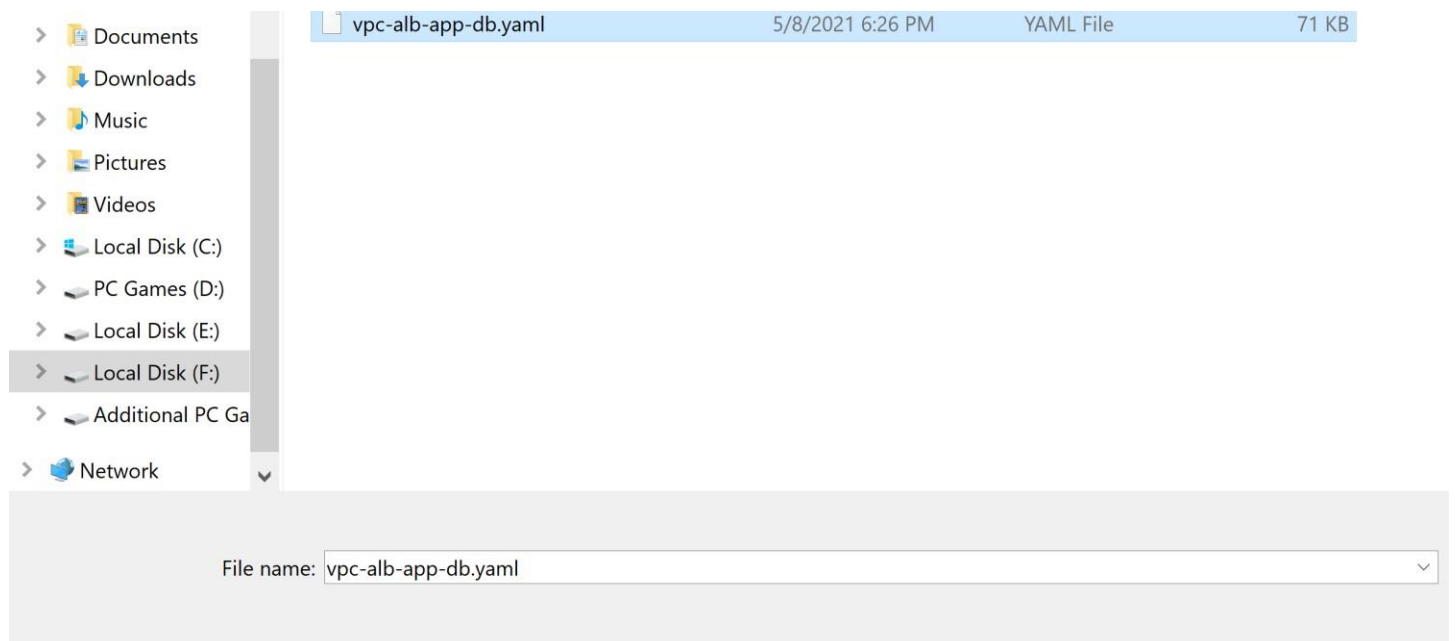
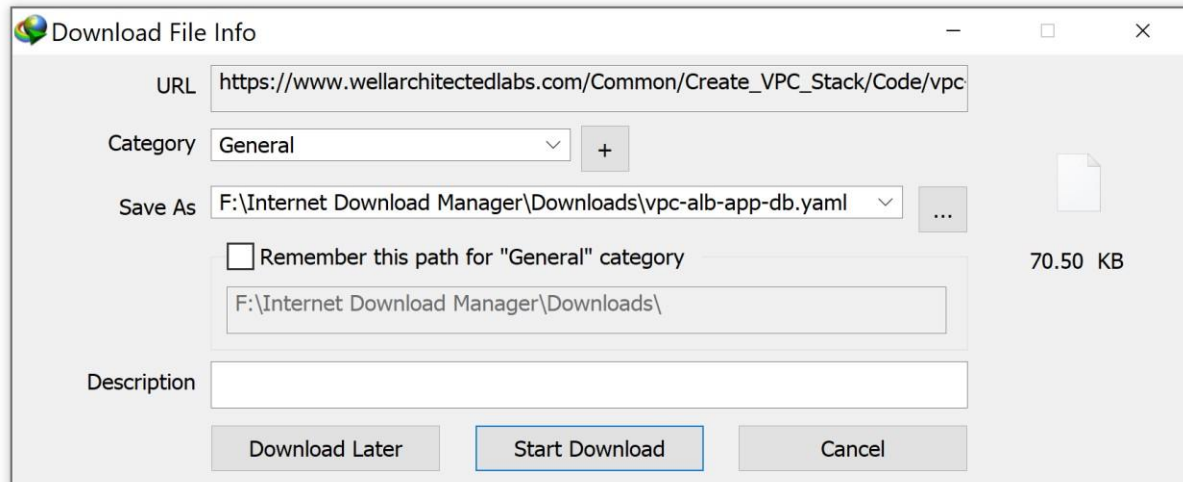
Cloud Computing - Cloud Design
CS/IS 243

4/01/2021

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RESILIENCY OF EC2 INSTANCES

Resiliency of EC2 instances is about the fundamentals of using tests to ensure your implementation is resilient to failure by injecting failure modes into your application. This may be a familiar concept to companies that practice Failure Mode Engineering Analysis (FMEA). It is also a key component of Chaos Engineering, which uses such failure injection to test hypotheses about workload resiliency. One primary capability that AWS provides is the ability to test your systems at a production scale, under load.



I begin by downloading the CloudFormation template: “vpc-alb-app-db.yaml”. once that’s done, I store the downloaded template in a retrievable folder.

Management & Governance

AWS CloudFormation

Model and provision all your cloud infrastructure

AWS CloudFormation provides a common language to describe and provision all the infrastructure resources in your environment in a safe, repeatable way.

Create a CloudFormation stack

Use your own template or a sample template to quickly get started.

Create stack

CloudFormation > Stacks > Create stack

Step 1

Specify template

Step 2

Specify stack details

Step 3

Configure stack options

Step 4

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.

☒ Template is ready

☐ Use a sample template

☐ Create template in Designer

Documents

Downloads

Music

Pictures

Videos

Local Disk (C:)

PC Games (D:)

Local Disk (E:)

Local Disk (F:)

Additional PC Ga

Network

vpc-alb-app-db.yaml

5/8/2021 6:26 PM

YAML File

71 KB

File name: vpc-alb-app-db.yaml

All Files

Open

Cancel

Specify template

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

☒ Upload a template file

Upload a template file

Choose file

vpc-alb-app-db.yaml

JSON or YAML formatted file

S3 URL: https://s3-external-1.amazonaws.com/cf-templates-1n84jg1w6cvcs-us-east-1/2021129LoU-vpc-alb-app-db.yaml

View in Designer

Cancel

Next

In this step, I create a CloudFormation stack, uploaded the template I had installed earlier (vpc-albapp-db.yaml), after I was done uploading it, I clicked on Next.

Step 1
Specify template

Step 2
Specify stack details

Step 3
Configure stack options

Specify stack details

Stack name

Stack name

Stack name can include letters (A-Z and a-z), numbers (0-9), and dashes (-).

Parameters

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

General Configuration

Naming Prefix

The naming prefix for resources created by this template, and exported values that can be referenced by other stacks.

VPC IPv4 CIDR block

VPC CIDR block for IPv4. Default of 10.0.0.0/16 is recommended for testing.

Size of each IPv4 subnet in the VPC

Host bit mask length of each subnet, e.g. default of 8 will be a /24 subnet size.

Number of IPv4 subnets in VPC

Number of equally sized IPv4 subnets that will be created within the VPC CIDR block. Default of 256 is recommended for testing.

Size of each IPv6 subnet in the VPC

Host bit mask length of each subnet, e.g. default of 64 will be a /64 subnet size.

Number of IPv6 subnets in VPC

Number of equally sized IPv6 subnets that will be created within the VPC CIDR block.

Days to retain VPC Flow Logs

VPC Flow Log retention time in days. Note that VPC Flow Logs will be deleted when this stack is deleted.

Application Load Balancer Tier

Application Load Balancer tier

Create subnets and other resources for application load balancer (ALB) tier. False disables the ALB tier completely.

Application Tier

Application tier route to internet

Application subnets route to the internet through Nat Gateways (IPv4) or egress only internet gateway (IPv6). If set to true then shared tier also must be enabled.

Private Link Endpoints

VPC Endpoints can be used to access example common AWS services privately within a subnet, instead of via a NAT Gateway. Note for testing purposes a NAT Gateway is more cost effective than enabling endpoint services.

Database Tier

Database tier

Create subnets and other resources for database (DB) tier. False disables the DB tier completely.

TCP port number used by database

TCP/IP port number used in DB tier for Network ACL (NACL). Default is 3306 for MySQL. Examples; 5432 for PostgreSQL, 1433 for SQL Server, 11211 for Memcache/Elasticache, 6379 for Redis.

Shared Tier

Shared tier

Create subnets for shared tier. Set to true when enabling application route to Internet parameter as the shared tier contains NAT gateways that allow IPv4 traffic in the application tier to connect to the internet. False disables the shared tier completely.

Cancel

Previous

Next

In this step, I specify the stack details. I named the stack as “WebApp1-VPC” and I leave the rest of the parameters at its default settings. I clicked on Next after I was done inputting the appropriate informations.

CloudFormation > Stacks > Create stack

Step 1
Specify template

Step 2
Specify stack details

Step 3
Configure stack options

Step 4
Review

Configure stack options

Tags

You can specify tags (key-value pairs) to apply to resources in your stack. You can add up to 50 unique tags for each stack. [Learn more](#)

Remove

Add tag

Permissions

Choose an IAM role to explicitly define how CloudFormation can create, modify, or delete resources in the stack. If you don't choose a role, CloudFormation uses permissions based on your user credentials. [Learn more](#)

IAM role - optional

Choose the IAM role for CloudFormation to use for all operations performed on the stack.

IAM role na...▼

Sample-role-name▼

Remove

Advanced options

You can set additional options for your stack, like notification options and a stack policy. [Learn more](#)

► Stack policy

Defines the resources that you want to protect from unintentional updates during a stack update.

► Rollback configuration

Specify alarms for CloudFormation to monitor when creating and updating the stack. If the operation breaches an alarm threshold, CloudFormation rolls it back. [Learn more](#)

► Notification options

► Stack creation options

Cancel

Previous

Next

I left everything at its default settings at the Configure stack options page and clicked on Next to move on to the next step.

CloudFormation > Stacks > Create stack

Step 1
Specify template

Step 2
Specify stack details

Step 3
Configure stack options

Step 4
Review

Review WebApp1-VPC

Step 1: Specify template

Template

Template URL
https://s3-external-1.amazonaws.com/cf-templates-1n84jg1w6cvcs-us-east-1/2021129Lup-vpc-alb-app-db.yaml

Quick-create link

Capabilities

The following resource(s) require capabilities: [AWS::IAM::Role]

This template contains Identity and Access Management (IAM) resources. Check that you want to create each of these resources and that they have the minimum required permissions. In addition, they have custom names. 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.

Cancel Previous Create change set Create stack

The next page, which was the Review page, I acknowledged that everything I had done in the earlier steps are correct. Once I was done, I clicked on Create stack.

CloudFormation > Stacks > WebApp1-VPC

Stacks (1)

Filter by stack name

Active View nested

WebApp1-VPC
2021-05-08 19:01:08 UTC-0700
CREATE_IN_PROGRESS

WebApp1-VPC

Delete Update Stack actions Create stack

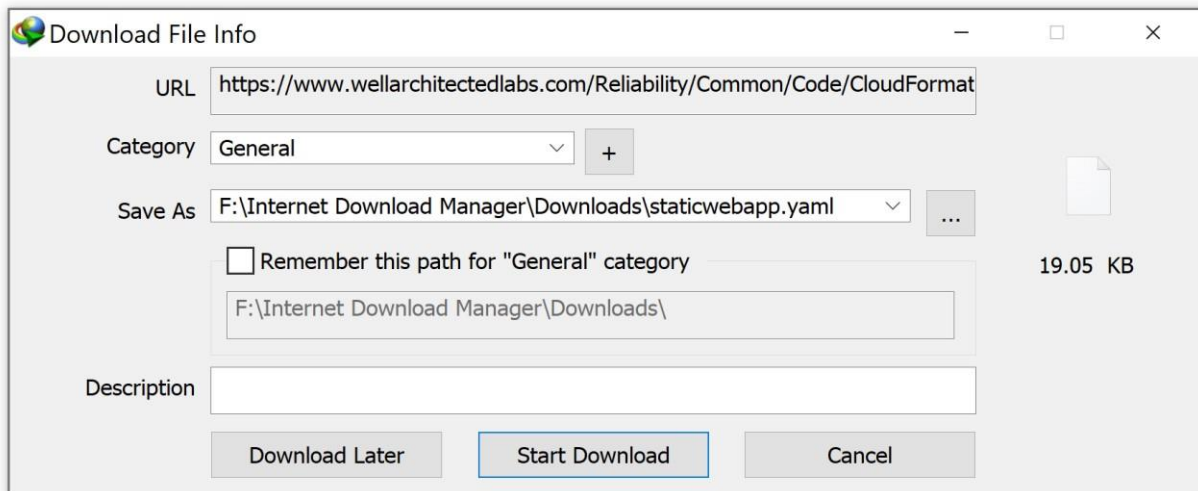
Stack info Events Resources Outputs Parameters Template Change sets

Events (1)

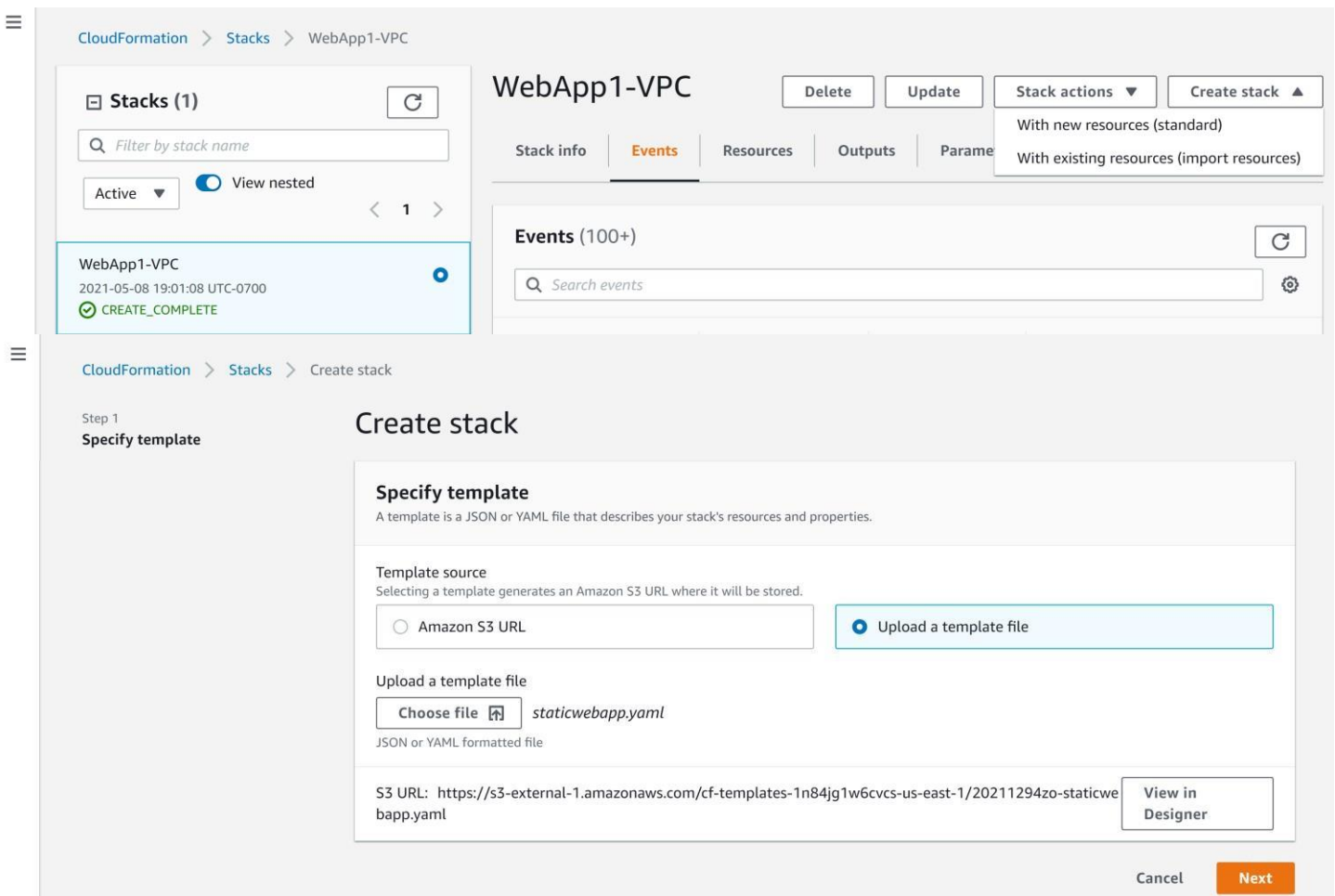
Search events

Timestamp	Logical ID	Status	Status reason
2021-05-08 19:01:08 UTC-0700	WebApp1-VPC	CREATE_IN_PROGRESS	User Initiated

My stack is being created.



For this step, I will also need to download another template (staticwebapp.yaml) and store it in a retrievable location.



Within the WebApp-VPC dashboard, I toggle to the Create stack tab and I select ‘with new resources (standard)’. I am then taken to the Create stack page where I can upload the new template I downloaded earlier: staticwebapp.yaml. I click on Next after I upload the template.

CloudFormation > Stacks > Create stack

Step 1
Specify template

Create stack

CancelPreviousNext

Upload a template file

Choose filestaticwebapp.yaml

JSON or YAML formatted file

S3 URL: https://s3-external-1.amazonaws.com/cf-templates-1n84jg1w6cvcs-us-east-1/2021129L1B-staticwebapp.yamlView in Designer

CancelNext

CloudFormation > Stacks > Create stack

Step 1
Specify template

Step 2
Specify stack details

Step 3
Configure stack options

Specify stack details

Stack name

Stack name

WebApp1-Static

Stack name can include letters (A-Z and a-z), numbers (0-9), and dashes (-).

CloudFormation > Stacks > Create stack

Step 1
Specify template

Step 2
Specify stack details

Step 3
Configure stack options

Step 4
Review

Configure stack options

Tags

You can specify tags (key-value pairs) to apply to resources in your stack. You can add up to 50 unique tags for each stack. [Learn more](#)

KeyValueRemove

Add tag

Quick-create link

Capabilities

The following resource(s) require capabilities: [AWS::IAM::ManagedPolicy]

This template contains Identity and Access Management (IAM) resources. Check that you want to create each of these resources and that they have the minimum required permissions. In addition, they have custom names. 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.

CancelPreviousCreate change setCreate stack

In the Specify stack details page, I name the stack “WebApp1-Static” and leave all else at its default settings. Clicking on Next takes me to the Configure stack options page, here I leave everything on its default settings and click on Next. I am then taken to the Review WebApp1-Static page.

CloudFormation > Stacks > Create stack

Step 1
Specify template

Step 2
Specify stack details

Step 3
Configure stack options

Step 4
Review

Review WebApp1-Static

Step 1: Specify template

Edit

Template

Template URL
https://s3-external-1.amazonaws.com/cf-templates-1n84jg1w6cvcs-us-east-1/2021129L1B-staticwebapp.yaml

Stack description
AWS CloudFormation Sample Template for a static web app. This template installs a highly-available, scalable web application deployment. It demonstrates using the AWS CloudFormation bootstrap scripts to deploy a stateless web application. ****WARNING**** You will be billed for the AWS resources created if you create a stack from this template. Copyright 2019-2020 Amazon.com, Inc. or its affiliates. All Rights Reserved. Licensed under the Apache License, Version 2.0 (the "License"). You may not use this file except in compliance with the License. A copy of the License is located at https://www.apache.org/licenses/LICENSE-2.0 or in the "license" file accompanying this file. This file is distributed on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.

Capabilities

The following resource(s) require capabilities: [AWS::IAM::InstanceProfile, AWS::IAM::Role]

This template contains Identity and Access Management (IAM) resources. Check that you want to create each of these resources and that they have the minimum required permissions. In addition, they have custom names. 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.

Cancel

Previous

Create change set

Create stack

From the Review WebApp1-Static page, I verify that I have inputted the correct information, once that is done, I click on Create stack after I have acknowledged what I am attempting to do.

CloudFormation > Stacks > WebApp1-Static

Stacks (2)

Filter by stack name

Active View nested

WebApp1-Static
2021-05-09 00:17:47 UTC-0700
CREATE_IN_PROGRESS

WebApp1-VPCC
2021-05-08 19:01:08 UTC-0700
CREATE_COMPLETE

WebApp1-Static

Delete Update Stack actions Create stack

Stack info Events Resources Outputs Parameters Template Change sets

Events (1)

Search events

Timestamp	Logical ID	Status	Status reason
2021-05-09 00:17:47 UTC-0700	WebApp1-Static	CREATE_IN_PROGRESS	User Initiated

The stack, WebApp1-Static is being created.

CloudFormation > Stacks > WebApp1-Static

Stacks (2)

Filter by stack name

Active View nested

WebApp1-Static
2021-05-09 00:17:47 UTC-0700
CREATE_COMPLETE

WebApp1-VPC
2021-05-08 19:01:08 UTC-0700
CREATE_COMPLETE

WebApp1-Static

Delete Update Stack actions Create stack

Stack info Events Resources **Outputs** Parameters Template Change sets

Outputs (1)

Search outputs

Key	Value	Description	Export name
WebsiteURL	http://WebApp1-Static-18KNPZV4UBWN-210491331.us-east-1.elb.amazonaws.com/index.html	Static Website	-

Hello World from i-08d00892cd78f90dc

After the WebApp1-Static stack has been created, I have a link that gives me access to a static website. It is a static Hello World website.

Hello World from i-0f3fdc65280cb6aff

Hello World from i-08d00892cd78f90dc

There are two EC2 instances hosting my static website; i-0f3fdc65280cb6aff and i-08d00892cd78f90dc.

AWS Management Console

AWS services

Recently visited services



EC2



Billing



New EC2 Experience

Tell us what you think



EC2 Dashboard New

Events

Tags

Limits

Resources

You are using the following Amazon EC2 resources

Instances (running)

2

New EC2 Experience

Tell us what you think



EC2 Dashboard New

Events

Tags

Limits

Instances

Instances New

Instances (2) [Info](#)



Connect

Instance state

Actions

Launch instances



Filter instances

< 1 >

Instance state: running

Clear filters

<input type="checkbox"/>	Name	Instance ID	Instance state	Instance type	Status check	Alarm status
<input type="checkbox"/>	WebApp1	i-0f3fdc65280cb6aff	Running	t3.micro	2/2 checks passed	No alarms
<input type="checkbox"/>	WebApp1	i-08d00892cd78f90dc	Running	t3.micro	2/2 checks passed	No alarms

For this step, I will attempt to shut one of the two instances; i-0f3fdc65280cb6aff and i08d00892cd78f90dc. down.

aws

Services

Search for services, features, marketplace products, and docs

[Alt+S]

Archie15

N. Virginia

Support

New EC2 Experience

EC2 Dashboard

Events

Tags

Limits

Instances

Instances (1/2)

Info

Filter instances

Instance state: running

Clear filters

	Name	Instance ID	Instance type	Status check	Alarm status
<input checked="" type="checkbox"/>	WebApp1	i-0f3fdc65280cb6aff	t3.micro	2/2 checks passed	No alarms
<input type="checkbox"/>	WebApp1	i-08d00892cd78f90dc	t3.micro	2/2 checks passed	No alarms

Connect

Instance state

Actions

Launch instances

Stop instance

Start instance

Reboot instance

Hibernate instance

Terminate instance

Stop instance?

Instance IDs

i-0f3fdc65280cb6aff (WebApp1)

The following instances are attached to an Auto Scaling group:

- i-0f3fdc65280cb6aff (WebApp1)

If you stop the instances, Amazon EC2 Auto Scaling might launch replacement instances automatically. If you do not want Amazon EC2 Auto Scaling to launch replacement instances, first detach the instances from the Auto Scaling group.

To confirm that you want to stop the instance, choose the *Stop* button below.

Cancel

Stop

New EC2 Experience

Successfully stopped i-0f3fdc65280cb6aff

I have chosen to stop instance; i-0f3fdc65280cb6aff.

New EC2 Experience

EC2 Dashboard

Events

Tags

Limits

Instances

Instances

Instance Types

EC2 > Target groups

Target groups (1)

Search or filter target groups

1

	Name	ARN	Port	Protocol	Target type
<input type="checkbox"/>	WebAp-ALB1T-MH27IR1TTE7M	arn:aws:elasticloadbalancin...	80	HTTP	Instance

EC2 > Target groups > WebAp-ALB1T-MH27IR1TTE7M

WebAp-ALB1T-MH27IR1TTE7M

arn:aws:elasticloadbalancing:us-east-1:32681043577:targetgroup/WebAp-ALB1T-MH27IR1TTE7M/bc00739e115abd3e

Details

Target type Instance	Protocol : Port HTTP: 80	Protocol version HTTP1	VPC vpc-0f8a918381cea721c
Load balancer WebAp-ALB1L-18KNPZV4UBWN			

Total targets	Healthy	Unhealthy	Unused	Initial	Draining
2	2	0	0	0	0

Targets

Monitoring

Health checks

Attributes

Tags

Add to dashboard

1h 3h 12h 1d 3d 1w custom

Unhealthy Hosts

Count

1

0.5

0

05:00 05:30 06:00 06:30 07:00 07:30

WebAp-ALB1T-MH27IR1TTE7M

Healthy Hosts

Count

2

1

0

05:00 05:30 06:00 06:30 07:00 07:30

WebAp-ALB1T-MH27IR1TTE7M

Target Response Time

Seconds

Requests

Count

Targets

Monitoring

Health checks

Attributes

Tags

Registered targets (2)

Filter resources by property or value

1

	Instance ID	Name	Port	Zone	Status	Status details
<input type="checkbox"/>	i-08d00892cd78f90dc	WebApp1	80	us-east-1a	healthy	
<input type="checkbox"/>	i-01040dab40e31f5f5	WebApp1	80	us-east-1b	healthy	

Next thing I do is head on over to load balancer to ensure that the traffic is only being sent to the remaining healthy instance; i-08d00892cd78f90dc.

Activity history (4)



Q Filter activity history

< 1 > ⚙

Status ▾	Description ▾	Cause
Successful	Launching a new EC2 instance: i-01040dab40e31f5f5	At 2021-05-09T07:43:06Z an instance was started in response to a difference between desired and actual capacity, increasing the capacity from 1 to 2.
Successful	Terminating EC2 instance: i-0f3fdc65280cb6aff	At 2021-05-09T07:42:46Z an instance was taken out of service in response to an EC2 health check indicating it has been terminated or stopped.
Successful	Launching a new EC2 instance: i-08d00892cd78f90dc	At 2021-05-09T07:20:19Z a user request update of AutoScalingGroup constraints to minimum size: 2 changing the desired capacity from 0 to 2. At 2021-05-09T07:20:20Z an instance was started in response to a difference between desired and actual capacity, increasing the capacity from 1 to 2.
Successful	Launching a new EC2 instance: i-0f3fdc65280cb6aff	At 2021-05-09T07:20:19Z a user request update of AutoScalingGroup constraints to minimum size: 2 changing the desired capacity from 0 to 2. At 2021-05-09T07:20:20Z an instance was started in response to a difference between desired and actual capacity, increasing the capacity from 1 to 2.

Another thing I want to do is also view the Activity History.