

DevOps-challenge

This repo is a DevOps challenge to deploy an application in Amazon EKS cluster.

Steps for deploying the cluster using EKS:

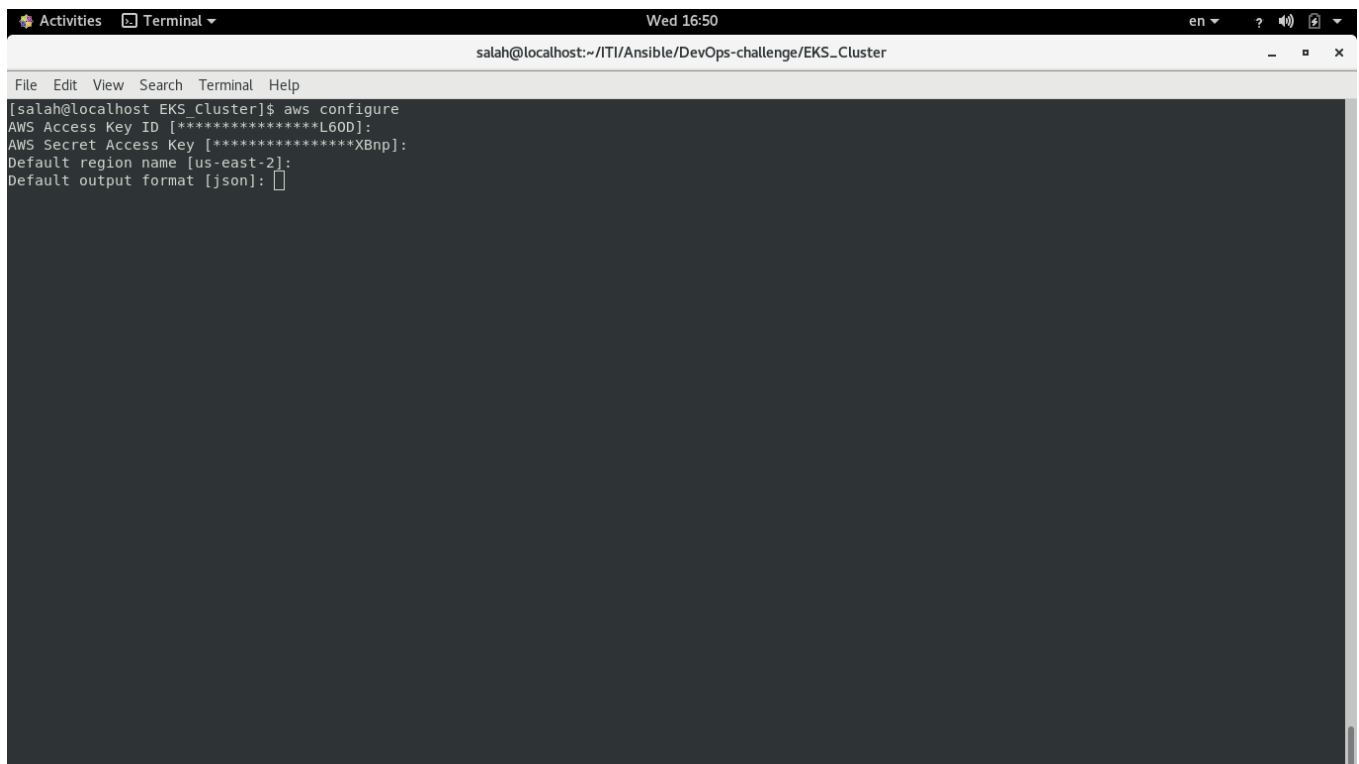
1- Implement and configure an EKS cluster on AWS using infrastructure as a code.

- install terraform
- install awscli
- install AWS IAM Authenticator
- install WGET
- Install Kubectl

2- Setting up AWS IAM users for Terraform:

- create an AWS IAM user and give it:
 - AdministratorAccess
 - AmazonEKSClusterPolicy

After these steps, AWS will provide you a Secret Access Key and Access Key ID. Save them preciousy because this will be the only time AWS gives it to yo
Configure AWS CLI to use your credentials

A terminal window titled 'salah@localhost:~/ITI/Ansible/DevOps-challenge/EKS_Cluster' showing the execution of the 'aws configure' command. The command prompts for the AWS Access Key ID, Secret Access Key, default region name, and default output format. The user has entered '*****L60D' for the Access Key ID and '*****XBnp' for the Secret Access Key. The region is 'us-east-2' and the output format is 'json'.

```
salah@localhost EKS_Cluster]$ aws configure
AWS Access Key ID [*****L60D]:
AWS Secret Access Key [*****XBnp]:
Default region name [us-east-2]:
Default output format [json]:
```

After you've done this, initialize your Terraform workspace, which will download the provider and initialize it with the values provided in the **terraform.tfvars** file by running

\$ terraform init

A terminal window titled 'salah@localhost:~/ITI/Ansible/DevOps-challenge/EKS_Cluster' showing the output of the 'terraform init' command. It lists the initialization of provider plugins (hashicorp/template, hashicorp/kubernetes, hashicorp/aws, hashicorp/random, hashicorp/local, hashicorp/null) and displays a warning about deprecated interpolation-only expressions. It also provides instructions on how to silence the warning and how to use template interpolation syntax. The command concludes with 'Terraform has been successfully initialized!' and a prompt to run 'terraform plan' to see any changes required.

```
salah@localhost EKS_Cluster]$ terraform init

Initializing provider plugins...
- Using previously-installed hashicorp/template v2.2.0
- Using previously-installed hashicorp/kubernetes v1.13.3
- Using previously-installed hashicorp/aws v3.17.0
- Using previously-installed hashicorp/random v2.3.1
- Using previously-installed hashicorp/local v1.4.0
- Using previously-installed hashicorp/null v2.1.2

Warning: Interpolation-only expressions are deprecated

on .terraform/modules/vpc/outputs.tf line 353, in output "vpc_endpoint_sqs_id":
353:   value      = "${element(concat(aws_vpc_endpoint_sqs.*.id, list("")), 0)}"

Terraform 0.11 and earlier required all non-constant expressions to be
provided via interpolation syntax, but this pattern is now deprecated. To
silence this warning, remove the "${ sequence from the start and the }"
sequence from the end of this expression, leaving just the inner expression.

Template interpolation syntax is still used to construct strings from
expressions when the template includes multiple interpolation sequences or a
mixture of literal strings and interpolations. This deprecation applies only
to templates that consist entirely of a single interpolation sequence.

(and 11 more similar warnings elsewhere)

Terraform has been successfully initialized!

You may now begin working with Terraform. Try running "terraform plan" to see
any changes that are required for your infrastructure. All Terraform commands
should now work.

If you ever set or change modules or backend configuration for Terraform,
rerun this command to reinitialize your working directory. If you forget, other
commands will detect it and remind you to do so if necessary.
[salah@localhost EKS_Cluster]$
```

Provision your EKS cluster by running

```
$ terraform apply
```

```

data.aws_eks_cluster_auth.cluster: Reading...
data.aws_eks_cluster.cluster: Reading...
data.aws_eks_cluster_auth.cluster: Read complete after 0s [id=challenge-eks-oGMbLHKa]
data.aws_eks_cluster.cluster: Read complete after 1s [id=challenge-eks-oGMbLHKa]
module.eks.kubernetes_config_map.aws_auth[0]: Creating...
module.eks.kubernetes_config_map.aws_auth[0]: Creation complete after 1s [id=kube-system/aws-auth]

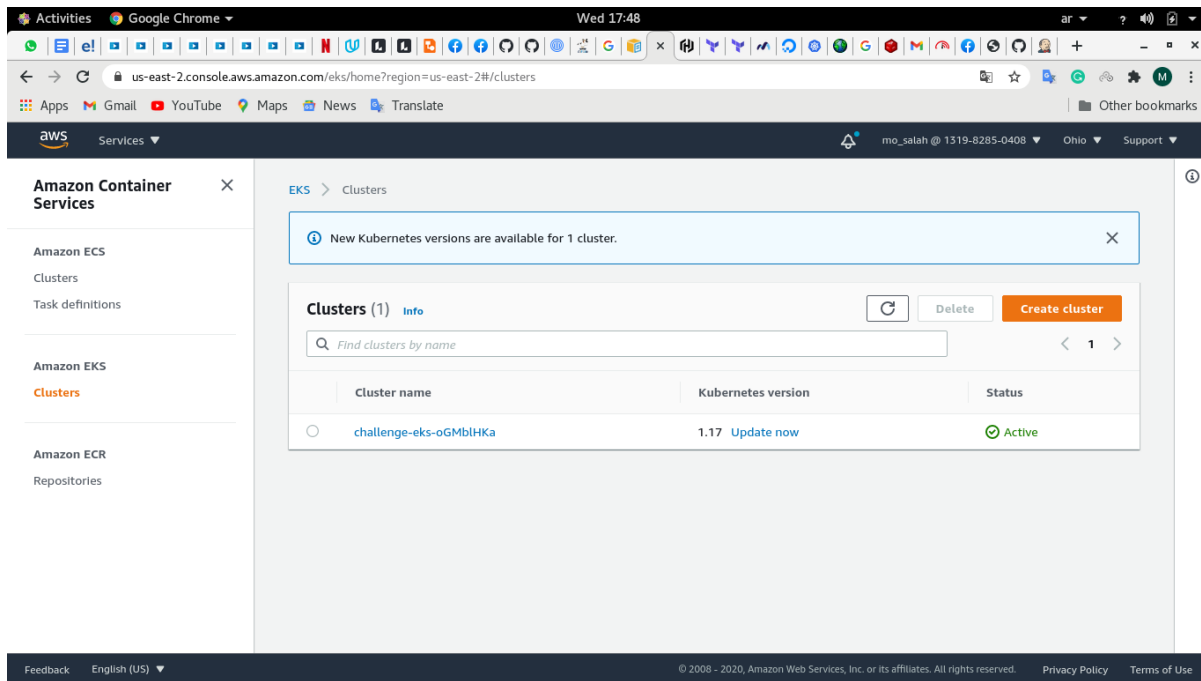
Apply complete! Resources: 49 added, 4 changed, 0 destroyed.

Outputs:

cluster_endpoint = https://4653B709FA05BBC4932EC726196980B6.gr7.us-east-2.eks.amazonaws.com
cluster_id = challenge-eks-oGMbLHKa
cluster_name = challenge-eks-oGMbLHKa
cluster_security_group_id = sg-0c96d2803247e8cbe
config_map_aws_auth = [
  {
    "data" = {
      "mapAccounts" = "[]\n"
      "mapRoles" = "- \"groups\":\n - \"system:bootstrappers\"\n - \"system:nodes\"\n \"rolearn\": \"arn:aws:iam::131982850408:role/challenge-eks-oGMbLHKa2020112515373568740000000c\"\n \"username\": \"system:node:{{EC2PrivateDNSName}}\"\n\n"
      "mapUsers" = "[]\n"
    }
    "id" = "kube-system/aws-auth"
    "metadata" = [
      {
        "generate_name" = ""
        "generation" = 0
        "labels" = {
          "app.kubernetes.io/managed-by" = "Terraform"
          "terraform.io/module" = "terraform-aws-modules.eks.aws"
        }
        "name" = "aws-auth"
        "namespace" = "kube-system"
        "resource_version" = "1362"
        "self_link" = "/api/v1/namespaces/kube-system/configmaps/aws-auth"
        "uid" = "18c0ad9e-fcda-417a-9222-abcf7edec09b"
      }
    ]
  }
]

```

- In AWS console



Activities Google Chrome Wed 17:48

us-east-2.console.aws.amazon.com/eks/home?region=us-east-2#/clusters

Amazon Container Services

Amazon ECS
Clusters
Task definitions

Amazon EKS
Clusters

Amazon ECR
Repositories

EKS > Clusters

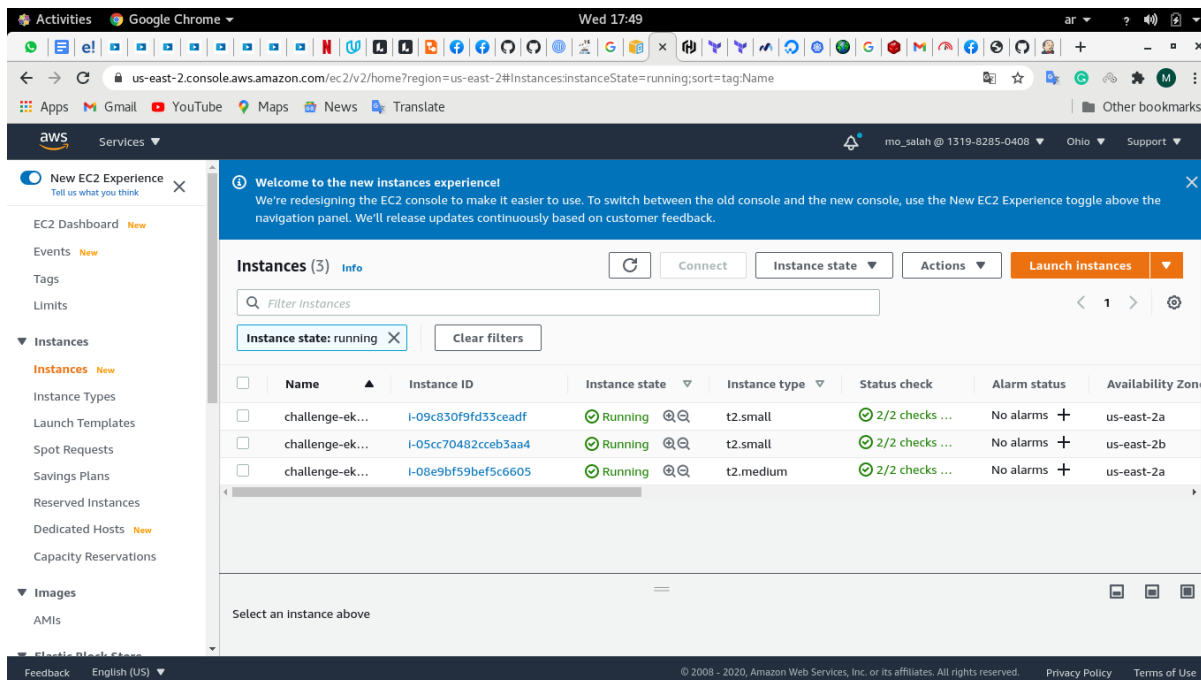
New Kubernetes versions are available for 1 cluster.

Clusters (1) Info

Find clusters by name

Cluster name	Kubernetes version	Status
challenge-eks-oGMBIHka	1.17 Update now	Active

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Activities Google Chrome Wed 17:49

us-east-2.console.aws.amazon.com/ec2/v2/home?region=us-east-2#Instances:instanceState=running;sort=tag:Name

Amazon EC2

New EC2 Experience

EC2 Dashboard
Events
Tags
Limits

Instances

Instances
Instance Types
Launch Templates
Spot Requests
Savings Plans
Reserved Instances
Dedicated Hosts
Capacity Reservations

Images
AMIs

Welcome to the new instances experience! We're redesigning the EC2 console to make it easier to use. To switch between the old console and the new console, use the New EC2 Experience toggle above the navigation panel. We'll release updates continuously based on customer feedback.

Instances (3) Info

Filter Instances

Instance state: running

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone
challenge-ek...	I-09c830f9fd33ceadf	Running	t2.small	2/2 checks ...	No alarms	us-east-2a
challenge-ek...	I-05cc70482cceb3aa4	Running	t2.small	2/2 checks ...	No alarms	us-east-2b
challenge-ek...	I-08e9bf59bef5c6605	Running	t2.medium	2/2 checks ...	No alarms	us-east-2a

Select an instance above

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configure kubectl:

This command will get the access credentials for your cluster and automatically configure kubectl.

```
$ aws eks --region us-east-2 update-kubeconfig --name challenge-eks-oGMbIHKa
```

- ** Implement the needed DevOps tools to create CICD pipeline (Jenkins, SonarQube, Nexus, etc. ...) using ansible or any other configuration management tool on the created k8s cluster

```
** install openshift
```

```
** install ansible
```

```
** RUN $ ansible-playbook roles.yaml
```

```

File Edit View Search Terminal Help
salah@localhost:~/ITI/Ansible/DevOps-challenge/roles

In File ~/home/salah/.local/lib/python3.6/site-packages/urllib3/connectionpool.py, line 760, in urlopen: **response kw\n
File ~/home/salah/.local/lib/python3.6/site-packages/urllib3/connectionpool.py, line 760, in urlopen: **response kw\n
File ~/home/salah/.local/lib/python3.6/site-packages/urllib3/connectionpool.py, line 760, in urlopen: **response kw\n
File ~/home/salah/.local/lib/python3.6/site-packages/urllib3/connectionpool.py, line 720, in urlopen: method, url, error, pool=self, stacktrace=sys.exc_info()[2]\n
File ~/home/salah/.local/lib/python3.6/site-packages/urllib3/util/retry.py, line 430, in increment: raise MaxRetryError(pool, url, error or ResponseError(cause))\n
urllib3.exceptions.MaxRetryError: HTTPConnectionPool(host='9a47539e51920541ad7e9b66-8397adf.gr7.us-east-2.eks.amazonaws.com', port=443): Max retries exceeded with url: /v1/version (Caused by NewConnectionError('<urllib3.connection.VerifiedHTTPSConnection object at 0x7f533938dc88>: Failed to establish a new connection: [Errno -2] Name or service not known'))\n", "module_stdout": "", "msg": "MODULE FAILURE\nSee stdout/stderr for the exact error", "rc": 1)

PLAY RECAP *****
localhost                : ok=1   changed=0    unreachable=0    failed=1    skipped=0    rescued=0    ignored=0

[salah@localhost roles]$ ansible-playbook roles.yaml
[WARNING]: No inventory was parsed, only implicit localhost is available
[WARNING]: provided hosts list is empty, only localhost is available. Note that the implicit localhost does not match 'all'

PLAY [localhost] *****

TASK [Gathering Facts] *****
ok: [localhost]

TASK [namespace : Create test namespace] *****
changed: [localhost]

TASK [jenkins : jenkins_deployment] *****
changed: [localhost]

TASK [nexus : nexus_deployment] *****
changed: [localhost]

TASK [sonarQube : sonarQube_deployment] *****
changed: [localhost]

PLAY RECAP *****
localhost                : ok=5   changed=4    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

[salah@localhost roles]$

```

** to see running pods

\$ kubectl get po -n test

```
Activities Terminal Wed 18:23
salah@localhost:~/ITI/Ansible/DevOps-challenge/EKS_Cluster

File Edit View Search Terminal Help
[salah@localhost EKS_Cluster]$ kubectl get po -n test
NAME                                READY    STATUS    RESTARTS   AGE
jenkins-deployment-759b989cf4-m2bls 1/1      Running   0           2m7s
jenkins-deployment-759b989cf4-s5bp8 1/1      Running   0           2m7s
nexus-deployment-848b7b9755-5brft 1/1      Running   0           2m2s
nexus-deployment-848b7b9755-jgcjb 0/1      Pending   0           2m2s
sonarqube-deployment-6f8cc74748-r2pzx 1/1      Running   0           116s
sonarqube-deployment-6f8cc74748-rs9gx 1/1      Running   0           116s
[salah@localhost EKS_Cluster]$
```

To show services find it by

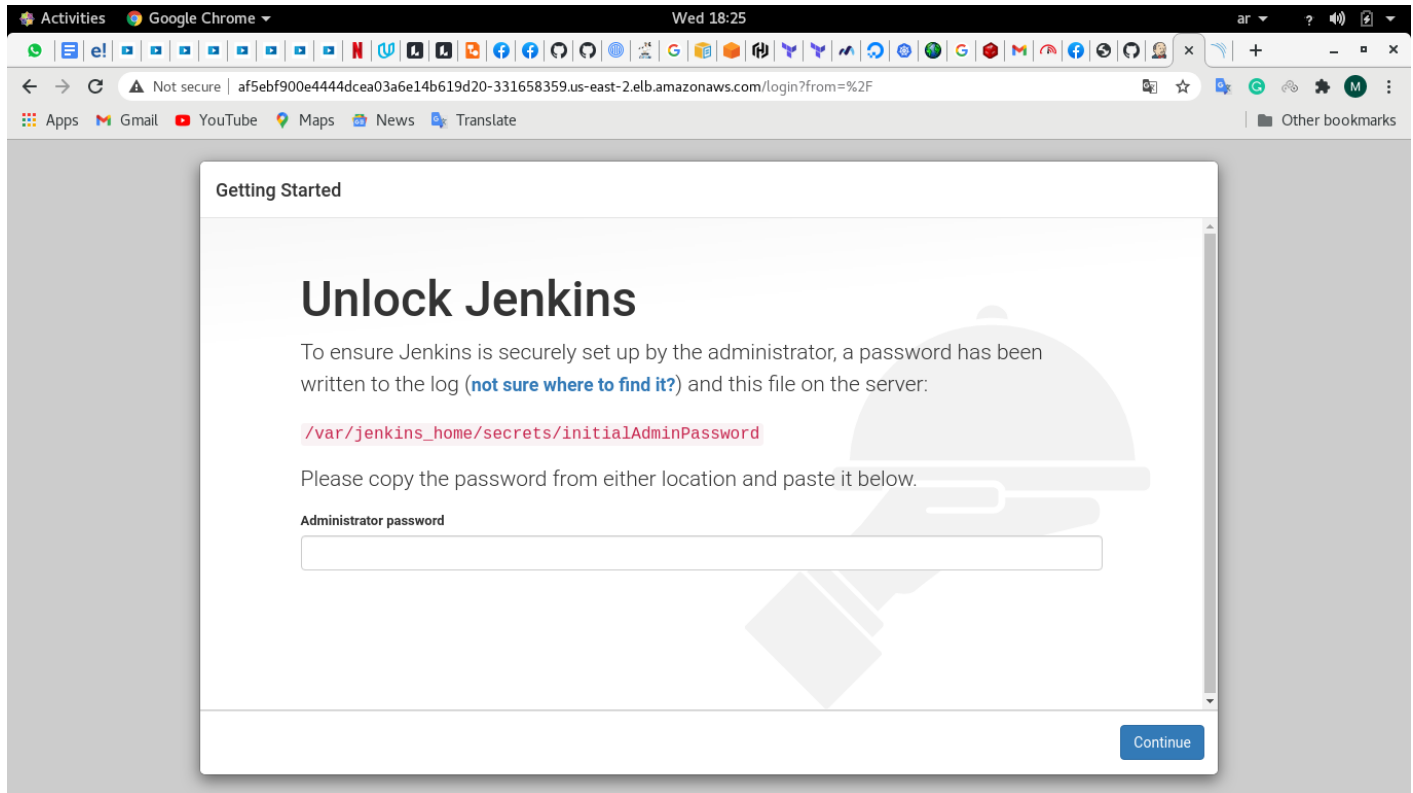
\$ kubectl get svc -n test

```
Activities Terminal Wed 19:10
salah@localhost:~/ITI/Ansible/DevOps-challenge/EKS_Cluster

File Edit View Search Terminal Help
[salah@localhost EKS_Cluster]$ kubectl get po -n test
NAME                                READY    STATUS    RESTARTS   AGE
jenkins-deployment-759b989cf4-m2bls 1/1      Running   0           2m7s
jenkins-deployment-759b989cf4-s5bp8 1/1      Running   0           2m7s
nexus-deployment-848b7b9755-5brft 1/1      Running   0           2m2s
nexus-deployment-848b7b9755-jgcjb 0/1      Pending   0           2m2s
sonarqube-deployment-6f8cc74748-r2pzx 1/1      Running   0           116s
sonarqube-deployment-6f8cc74748-rs9gx 1/1      Running   0           116s
[salah@localhost EKS_Cluster]$ kubectl get svc -n test
NAME      TYPE      CLUSTER-IP      EXTERNAL-IP      PORT(S)      AGE
jenkins   LoadBalancer 172.20.203.221   af5ebf900e4444dcea03a6e14b619d20-331658359.us-east-2.elb.amazonaws.com 80:30327/TCP 2m56s
nexus     LoadBalancer 172.20.77.157    ab34ec509510a470db95dd1d81dc090d-708550953.us-east-2.elb.amazonaws.com 80:32059/TCP 2m51s
sonarqube LoadBalancer 172.20.34.223    ac1873cd6e0bf47308688c75506ea289-95454528.us-east-2.elb.amazonaws.com 80:31659/TCP 2m45s
[salah@localhost EKS_Cluster]$ ^C
[salah@localhost EKS_Cluster]$ kubectl get svc -n test
NAME      TYPE      CLUSTER-IP      EXTERNAL-IP      PORT(S)      AGE
jenkins   LoadBalancer 172.20.203.221   af5ebf900e4444dcea03a6e14b619d20-331658359.us-east-2.elb.amazonaws.com 80:30327/TCP 12m
nexus     LoadBalancer 172.20.77.157    ab34ec509510a470db95dd1d81dc090d-708550953.us-east-2.elb.amazonaws.com 80:32059/TCP 12m
sonarqube LoadBalancer 172.20.34.223    ac1873cd6e0bf47308688c75506ea289-95454528.us-east-2.elb.amazonaws.com 80:31659/TCP 12m
[salah@localhost EKS_Cluster]$ kubectl get svc -n test
NAME      TYPE      CLUSTER-IP      EXTERNAL-IP      PORT(S)      AGE
jenkins   LoadBalancer 172.20.203.221   af5ebf900e4444dcea03a6e14b619d20-331658359.us-east-2.elb.amazonaws.com 80:30327/TCP 25m
nexus     LoadBalancer 172.20.77.157    ab34ec509510a470db95dd1d81dc090d-708550953.us-east-2.elb.amazonaws.com 80:32059/TCP 25m
sonarqube LoadBalancer 172.20.34.223    ac1873cd6e0bf47308688c75506ea289-95454528.us-east-2.elb.amazonaws.com 80:31659/TCP 25m
[salah@localhost EKS_Cluster]$
```

** By External -IP you can access all services

- Jenkins



-Nexus

Activities

Google Chrome

Wed 18:47

en

Not secure

ab34ec509510a470db95dd1d81dc090d-708550953.us-east-2.elb.amazonaws.com

Apps

Gmail

YouTube

Maps

News

Translate

Other bookmarks

Sonatype Nexus Repository Manager

OSS 3.28.1-01

Search components

Sign In

Browse

Welcome

Search

Browse

Welcome

Learn about Sonatype Nexus Repository Manager

Get Started

Configuration

Set things up properly

Documentation

Visit our help site

Community

Ask and answer questions

Repository Formats

APT

Composer*

Conan

CPAN*

Docker

ELPA*

Git LFS

GO Go

Helm

Maven

npm

NuGet

p2

PyPI

R

Raw

RubyGems

Yum

* Community supported

Be careful what you commit

11% of components used in applications are known to be vulnerable.

LEARN MORE

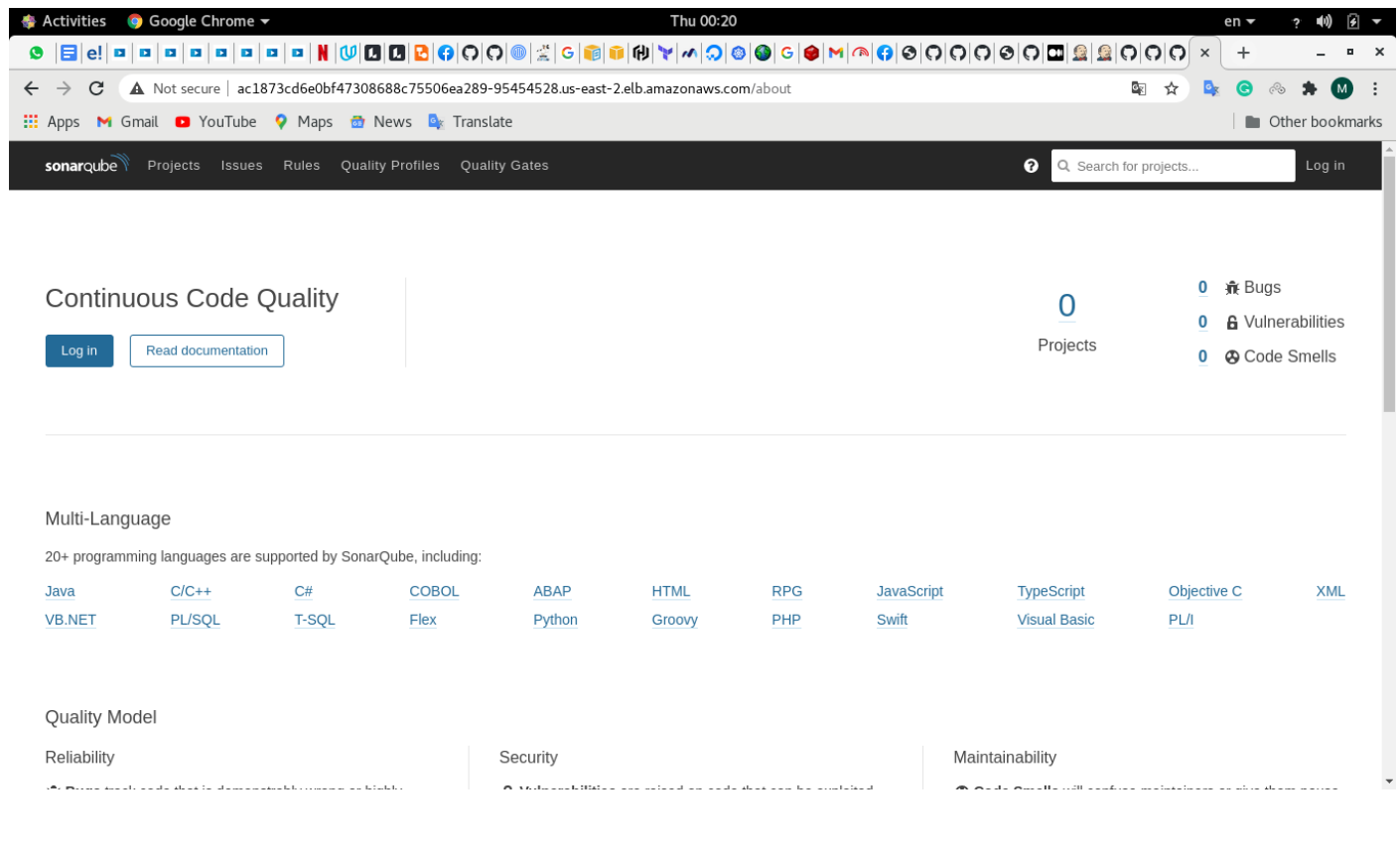
Nexus Repository Pro

Repository staging, dynamic storage for blob stores, & enterprise support.

Try Pro

https://help.sonatype.com/display/NXRM3/Raw+Repositories

-SonarQube



3) Implementation a CICD pipeline for any application using the tools and the platform implemented from the previous steps this pipeline should be using groovy scripting jenkins file.

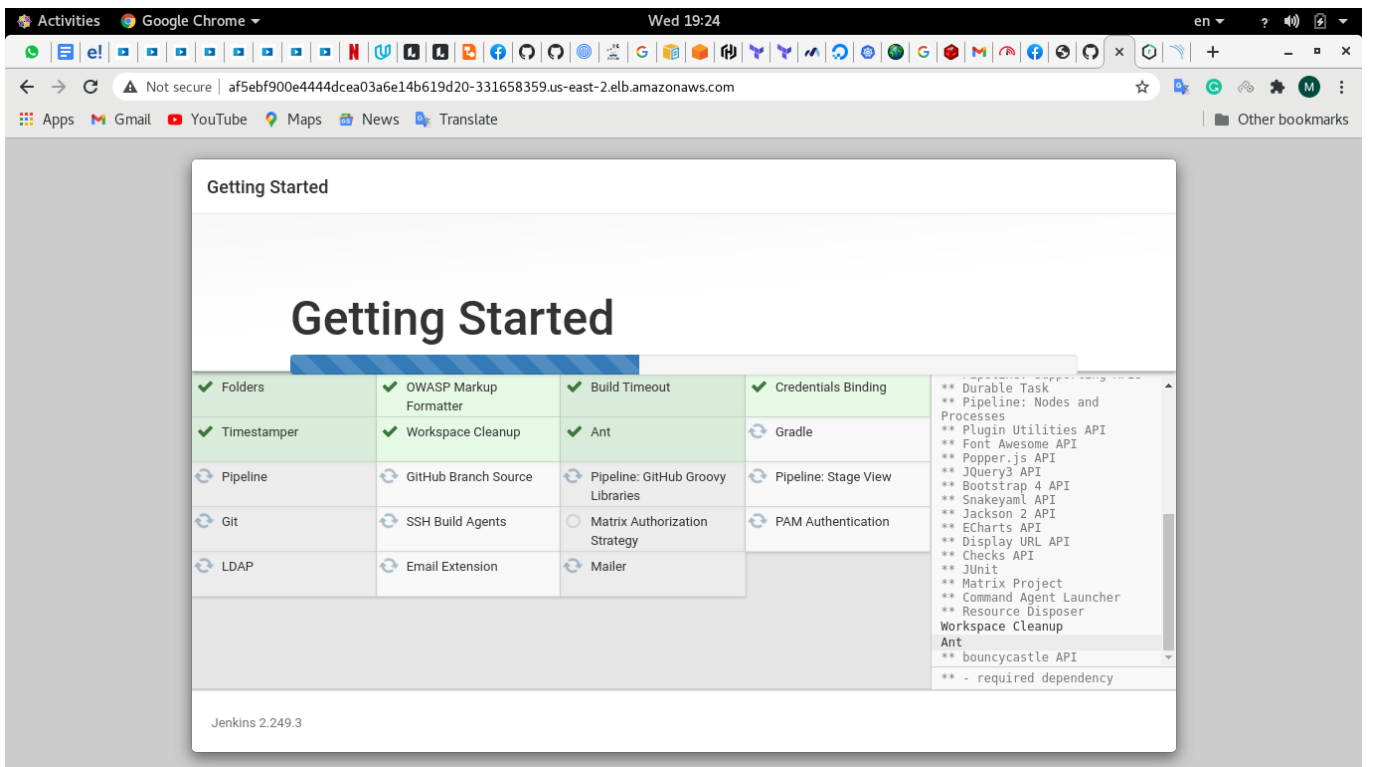
**** Configure jenkins to create CI/CD pipeline**

```
$ kubectl exec -n test pod name -- cat /var/jenkins_home/secrets/initialAdminPassword
```

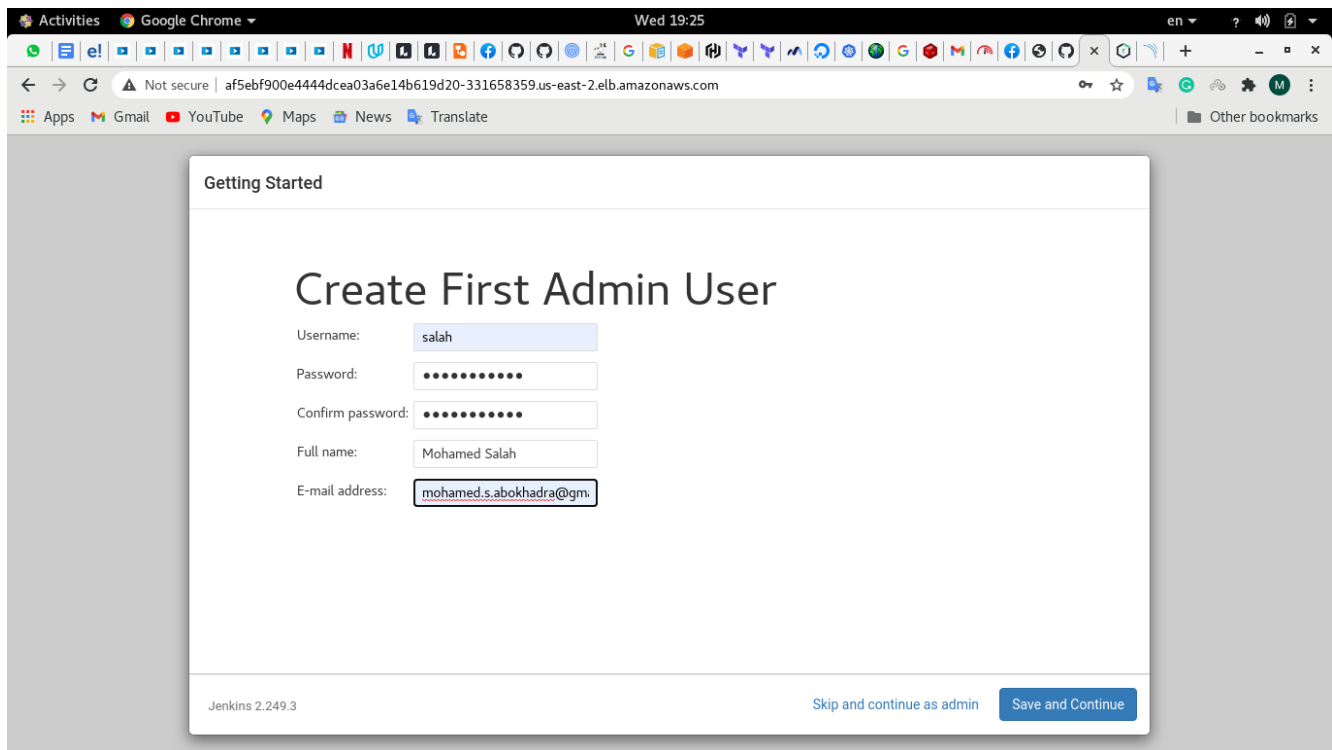
```
Activities Terminal Wed 19:22
salah@localhost:~/ITI/Ansible/DevOps-challenge/EKS_Cluster

[salah@localhost EKS_Cluster]$ kubectl exec -n test jenkins-deployment-759b989cf4-m2bls -- cat /var/jenkins_home/secrets/initialAdminPassword
289f971a8ee54cf6998f672cb00225a5
[salah@localhost EKS_Cluster]$
```

- Install plugins



- Create user

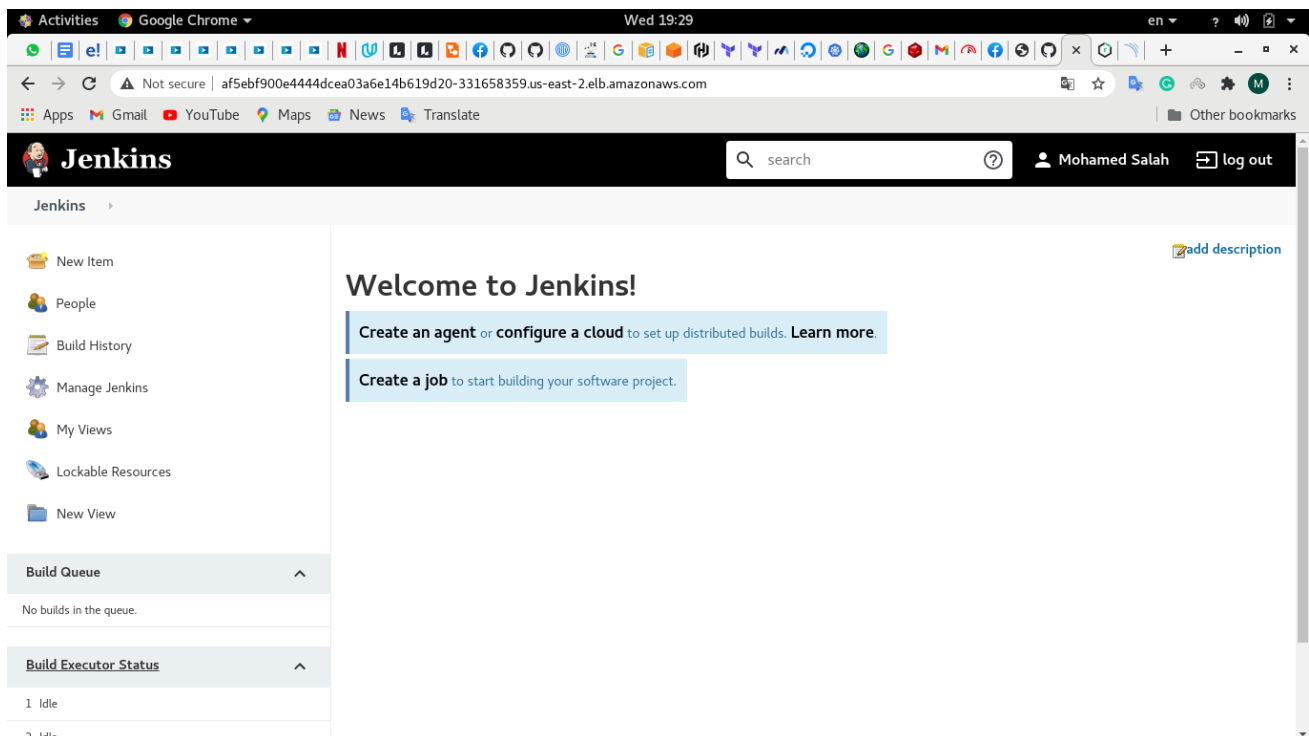


The screenshot shows the Jenkins 'Getting Started' page in a Google Chrome browser. The page title is 'Getting Started' and the main heading is 'Create First Admin User'. The form contains the following fields:

- Username: salah
- Password: (masked with dots)
- Confirm password: (masked with dots)
- Full name: Mohamed Salah
- E-mail address: mohamed.s.abokhadra@gm.

At the bottom of the form, there is a 'Jenkins 2.249.3' label and two buttons: 'Skip and continue as admin' and 'Save and Continue'.

- Jenkins dashboard



The screenshot shows the Jenkins dashboard in a Google Chrome browser. The top navigation bar includes the Jenkins logo, a search bar, and a user profile for 'Mohamed Salah' with a 'log out' button. The main content area is titled 'Welcome to Jenkins!' and contains two blue boxes with instructions:

- Create an agent or configure a cloud to set up distributed builds. [Learn more.](#)
- Create a job to start building your software project.

The left sidebar contains a list of links: 'New Item', 'People', 'Build History', 'Manage Jenkins', 'My Views', 'Lockable Resources', and 'New View'. Below these links, there are two sections: 'Build Queue' (showing 'No builds in the queue.') and 'Build Executor Status' (showing two idle executors).

- Add credentials

The screenshot shows the Jenkins web interface in Google Chrome. The browser address bar shows a URL from Amazon AWS. The Jenkins header includes a search bar and user information (admin, log out). The breadcrumb trail is: Dashboard > Credentials > System > Global credentials (unrestricted). The left sidebar has links for 'Back to credential domains' and 'Add Credentials'. The main content area is titled 'Global credentials (unrestricted)' and contains a table of credentials.

ID	Name	Kind	Description
dockerhup	mohamedabokhadra/*****	Username with password	

Icon: [S](#) [M](#) [L](#)

REST API Jenkins 2.268

** Create jenkinsfile

** Install Python 3, Ansible, and the openshift module on jenkins :

```
$ sudo apt update && sudo apt install -y python3 && sudo apt install -y python3-pip && sudo pip3  
install ansible && sudo pip3 install openshift
```

** Install docker CLI

** Create pipeline from jenkins dashboard

** Build The pipeline