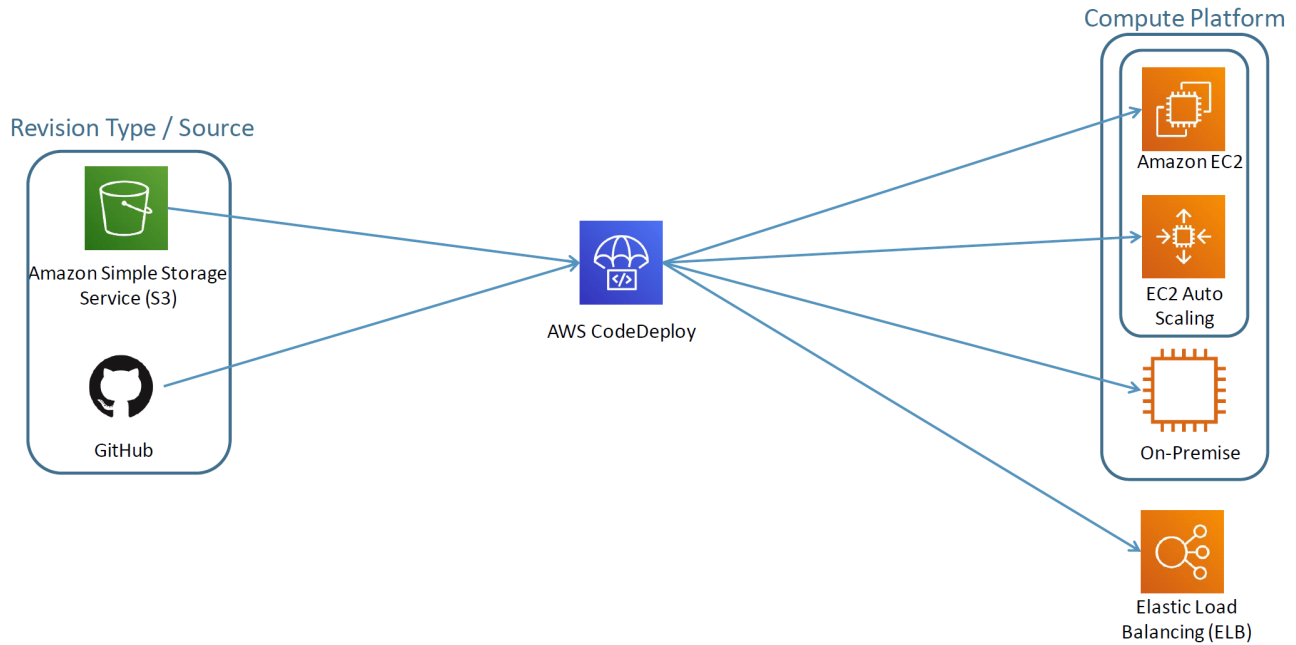


## 3. CI/CD in AWS - Part II

### Code Deploy

CodeDeploy is a development service that automates application deployments to EC2 instances, On-premises instances, AWS lambda, AWS ECS

New features can be released rapidly, avoiding downtime



### Pre-requisites

1. Create Service Role for CodeDeploy - To handle the EC2 instances
2. Create an IAM instance profile - For EC2 instance, which will have permission to access the S3 bucket to bring the artifact to the EC2

#### **Service Role**

IAM Service Create Role AWS Service CodeDeploy

# Select trusted entity

## Trusted entity type

☒ **AWS service**  
Allow AWS services like EC2, Lambda, or others to perform actions in this account.

☐ **AWS account**  
Allow entities in other AWS accounts belonging to you or a 3rd party to perform actions in this account.

☐ **Web identity**  
Allows users federated by the specified external web identity provider to assume this role to perform actions in this account.

☐ **SAML 2.0 federation**  
Allow users federated with SAML 2.0 from a corporate directory to perform actions in this account.

☐ **Custom trust policy**  
Create a custom trust policy to enable others to perform actions in this account.

## Use case

Allow an AWS service like EC2, Lambda, or others to perform actions in this account.

### Common use cases

- ☐ **EC2**  
Allows EC2 instances to call AWS services on your behalf.
- ☐ **Lambda**  
Allows Lambda functions to call AWS services on your behalf.

### Use cases for other AWS services:

CodeDeploy ▼

☒ **CodeDeploy**  
Allows CodeDeploy to call AWS services such as Auto Scaling on your behalf.

☐ **CodeDeploy for Lambda**  
Allows CodeDeploy to route traffic to a new version of an AWS Lambda function version on your behalf.

☐ **CodeDeploy - ECS**  
Allows CodeDeploy to read S3 objects, invoke Lambda functions, publish to SNS topics, and update ECS services on your behalf.

Cancel

Next

Add permissions

Permissions policies (1)

The type of role that you selected requires the following policy.

Policy name	Type	Attached entities
AWSCodeDeployRole	AWS ma...	0

AWSCodeDeployRole

Provides CodeDeploy service access to expand tags and interact with Auto Scaling on your behalf.

Copy

```
1 {
2   "Version": "2012-10-17",
3   "Statement": [
4     {
5       "Effect": "Allow",
6       "Action": [
7         "autoscaling:CompleteLifecycleAction",
8         "autoscaling:DeleteLifecycleHook",
9         "autoscaling:DescribeAutoScalingGroups",
10        "autoscaling:DescribeLifecycleHooks",
11        "autoscaling:PutLifecycleHook",
12        "autoscaling:RecordLifecycleActionHeartbeat",
13        "autoscaling:CreateAutoScalingGroup",
14        "autoscaling:UpdateAutoScalingGroup",
15        "autoscaling:EnableMetricsCollection",
16        "autoscaling:DescribePolicies",
17        "autoscaling:DescribeScheduledActions",
18        "autoscaling:DescribeNotificationConfigurations",
19        "autoscaling:SuspendProcesses",
20        "autoscaling:ResumeProcesses",
21        "autoscaling:AttachLoadBalancers",
22        "autoscaling:AttachLoadBalancerTargetGroups",
23        "autoscaling:PutScalingPolicy",
24        "autoscaling:PutScheduledUpdateGroupAction",
25        "autoscaling:PutNotificationConfiguration",
26        "autoscaling:PutWarmPool",
27        "autoscaling:DescribeScalingActivities",
28        "autoscaling:DeleteAutoScalingGroup",
29        "ec2:DescribeInstances",
30        "ec2:DescribeInstanceStatus"
```

Set permissions boundary - optional

Set a permissions boundary to control the maximum permissions this role can have. This is not a common setting, but you can use it to delegate permission management to others.

Role details

Role name

Enter a meaningful name to identify this role.

restapps-CodeDeploy-Service-role

Maximum 64 characters. Use alphanumeric and '+,=,@,-' characters.

Description

Add a short explanation for this role.

Allows CodeDeploy to call AWS services such as Auto Scaling on your behalf.

Maximum 1000 characters. Use alphanumeric and '+,=,@,-' characters.

Step 1: Select trusted entities

Edit

```
1 {
2   "Version": "2012-10-17",
3   "Statement": [
4     {
5       "Sid": "",
6       "Effect": "Allow",
7       "Principal": {
8         "Service": [
9           "codedeploy.amazonaws.com"
10        ]
11      },
12      "Action": [
13        "sts:AssumeRole"
14      ]
15    }
16  ]
17 }
```

Step 2: Add permissions

Edit

Permissions policy summary

Policy name	Type	Attached as
AWSCodeDeployRole	AWS managed	Permissions policy

Tags

No tags associated with the resource.

Add tag

You can add up to 50 more tags.

Add tags (Optional)

Tags are key-value pairs that you can add to AWS resources to help identify, organize, or search for resources.

CancelPreviousNextCancelPreviousCreate role

IAM Role

IAM Service Create Policy

IAM > Policies

Policies (960) Info

A policy is an object in AWS that defines permissions.

Filter policies by property or policy name and press enter

< 1 2 3 4 5 6 7 ... 48 > ⚙

Policy name	Type	Used as	Description
CodeBuildBasePolicy-demo-...	Customer ...	Permission...	Policy used in tru

Actions

Create policy

Visual editor JSON

Name\* `restapps-codedeploy-ec2-policy`

Description
-------------

Summary



No tags associated with the resource

## Trusted entity type

- Use case**  
Allow an AWS service like EC2, Lambda, or others to perform actions in this account.
- Common use cases**
- ☒ **EC2**  
Allows EC2 instances to call AWS services on your behalf.
  - ☐ **Lambda**  
Allows Lambda functions to call AWS services on your behalf.
- Use cases for other AWS services:**
- ☐ Choose a service to view use case

Cancel Next

Create policy

Filter policies by property or policy name and press enter 1 match < 1 > ⓘ

[illegible]

Set a permissions boundary to control the maximum permissions this role can have. This is not a common setting, but you can use it to delegate permission management to others.

Cancel Previous Next

[illegible]

```

1  # Create a 10x10 matrix of random values
2  N = 10
3  A = matrix(rnorm(N*N), nrow=N, ncol=N)
4
5  # Compute the eigenvalues and eigenvectors
6  E = eigen(A)
7
8  # Sort the eigenvalues in descending order
9  E = E[order(Re(E$values), decreasing=TRUE)]
10
11 # Print the sorted eigenvalues
12 print(E$values)
13
14 # Print the sorted eigenvectors
15 print(E$vectors)

```

Category	Value	Unit
Category 1	100	Unit 1
Category 2	200	Unit 2
Category 3	300	Unit 3
Category 4	400	Unit 4
Category 5	500	Unit 5
Category 6	600	Unit 6
Category 7	700	Unit 7
Category 8	800	Unit 8
Category 9	900	Unit 9
Category 10	1000	Unit 10

[illegible]

[Home](#)
[Privacy](#)
[Contact](#)

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Action": [
        "s3:Get**",
        "s3:List**"
      ],
      "Effect": "Allow",
      "Resource": "*"
    }
  ]
}
```

## Step 1: Create EC2 VM

### Step 1: Create EC2 VM

Instances [Info](#)

↻

Connect

Instance state ▼

Actions ▼

Launch instances


▼

🔍 Search


<

1


☐	Name ▼	Instance ID	Instance state ▼	Instance type ▼
<div>No instances</div> <div>You do not have any instances in this region</div> <div>Launch instances</div>				




Amazon Linux




Ubuntu




Windows




Red Hat



SUSE Linux



macOS



Browse more AMIs

Including AMIs from AWS, Marketplace and the Community

Amazon Machine Image (AMI)

Amazon Linux 2 AMI (HVM) - Kernel 5.10, SSD Volume Type

ami-0c6f7528ff583bf9a (64-bit (x86)) / ami-00b5f1c358708486 (64-bit (Arm))

Virtualization: hvm    ENA enabled: true    Root device type: ebs

Free tier eligible

Search

Amazon Linux 2 AMI (HVM) - Kernel 5.10, SSD Volume Type

ami-0c6f7528ff583bf9a (64-bit (x86)) / ami-00b5f1c358708486 (64-bit (Arm))

Virtualization: hvm    ENA enabled: true    Root device type: ebs

Free tier eligible

Amazon Linux 2 AMI (HVM) - Kernel 4.14, SSD Volume Type

ami-065efef2c739d613b (64-bit (x86)) / ami-09f0bb50202ca06b0 (64-bit (Arm))

Virtualization: hvm    ENA enabled: true    Root device type: ebs

Free tier eligible

Deep Learning AMI GPU PyTorch 1.12.0 (Amazon Linux 2) 20220727

ami-012fb2e1c5d400f97 (64-bit (x86))

Virtualization: hvm    ENA enabled: true    Root device type: ebs

▼ Advanced details Info

Purchasing option Info

☐ Request Spot Instances

Request Spot Instances at the Spot price, capped at the On-Demand price

Domain join directory Info

Select

Create new directory

IAM instance profile Info

restapps-CodeDeploy-InstanceProfileRole

Create new IAM profile

Hostname type Info

IP name

DNS Hostname Info

☒ Enable IP name IPv4 (A record) DNS requests

☒ Enable resource-based IPv4 (A record) DNS requests

▼ Network settings Get guidance

Edit

Network Info

vpc-051bd36f10e205ebb

Subnet Info

No preference (Default subnet in any availability zone)

Auto-assign public IP Info

Enable

Firewall (security groups) Info

A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.

☐ Create security group

☒ Select existing security group

Common security groups Info

Select security groups

Compare security groups

default-ssg1 sg-0978814ce6a1e87f5 X

VPC: vpc-051bd36f10e205ebb

Security groups that you add or remove here will be added to or removed from all your network interfaces.

**UserData** What needs to be in the VM, mentioned in the UserData. Region for code deploy is us-east-1 because the services are launched in us-east-1

```
#!/bin/bash
yum update
yum -y install ruby
yum -y install wget
yum -y erase java-1.7.0-openjdk.x86_64
yum -y install java-1.8.0-openjdk.x86_64
yum -y install java-1.8.0-openjdk-devel
sudo amazon-linux-extras install tomcat9
sudo systemctl enable tomcat
cd /home/ec2-user
wget https://aws-codedeploy-us-east-1.s3.amazonaws.com/latest/install
chmod +x ./install
./install auto
```

To SSH or Putty into the instance, a key-pair can be created like below,

Create key pair

We noticed that you didn't select a key pair. If you want to be able to connect to your instance it is recommended that you create one.

Key pairs allow you to connect to your instance securely.

Enter the name of the key pair below. When prompted, store the private key in a secure and accessible location on your computer. **You will need it later to connect to your instance.** [Learn more](#)

Create new key pair

Proceed without key pair

Key pair name

demo2024

The name can include up to 255 ASCII characters. It can't include leading or trailing spaces.

Key pair type

RSA

RSA encrypted private and public key pair

ED25519

ED25519 encrypted private and public key pair (Not supported for Windows instances)

Private key file format

.pem

For use with OpenSSH

.ppk

For use with PuTTY

Cancel

Create key pair

### Create CodeDeploy files and scripts

First we setup the CodeDeploy Application AWS CodeDeploy Service Applications

Developer Tools

CodeDeploy

Source • CodeCommit

Artifacts • CodeArtifact

Build • CodeBuild

▼

Deploy • CodeDeploy

Getting started

Deployments

Applications

Deployment configurations

On-premises instances

Pipeline • CodePipeline

Developer Tools > CodeDeploy > Applications

Applications

Notify

View details

Deploy application

Create application

<

1

>

Application name	Compute platform	Created
No results		
There are no results to display.		

Developer Tools > CodeDeploy > Applications > Create application

Create application

Application configuration

Application name

Enter an application name

rest-app

100 character limit

Compute platform

Choose a compute platform

EC2/On-premises

Cancel

Create application

## Deployment groups

[View details](#)[Edit](#)[Create deployment group](#)

< 1 > ⚙

Name	Status	Last attempted deployment	Last successful deployment	Trigger count
------	--------	---------------------------	----------------------------	---------------

No deployment groups

Before you can deploy your application using CodeDeploy, you must create a deployment group.

[Create deployment group](#)



## Deployment group name

Enter a deployment group name

100 character limit

## Service role

Enter a service role

Enter a service role with CodeDeploy permissions that grants AWS CodeDeploy access to your target instances.



## Deployment type

Choose how to deploy your application

☒ In-place

Updates the instances in the deployment group with the latest application revisions. During a deployment, each instance will be briefly taken offline for its update

☐ Blue/green

Replaces the instances in the deployment group with new instances and deploys the latest application revision to them. After instances in the replacement environment are registered with a load balancer, instances from the original environment are deregistered and can be terminated.

## Environment configuration

Select any combination of Amazon EC2 Auto Scaling groups, Amazon EC2 instances, and on-premises instances to add to this deployment

☐ Amazon EC2 Auto Scaling groups

☒ Amazon EC2 instances

1 unique matched instance. [Click here for details](#)

You can add up to three groups of tags for EC2 instances to this deployment group.

**One tag group:** Any instance identified by the tag group will be deployed to.

**Multiple tag groups:** Only instances identified by all the tag groups will be deployed to.

Tag group 1

Key



Value - optional



Remove tag

Add tag

+ Add tag group

☐ On-premises instances

## Matching instances

1 unique matched instance. [Click here for details](#)

#### Install AWS CodeDeploy Agent

- ☐ Never
- ☐ Only once
- ☒ Now and schedule updates

Basic scheduler Cron expression

14 Days

### Deployment settings

#### Deployment configuration

Choose from a list of default and custom deployment configurations. A deployment configuration is a set of rules that determines how fast an application is deployed and the success or failure conditions for a deployment.

CodeDeployDefault.AllAtOnce or Create deployment configuration

### Load balancer

Select a load balancer to manage incoming traffic during the deployment process. The load balancer blocks traffic from each instance while it's being deployed to and allows traffic to it again after the deployment succeeds.

☐ Enable load balancing

#### ▼ Advanced - optional

### Triggers

Delete trigger

Create trigger

	Name	Events	Type
<input type="radio"/>	restapp-deployment-trigger	DeploymentStart, DeploymentSuccess, DeploymentFailure, DeploymentStop, DeploymentReady, DeploymentRollback	AWS SNS

### Alarms

Delete alarm

Add alarm

Name

No Amazon CloudWatch alarms have been created for this deployment group

- ☐ Ignore alarm configuration  
Skips the step of checking Amazon CloudWatch alarms during the deployment process
- ☐ Continue deployment even if alarm status is unavailable  
Permits deployment to run when alarm data cannot be retrieved from Amazon Cloudwatch

### Rollbacks

Enable deployment rollbacks for this deployment group

- ☐ Roll back when a deployment fails
- ☐ Roll back when alarm thresholds are met
- ☒ Disable rollbacks

Create Deployment

Developer Tools > CodeDeploy > Applications > rest-app > dev-env

dev-env

EditDeleteCreate deployment

Deployment group details

Deployment group name	Application name	Compute platform
dev-env	rest-app	EC2/On-premises
Deployment type	Service role ARN	Deployment configuration
In-place	arn:aws:iam::481252253919:role/restapps-CodeDeploy-Service-role	CodeDeployDefault.AllAtOnce

Create deployment

Deployment settings

Application

rest-app

Deployment group

dev-env

Compute platform

EC2/On-premises

Deployment type

In-place

Revision type

☒ My application is stored in Amazon S3

☐ My application is stored in my local file system

Revision location

Copy and paste the Amazon S3 bucket where your revision is stored

s3://rest-apps-demo/devbuilds/demo-cb1


s3://bucket-name/folder/object.[zip|tar|tgz]


Revision file type

.zip

Developer tools / CodeDeploy / Deployments / d-0Q2WFXAYI


## d-0Q2WFXAYI

 [Copy deployment](#) [Retry deployment](#)

 The overall deployment failed because too many individual instances failed deployment, too few healthy instances are available for deployment, or some instances in your deployment group are experiencing problems.

### Deployment status


Installing application on your instances 1%

0 of 1 instances updated  Failed


### Deployment details

Application  
[rest-app](#)

Deployment ID  
d-0Q2WFXAYI

Status  
 Failed

arn:aws:ec2:us-east-1:481252253919:instance/i-0f8b9c01bf1c2f30a

 The CodeDeploy agent did not find an AppSpec file within the unpacked revision directory at revision-relative path **"appspec.yml"**. The revision was unpacked to directory `"/opt/codedeploy-agent/deployment-root/da28505c-28f4-4231-bea7-d2984a54f790/d-0Q2WFXAYI/deployment-archive"`, and the AppSpec file was expected but not found at path `"/opt/codedeploy-agent/deployment-root/da28505c-28f4-4231-bea7-d2984a54f790/d-0Q2WFXAYI/deployment-archive/appspec.yml"`. Consult the AWS CodeDeploy Appspec documentation for more information at <http://docs.aws.amazon.com/codedeploy/latest/userguide/reference-appspec-file.html>  
[View more.](#)

### Deployment details

Application  
[rest-app](#)

**Step 1:** Create `appspec.yml` – which execute the scripts while deploying

Create `appspec.yml`, and add it in the project folder

**i** version: 0.0  
os: linux  
files:  
- source: target/demo.war  
destination: /usr/share/tomcat/webapps/  
hooks:  
BeforeInstall:  
- location: scripts/before\_install.sh  
timeout: 300  
runas: root  
AfterInstall:  
- location: scripts/after\_install.sh  
timeout: 300  
runas: root  
ApplicationStart:  
- location: scripts/start\_server.sh  
timeout: 300  
runas: root  
ApplicationStop:  
- location: scripts/stop\_server.sh  
timeout: 300  
runas: root

**Step 2:** Create a `script` folder in the project directory, add before\_install script, start-up script, shutdown script in the Script folder

**i** **before\_install Script**

```
#!/bin/bash
rm -rf /usr/share/tomcat/webapps/demo*

after_install Script
```

**start\_server Script**

```
#!/bin/bash
sudo systemctl start tomcat
```

**stop\_server Script**

```
#!/bin/bash
isExistApp=`pgrep java`
if [[ -n $isExistApp ]]; then
    sudo systemctl stop tomcat
fi
```

**Step 3: Create Deployment**

Developer Tools > CodeDeploy > Applications > rest-app > dev-env

dev-env Edit Delete Create deployment

**Deployment group details**

Deployment group name dev-env	Application name rest-app	Compute platform EC2/On-premises
Deployment type In-place	Service role ARN arn:aws:iam::481252253919:role/restapps-CodeDeploy-Service-role	Deployment configuration CodeDeployDefault.AllAtOnce
Rollback enabled False	Agent update scheduler <a href="#">Learn to schedule update in AWS Systems Manager</a>	

**Environment configuration: Amazon EC2 instances**

Key	Value
-----	-------

Deployment settings

Application

rest-app

Deployment group

Q

dev-env

×

Compute platform

EC2/On-premises

Deployment type

In-place

Revision type

☒ My application is stored in Amazon S3

☐ My application is stored in GitHub

Revision location

Copy and paste the Amazon S3 bucket where your revision is stored

Q

s3://rest-apps-demo/devbuilds/demo-cb1

×

s3://bucket-name/folder/object.[zip|tar|tgz]

Revision file type

.zip

▼

d-K4JIMFTYI

↻

Copy deployment

Deployment status

Installing application on your instances

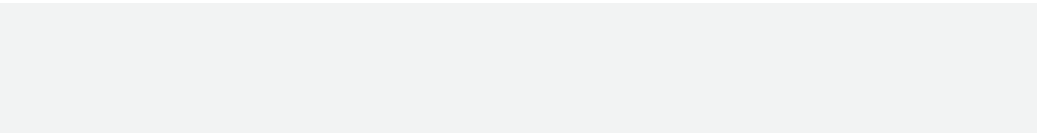
100%

1 of 1 instances updated ✔ Succeeded

Deployment details

Application	Deployment ID	Status
rest-app	d-K4JIMFTYI	<span>✔ Succeeded</span>
Deployment configuration	Deployment group	Initiated by
CodeDeployDefault.AllAtOnce	dev-env	User action
Deployment description		
-		

**Step 4:** App can be accessed on `{public ip of ec2 instance} : {tomcat-portnumber} / {projectname} / {api}`



**Instance: i-02238f3c35d4af1f3 (sample instance)**

Details

Security

Networking

Storage

Status checks

Monitoring

Tags

▼ Instance summary [Info](#)

Instance ID

📄

i-02238f3c35d4af1f3 (sample instance)

IPv6 address

-

Public IPv4 address

📄

54.87.233.255 [open address](#) [🔗](#)

Instance state

✔ Running



⚠ Not secure | 54.87.233.255:8080/demo/hello

MW Github Deployment App Dev Tasks

---

Hi from Project - v5