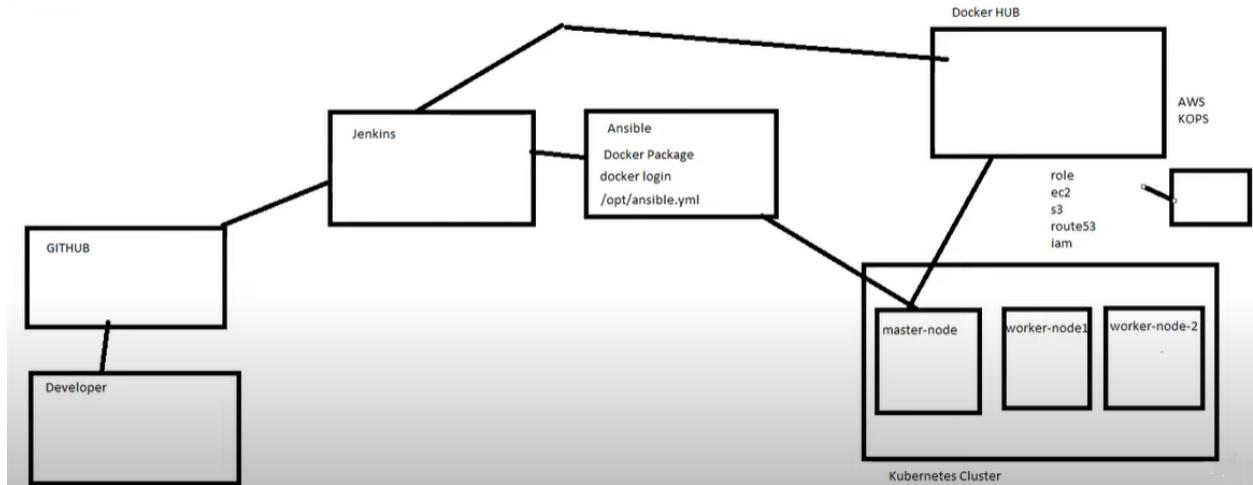


EPAM Project

-----by anjana

Objective :



Terraform code to create 3 EC2 Instances

main.tf

```
terraform {  
    required_providers {  
        aws = {  
            source  = "hashicorp/aws"  
            version = "~> 4.0"  
        }  
    }  
    backend "s3" {  
        bucket="mybackupbucket13"  
        encrypt=true  
        key="terraform.tfstate"  
        region   = "ap-south-1"  
    }  
}  
provider "aws" {  
    region      = "ap-south-1"  
}  
  
resource "aws_vpc" "mainvpc" {  
    cidr_block = "10.1.0.0/16"  
}
```

```

resource "aws_security_group" "cw_sg_ssh" {
  name = "cw-blog-3-sg-using-terraform"
  #Incoming traffic
  ingress {
    from_port = 22
    to_port = 22
    protocol = "tcp"
    cidr_blocks = ["0.0.0.0/0"] #replace it with your ip address
  }
  ingress {
    from_port = 80
    to_port = 80
    protocol = "tcp"
    cidr_blocks = ["0.0.0.0/0"] #replace it with your ip address
  }

  #Outgoing traffic
  egress {
    from_port = 0
    protocol = "-1"
    to_port = 0
    cidr_blocks = ["0.0.0.0/0"]
  }
}

resource "aws_instance" "my-machine" {
  count = 3
  # Creates four identical aws ec2 instances
  # All four instances will have the same ami and instance_type
  ami = "ami-076e3a557efef1aa9c"
  instance_type = "t2.micro"
  security_groups = ["cw-blog-3-sg-using-terraform"]

  tags = {
    # The count.index allows you to launch a resource

    # starting with the distinct index number 0 and corresponding to this
    instance.
    Name = "my-machine-${count.index}"
  }
}

resource "aws_cloudwatch_metric_alarm" "disk_percentage_low" {
  for_each           = toset(var.instance)

```

```

alarm_name          = "disk_percentage_low"
comparison_operator = "LessThanOrEqualToThreshold"
evaluation_periods  = "1"
metric_name         = "LogicalDisk % Free Space"
namespace           = "AWS/EC2"
period              = "60"
statistic           = "Average"
threshold           = "20"
alarm_description   = "This metric monitors ec2 disk utilization"
actions_enabled     = "true"
#alarm_actions       = [aws_sns_topic.disk_alarm.arn]
insufficient_data_actions = []

dimensions = {
  InstanceId      = "aws_instance.my-machine.my-machine-0.id"
  InstanceType    = "t2.micro"
  instance        = each.value
}
}

```

variables.tf

```

variable "volume_size" {
  default = 8
}

variable "instance" {
  type=list
  default = ["my-machine-0", "my-machine-1", "my-machine-2"]
}

```

```

variable "volume_size" {
  default = 8
}

variable "instance" {
  type = "list"
  default = ["my-machine-0", "my-machine-1", "my-machine-2"]
}

resource "aws_lambda_function" "lambda" {
  filename = "lambda.zip"
  function_name = "my-lambda"
  handler = "index.handler"
  role = "arn:aws:iam::123456789012:role/lambda-execution-role"
  runtime = "nodejs14.x"
  memory_size = var.volume_size
  timeout = 3
  environment {
    variables = {
      INSTANCE_TYPE = var.instance[0]
    }
  }

  depends_on = [vpc, sg, vpc_endpoint]
}

resource "aws_lambda_function" "lambda_1" {
  filename = "lambda.zip"
  function_name = "my-lambda-1"
  handler = "index.handler"
  role = "arn:aws:iam::123456789012:role/lambda-execution-role"
  runtime = "nodejs14.x"
  memory_size = var.volume_size
  timeout = 3
  environment {
    variables = {
      INSTANCE_TYPE = var.instance[1]
    }
  }

  depends_on = [vpc, sg, vpc_endpoint]
}

resource "aws_lambda_function" "lambda_2" {
  filename = "lambda.zip"
  function_name = "my-lambda-2"
  handler = "index.handler"
  role = "arn:aws:iam::123456789012:role/lambda-execution-role"
  runtime = "nodejs14.x"
  memory_size = var.volume_size
  timeout = 3
  environment {
    variables = {
      INSTANCE_TYPE = var.instance[2]
    }
  }

  depends_on = [vpc, sg, vpc_endpoint]
}

```

TERMINAL

```

Plan: 8 to add, 0 to change, 0 to destroy.

Note: You didn't use the -out option to save this plan, so Terraform can't guarantee to take exactly these actions if you run "terraform apply" now.

PS C:\Users\Anjanadevi_Nandam\Desktop\Project\Terraform>

```

```

resource "aws_vpc" "mainvpc" {
  cidr_block = "10.1.0.0/16"
}

resource "aws_security_group" "cw_sg_ssh" {
  name = "cw-blog-3-sg-using-terraform"
  ingress {
    protocol = "-1"
    self     = true
    from_port = 0
    to_port   = 0
  }
  egress {
    from_port = 0
    to_port   = 0
  }
}

resource "aws_security_group" "cw_sg_vpc" {
  name = "cw-vpc-0-sg"
  egress {
    from_port = 0
    to_port   = 0
  }
}

resource "aws_subnet" "main_subnet" {
  vpc_id       = aws_vpc.mainvpc.id
  cidr_block   = "10.1.1.0/24"
  availability_zone = "us-east-1a"
}

resource "aws_subnet" "sub_subnet" {
  vpc_id       = aws_vpc.mainvpc.id
  cidr_block   = "10.1.2.0/24"
  availability_zone = "us-east-1a"
}

resource "aws_internet_gateway" "igw" {
  vpc_id = aws_vpc.mainvpc.id
}

resource "aws_vpc_peering_connection" "vpc_peering" {
  vpc_id      = aws_vpc.mainvpc.id
  peer_vpc_id = aws_vpc.mainvpc.id
}

resource "aws_vpc_peering_connection_attachment" "vpc_peering_attachment" {
  peer_vpc_id = aws_vpc.mainvpc.id
  vpc_peering_connection_id = aws_vpc_peering_connection.vpc_peering.id
}

resource "aws_route_table" "main_route_table" {
  vpc_id = aws_vpc.mainvpc.id
  association {
    subnet_id = aws_subnet.main_subnet.id
    gateway_id = aws_internet_gateway.igw.id
  }
}

resource "aws_route_table_association" "main_route_table_association" {
  route_table_id = aws_route_table.main_route_table.id
  subnet_id      = aws_subnet.main_subnet.id
}

resource "aws_route_table_association" "sub_route_table_association" {
  route_table_id = aws_route_table.main_route_table.id
  subnet_id      = aws_subnet.sub_subnet.id
}

resource "aws_eip" "eip" {
  vpc_id = aws_vpc.mainvpc.id
}

resource "aws_eip_association" "eip_association" {
  allocation_id = aws_eip.eip.id
  subnet_id     = aws_subnet.main_subnet.id
}

resource "aws_instance" "my-machine" {
  ami           = "ami-037e566f9c9c8a27d"
  instance_type = "t2.micro"
  key_name      = "jenkins-keypair"
  vpc_security_group_ids = [aws_security_group.cw_sg_vpc.id]
  subnet_id     = aws_subnet.main_subnet.id
  associate_public_ip_address = true
}

resource "aws_lambda_function" "lambda" {
  filename = "lambda.zip"
  function_name = "my-lambda"
  handler = "index.handler"
  role = "arn:aws:iam::123456789012:role/lambda-execution-role"
  runtime = "nodejs14.x"
  memory_size = 128
  timeout = 3
  environment {
    variables = {
      INSTANCE_TYPE = "my-machine-0"
    }
  }

  depends_on = [vpc, sg, vpc_endpoint]
}

resource "aws_lambda_function" "lambda_1" {
  filename = "lambda.zip"
  function_name = "my-lambda-1"
  handler = "index.handler"
  role = "arn:aws:iam::123456789012:role/lambda-execution-role"
  runtime = "nodejs14.x"
  memory_size = 128
  timeout = 3
  environment {
    variables = {
      INSTANCE_TYPE = "my-machine-1"
    }
  }

  depends_on = [vpc, sg, vpc_endpoint]
}

resource "aws_lambda_function" "lambda_2" {
  filename = "lambda.zip"
  function_name = "my-lambda-2"
  handler = "index.handler"
  role = "arn:aws:iam::123456789012:role/lambda-execution-role"
  runtime = "nodejs14.x"
  memory_size = 128
  timeout = 3
  environment {
    variables = {
      INSTANCE_TYPE = "my-machine-2"
    }
  }

  depends_on = [vpc, sg, vpc_endpoint]
}

```

TERMINAL

```

Plan: 8 to add, 0 to change, 0 to destroy.

aws_vpc.mainvpc: Creating...
aws_instance.my-machine[0]: creating...
aws_cloudwatch_metric_alarm.disk_percentage_low["my-machine-1"]: creating...
aws_cloudwatch_metric_alarm.disk_percentage_low["my-machine-2"]: creating...
aws_instance.my-machine[2]: creating...
aws_instance.my-machine[1]: creating...
aws_security_group.cw_sg_ssh: Creating...
aws_lambda_function.lambda: creating...
aws_lambda_function.lambda_1: creating...
aws_lambda_function.lambda_2: creating...
aws_vpc_peering.vpc_peering: Creation complete after 2s [id=vpc-peering-037e566f9c9c8a27d]
aws_eip_association.eip_association: Creation complete after 2s [id=eip-06305694793489b33]
aws_security_group.cw_sg_vpc: Creation complete after 4s [id=sg-06305694793489b33]

```

Rename servers as jenkinserver, ansibleserver, ControllerVM(Kubernetes server)

Jenkins Server Setup

- Connect to jenkin server from xshell as root user
- Set password to the root user
- Install JDK 11 ,jenkins , Git

```

jenkin - root@ip-172-31-43-136:/home/ec2-user - Xshell 7 (Free for Home/School)
File Edit View Tools Tab Window Help
ssh://13.232.227.52:22
To add the current session, click on the left arrow button.
Session Manager  x 1jenkin +
Xshell 7 (Build 8109)
Copyright (c) 2020 NetStarang Computer, Inc. All rights reserved.
Type 'help' to learn how to use Xshell prompt.
[ec2-user]$
Connecting to 13.232.227.52:22...
Connection established.
To escape to local shell, press 'Ctrl+Alt+'.

WARNING! The remote SSH server rejected X11 forwarding request.
Last login: Thu Aug 4 03:48:34 2022 from 42.111.161.162
[ec2-user@ip-172-31-43-136 ~]$ sudo su
[root@ip-172-31-43-136 ec2-user]# vim /etc/ssh/sshd_config
[root@ip-172-31-43-136 ec2-user]#

```

Name	All Sessi...
Type	Folder
Sub items	5
Host	
Port	22
Protocol	SSH
User Name	
Description	

ssh://13.232.227.52:22

Type here to search

SSH2 xterm 187x42 1.21.35 1 session ENG 9:21 AM IN 8/4/2022

```

jenkin - root@ip-172-31-43-136:/home/ec2-user - Xshell 7 (Free for Home/School)
File Edit View Tools Tab Window Help
ssh://13.232.227.52:22
To add the current session, click on the left arrow button.
Session Manager  x 1jenkin +
Xshell 7 (Build 8109)
Copyright (c) 2020 NetStarang Computer, Inc. All rights reserved.
Type 'help' to learn how to use Xshell prompt.
[ec2-user]$
Connecting to 13.232.227.52:22...
Connection established.
To escape to local shell, press 'Ctrl+Alt+'.

WARNING! The remote SSH server rejected X11 forwarding request.
Last login: Thu Aug 4 03:48:34 2022 from 42.111.161.162
[ec2-user@ip-172-31-43-136 ~]$ sudo su
[root@ip-172-31-43-136 ec2-user]# vim /etc/ssh/sshd_config
[root@ip-172-31-43-136 ec2-user]# passwd root
Changing password for user root.
New password:
BAD PASSWORD: The password is shorter than 8 characters
Retype new password:
passwd: all authentication tokens updated successfully.
[root@ip-172-31-43-136 ec2-user]#

```

Name	All Sessi...
Type	Folder
Sub items	5
Host	
Port	22
Protocol	SSH
User Name	
Description	

ssh://13.232.227.52:22

Type here to search

SSH2 xterm 187x42 1.27.35 1 session ENG 9:23 AM IN 8/4/2022

Ansible Server Setup

Connect to jenkins server from xshell as root user
Set password to the root user
Install ansible and docker

```

Ansible - Xshell 7 (Free for Home/School)
File Edit View Tools Tab Window Help
Host IP address or the session name
To add the current session, click on the left arrow button.
Session Manager  x 1 DockerServer  x 2 Jenkins  x 3 Ansible  x 4 ControllerVM  +
Xshell 7 (Build 0109)
Copyright (c) 2020 NetSarang Computer, Inc. All rights reserved.
Type 'help' to learn how to use Xshell prompt.
[~]~$ 
Connecting to 43.204.32.4:22...
Connection established.
To escape to local shell, press 'Ctrl+Alt+'.

WARNING! The remote SSH server rejected X11 forwarding request.
Last failed login: Thu Aug 4 09:22:06 UTC 2022 from 178.62.85.201 on ssh:notty
There were 120 failed login attempts since the last successful login.
Last login: Thu Aug 4 06:48:15 2022 from 203.170.48.2

[~]~_ / Amazon Linux 2 AMI
[~]~_|_|

https://aws.amazon.com/amazon-linux-2/
[root@ip-172-31-35-88 ~]# cd /opt
[root@ip-172-31-35-88 opt]# ls
aws containedrh
[root@ip-172-31-35-88 opt]# cd /opt/
[root@ip-172-31-35-88 opt]# ls
aws containedrh
[root@ip-172-31-35-88 opt]# hostname -i
172.31.35.88
[root@ip-172-31-35-88 opt]# ls
aws containedrh
[root@ip-172-31-35-88 opt]# ls
aws containedrh Dockerfile rh
[root@ip-172-31-35-88 opt]# docker image build -t test .
Sending build context to Docker daemon 114.2kB
Step 1/1 : FROM centos:7.4-2009
5.4.0-102-generic-PolishFinalLibrary/centos
2d473b07cd5: Pull complete
Digest: sha256:c73f515d6b0fa7bb18d8202035e739a494ce760aa73129f60f4bf2bd22b407

Name jenkins
Host 13.232.227.52
Port 22
Protocol SSH
User Name
Description

Not connected.

```

ControllerVM setup

Connect to jenkin server from xshell as root user

Set password to the root user

Install Kubectl and kops

sudo su

vim /etc/ssh/sshd_config

passwd root

systemctl restart sshd

```

ControllerVM - Xshell 7 (Free for Home/School)
File Edit View Tools Tab Window Help
Host IP address or the session name
To add the current session, click on the left arrow button.
Session Manager  x 1 DockerServer  x 2 Jenkins  x 3 Ansible  x 4 ControllerVM  +
There was 1 failed login attempt since the last successful login.
Last login: Thu Aug 4 03:53:58 2022 from 157.119.110.47
[~]~_ / Amazon Linux 2 AMI
[~]~_|_|

https://aws.amazon.com/amazon-linux-2/
[ec2-user@ip-172-31-35-88 ~]$ sudo su
[root@ip-172-31-35-88 ec2-user]# vim /etc/ssh/sshd_config
[root@ip-172-31-35-88 ec2-user]# passwd root
Changing password for user root.
New password:
BAD PASSWORD: The password is shorter than 8 characters
Retype new password:
passwd: all authentication tokens updated successfully.
[root@ip-172-31-35-88 ec2-user]# cd ..
[root@ip-172-31-35-88 ~]# cd ..
[root@ip-172-31-35-88 ~]# systemctl restart sshd
hash: system: command not found
[root@ip-172-31-35-88 ~]# systemctl restart sshd
[root@ip-172-31-35-88 ~]# curl -LO "https://dl.k8s.io/release/$(curl -L -s https://dl.k8s.io/release/stable.txt)/bin/linux/amd64/kubectl"
% Total % Received % Xferd Average Speed Time Time Current
Dload Upload Total Spent Left Speed
100 154 100 154 0 0 531 0 ::---- ::---- ::---- 531
100 43.5M 100 43.5M 0 0 42.0M 0 0:00:01 0:00:01 ::---- 42.0M
[root@ip-172-31-35-88 ~]# curl -LO "https://dl.k8s.io/$(curl -L -s https://dl.k8s.io/release/stable.txt)/bin/linux/amd64/kubectl.sha256"
% Total % Received % Xferd Average Speed Time Time Current
Dload Upload Total Spent Left Speed
100 64 100 64 0 0 176 0 ::---- ::---- ::---- 176
[root@ip-172-31-35-88 ~]# echo "$(cat kubectl.sha256)" kubectl | sha256sum --check
kubectl: OK
[root@ip-172-31-35-88 ~]# sudo install -o root -g root -m 0755 kubectl /bin/kubectl
[root@ip-172-31-35-88 ~]# kubectl version --client
WARNING: This version information is deprecated and will be replaced with the output from kubectl version --short. Use --output=yaml|json to get the full version.

Name jenkins
Host 13.232.227.52
Port 22
Protocol SSH
User Name
Description

Not connected.

```

Install Kubectl

```

curl -LO https://storage.googleapis.com/kubernetes-release/release/$(curl -s https://storage.googleapis.com/kubernetes-release/release/stable.txt)/bin/linux/amd64/kubectl
chmod +x ./kubectl
sudo mv ./kubectl /bin/kubectl

```

```

ControllerVM - Xshell 7 (Free for Home/School)
File Edit View Tools Tab Window Help
Host IP address or the session name
To add the current session, click on the left arrow button.
Session Manager • 1 Dockerserver • 2 Jenkins • 3 Ansible • 4 ControllerVM +
All Sessions
13.232.245.103
18.197.143.146
35.158.95.32
Ansible
Docker
Dockerserver
jenkins
Kubernetes
Test-Server
100 43.5M 100 43.5M 0 0 42.0M 0 0:00:01 0:00:01 ---:--- 42.0M
% Total % Received % Xferd Average Speed Time Time Current
Dload Upload Total Spent Left Speed
100 154 100 154 0 0 542 0 ---:--- ---:--- 544
100 64 100 64 0 0 176 0 ---:--- ---:--- 176
[root@ip-172-31-35-88 ~]# echo $(cat kubectl.sha256) kubectl | sha256sum --check
kubectl: OK
[root@ip-172-31-35-88 ~]# sudo install -o root -o 0755 kubectl /bin/kubectl
[root@ip-172-31-35-88 ~]# kubectl version --client
WARNING: This version information is deprecated and will be replaced with the output from kubectl version --short. Use --output=yaml|json to get the full version.
Client Version: version.Info{Major:"1", Minor:"24+", GitVersion:"v1.24.3", GitCommit:"aef86a93758dc3cb2c658dd9657ab4ad4afc21cb", GitTreeState:"clean", BuildDate:"2022-07-10T14:10:00Z", Compiler:"gc", Platform:"linux/amd64"}
Kustomize Version: v4.5.4
[root@ip-172-31-35-88 ~]# curl -L https://github.com/kubernetes/kops/releases/download/$(curl -s https://api.github.com/repos/kubernetes/kops/releases/latest | grep t -f 4)/kops-linux-amd64
100 0 0 0 0 0 0 0:00:01 0:00:01 ---:--- 0
% Total % Received % Xferd Average Speed Time Time Current
Dload Upload Total Spent Left Speed
100 149M 100 149M 0 0 6381k 0 0:00:23 0:00:23 ---:--- 4144k
[root@ip-172-31-35-88 ~]# chmod +x kops-linux-amd64
[root@ip-172-31-35-88 ~]# sudo mv kops-linux-amd64 /usr/local/bin/kops
[root@ip-172-31-35-88 ~]# sudo mv kops-linux-amd64 /bin/kops
mv: cannot stat 'kops-linux-amd64': No such file or directory
[root@ip-172-31-35-88 ~]# cd /usr/local/bin
[root@ip-172-31-35-88 bin]# ls
kops
[root@ip-172-31-35-88 bin]# mv kops /bin/
[root@ip-172-31-35-88 bin]# cd
[root@ip-172-31-35-88 ~]# kops
KOps is Kubernetes Operations.
KOps is the easiest way to get a production grade Kubernetes cluster up and running. We like to think of it as kubectl for clusters.
Kops helps you create, destroy, upgrade and maintain production-grade, highly available, Kubernetes clusters from the command line. AWS (Amazon Web Services) is currently supported, with Digital Ocean and OpenStack in beta support.
Usage:
Name jenkins
Host 13.232.227.52
Port 22
Protocol SSH
User Name
Description

Not connected.
Type here to search Dev... Do... Downloads Terraform Concourse GitHub Jenkins Unzip Adm... Ne... ENG 28°C 11:36 PM IN 8/4/2022 CAP NUM

```

Create an IAM user/role with Route53, EC2, IAM and S3 full access

Identity and Access Management (IAM)

Last activity: 53 minutes ago

Maximum session duration: 1 hour

Permissions | Trust relationships | Tags | Access Advisor | Revoke sessions

Permissions policies (5)

You can attach up to 10 managed policies.

Policy name	Type	Description
AmazonEC2FullAccess	AWS managed	Provides full access to Amazon EC2
IAMFullAccess	AWS managed	Provides full access to IAM via the API
AmazonS3FullAccess	AWS managed	Provides full access to all buckets via the API
AmazonVPCFullAccess	AWS managed	Provides full access to Amazon VPC
AmazonRoute53FullAccess	AWS managed	Provides full access to all Amazon Route 53 features

Permissions boundary - (not set)

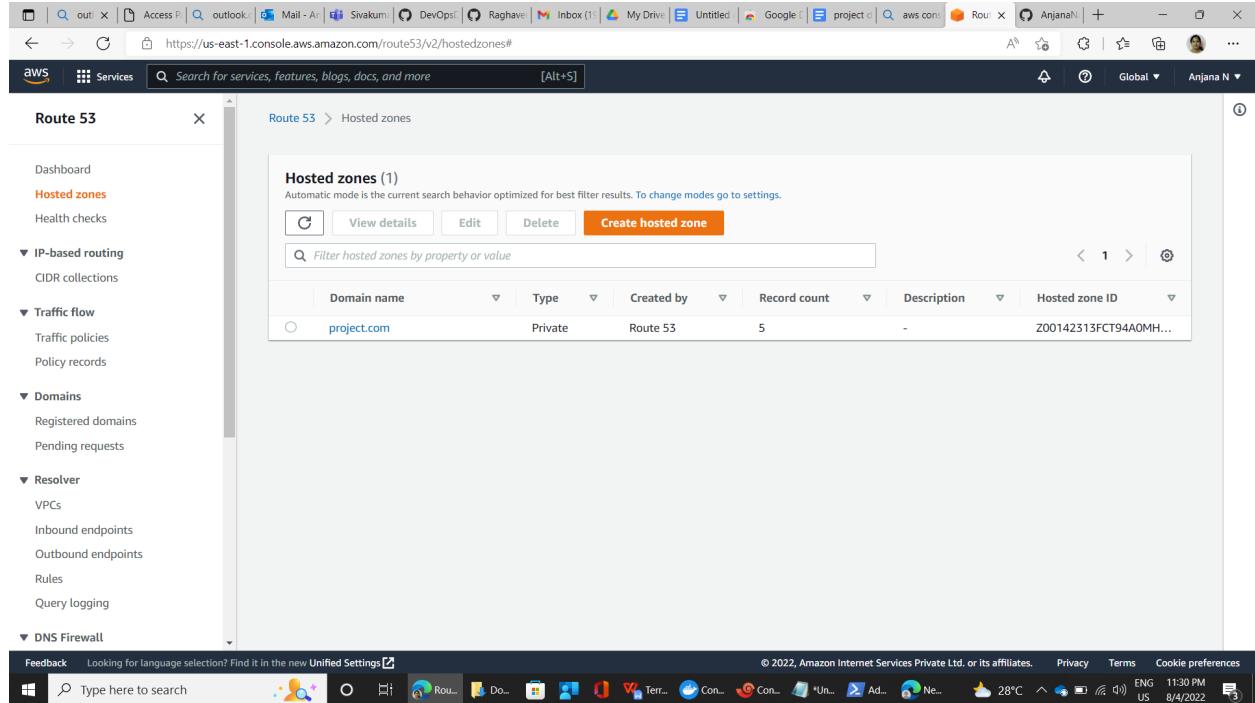
Set a permissions boundary to control the maximum permissions this role can have. This is not a common setting but can be used to delegate permission management to others.

Attach IAM role to EC2 instance

Install kops

```
curl -LO https://github.com/kubernetes/kops/releases/download/$(curl -s https://api.github.com/repos/kubernetes/kops/releases/latest | grep tag_name | cut -d '"' -f 4)/kops-linux-amd64  
  
chmod +x kops-linux-amd64  
  
sudo mv kops-linux-amd64 /bin/kops
```

Create a Route53 private hosted zone



The screenshot shows the AWS Route 53 service page. On the left, there's a navigation sidebar with various options like Hosted zones, IP-based routing, Traffic flow, Domains, Resolver, and DNS Firewall. The 'Hosted zones' option is currently selected. The main content area displays a table titled 'Hosted zones (1)'. The table has columns for Domain name, Type, Created by, Record count, Description, and Hosted zone ID. There is one entry: 'project.com' (Type: Private, Created by: Route 53, Record count: 5, Hosted zone ID: Z00142313FCT94AOMH...). Below the table, there are buttons for View details, Edit, Delete, and Create hosted zone.

create an S3 bucket : aws s3 mb s3://dev.k8s.project.com

The screenshot shows the Amazon S3 console with the URL <https://s3.console.aws.amazon.com/s3/buckets/dev.k8s.project.com?region=ap-south-1&tab=objects>. The main content area displays the 'Objects (1)' section for the 'dev.k8s.project.com' bucket. A message at the top says, "We're continuing to improve the S3 console to make it faster and easier to use. If you have feedback on the updated experience, choose Provide feedback." Below this, a banner says, "Store your archive datasets in the low-cost Amazon S3 Glacier storage classes." The objects list shows a single item: 'dev.k8s.project.com/' which is a Folder.

Expose environment variable: `export`

`KOPS_STATE_STORE=s3://dev.k8s.project.com`

The screenshot shows the Xshell 7 terminal window with multiple sessions open. Session 4 is active and shows the following command sequence:

```

$ AWS Access Key ID [None]:
$ AWS Secret Access Key [None]:
$ Default region name [None]: ap-south-1
$ aws configure
$ AWS Access Key ID [None]: "1[B"
$ AWS Secret Access Key [None]:
$ Default region name [None]: ap-south-1
$ Default output format [None]:
$ [root@ip-172-31-35-88 ~]# aws s3 mb s3://dev.k8s.project.com
$ make_bucket failed: s3://dev.k8s.project.com Unable to locate credentials
$ [root@ip-172-31-35-88 ~]# aws configure
$ AWS Access Key ID [None]: AKIAOYZ0A0Z7RRDN4PSC
$ AWS Secret Access Key [None]: 6fxsnUEmhTMm6DP26WdvP5Q0fir78ojE4X20dAcG
$ Default region name [ap-south-1]: 1[H
$ [root@ip-172-31-35-88 ~]# aws configure
$ AWS Access Key ID [None]: "1[A"
$ [root@ip-172-31-35-88 ~]# aws configure
$ AWS Access Key ID [None]: 6fxsnUEmhTMm6DP26WdvP5Q0fir78ojE4X20dAcG
$ AWS Secret Access Key [None]: "[1A"|[1A"
$ [root@ip-172-31-35-88 ~]# aws configure
$ AWS Access Key ID [None]: AKIAOYZ0A0Z7RRDN4PSC
$ AWS Secret Access Key [None]: 6fxsnUEmhTMm6DP26WdvP5Q0fir78ojE4X20dAcG
$ Default region name [ap-south-1]:
$ Default output format [None]:
$ [root@ip-172-31-35-88 ~]# aws s3 mb s3://dev.k8s.project.com
$ make_bucket: dev.k8s.project.com
$ [root@ip-172-31-35-88 ~]# export KOPS_STATE_STORE=s3://dev.k8s.project.com
$ [root@ip-172-31-35-88 ~]# aws s3 ls
$ 2022-08-03 18:52:09 clusters.k8s.sampledomain.com
$ 2022-08-03 09:53:09 dev.k8s.project.com
$ 2022-07-28 09:45:18 elasticbeanstalk-ap-south-1-053246742499
$ 2022-06-28 06:54:52 example-bucket-terraform
$ 2022-07-28 09:22:59 junkinbucket
$ 2022-08-03 07:57:41 mybackupsbucket13
$ [root@ip-172-31-35-88 ~]# ssh-keygen
$ Generating public/private rsa key pair.

```

Create sshkeys before creating cluster: `ssh-keygen`

Create kubernetes cluster definitions on S3 bucket:

`kops create cluster --cloud=aws --zones=ap-south-1a --name=dev.k8s.project.com --dns-zone=project.com --dns private`

Create kubernetes cluster :`kops update cluster dev.k8s.project.com --yes --admin`

Validate your cluster : kops validate cluster --wait 10m

To list nodes: kubectl get nodes

The screenshot shows the Xshell 7 interface with four sessions open:

- Dockerserver
- Jenkins
- Ansible
- ControllerVM

The ControllerVM session is active and displays the following terminal output:

```
[08994 10:02:45.600201 5990 update_cluster.go:326] Exporting kubeconfig for cluster
[08994 10:02:45.600373 5990 create_kubeconfig.go:98] Did not find API endpoint for gossip hostname; may not be able to reach cluster
Kubernetes has set the kubeconfig context to dev.k8s.project.com

Cluster changes have been applied to the cloud.

Changes may require instances to restart: kops rolling-update cluster
[root@ip-172-31-35-88 ~]# kops rolling-update cluster
Using cluster from kubectl context: dev.k8s.project.com

NAME STATUS NEEDUPDATE READY MIN TARGET MAX NODES
master-ap-south-1a Ready 0 1 1 1 1 1
nodes-ap-south-1a Ready 0 1 1 1 1 1

No rolling-update required.
[root@ip-172-31-35-88 ~]# cd .ssh
[root@ip-172-31-35-88 .ssh]# ls
authorized_keys  id_rsa  id_rsa.pub  known_hosts
[root@ip-172-31-35-88 .ssh]# vim authorized_keys
[root@ip-172-31-35-88 .ssh]# cd /opt
[root@ip-172-31-35-88 opt]# ls
deployment.yml  Dockerfile  service.yml
[root@ip-172-31-35-88 opt]# ls
deployment.yml  Dockerfile  service.yml
[root@ip-172-31-35-88 opt]# cat Dockerfile
FROM centos:7.9.2009
MAINTAINER anjana.nandam@gmail.com

RUN yum install -y httpd \
    zip \
    unzip \
    ADD https://www.free-css.com/assets/files/free-css-templates/download/page258/luxury.zip /var/www/html/
WORKDIR /var/www/html
RUN unzip luxury.zip
RUN cp -rfv luxury/* .
RUN rm -rf luxury luxury.zip
CMD ["/usr/sbin/httpd", "-D", "FOREGROUND"]

Not connected.
```

The terminal also shows a Jenkins configuration snippet:

```
Name jenkins
Host 13.232.227.52
Port 22
Protocol SSH
User Name
Description
```

The system tray at the bottom right shows the date and time as 11:44 PM on 8/4/2022, and the temperature as 28°C.

Establish Keyless communication between jenkin server to ansible and ansible to controllerVM(Kubernetes Server)

From jenkin server to Ansible:

in jenkin Server

Generate key: ssh-keygen

Vim /.ssh/id_rsa

Copy that key from that file and paste it in the authorized_keys file in ansible server

The same process should be repeated for ansible server, ControllerVM

The screenshot shows the Xshell 7 interface with four sessions open:

- Session Manager**: Shows a list of sessions with icons: 1 Dockerserver, 2 Jenkins, 3 Ansible, and 4 ControllerVM.
- Session 1: Dockerserver**: Displays a terminal window with the following output:


```
Cluster changes have been applied to the cloud.
Changes may require instances to restart: kops rolling-update cluster
Using cluster from kubectl context: dev.k8s.project.com

NAME          STATUS  NEEDUPDATE   READY  MIN  TARGET  MAX  NODES
master-ap-south-1a  Ready  0           1     1    1       1     1
nodes-ap-south-1a  Ready  0           1     1    1       1     1

No rolling-update required.

[root@ip-172-31-35-88 ~]# cd .ssh
[root@ip-172-31-35-88 .ssh]# ls
authorized_keys  id_rsa  id_rsa.pub  known_hosts
[root@ip-172-31-35-88 .ssh]# vim authorized_keys
[root@ip-172-31-35-88 .ssh]# cd /opt
[root@ip-172-31-35-88 opt]# ls
deployment.yml  Dockerfile  service.yml
[root@ip-172-31-35-88 opt]# ls
deployment.yml  Dockerfile  service.yml
[root@ip-172-31-35-88 opt]# cat Dockerfile
FROM centos:7.9.2009
MAINTAINER anjana.nandam@gmail.com
RUN yum install -y httpd \
zip \
unzip
ADD https://www.free-css.com/assets/files/free-css-templates/download/page258/luxory.zip /var/www/html/
WORKDIR /var/www/html
RUN unzip luxory.zip
RUN cp -rf luxory/* .
CMD ["/usr/sbin/httpd", "-D", "FOREGROUND"]
EXPOSE 80
[root@ip-172-31-35-88 opt]# ls
deployment.yml  Dockerfile  service.yml
```
- Session 2: Jenkins**: Shows session details for a Jenkins host.
- Session 3: Ansible**: Shows session details for an Ansible host.
- Session 4: ControllerVM**: Shows session details for a ControllerVM host.

The terminal window also shows system status at the bottom:

```
xterm 17x80 38,9 4 sessions 28°C ENG 11:51 PM IN 8/4/2022
```

Continuous Integration with Jenkins

Create following files:

Create a docker file and push into the git repository

AnjanaNandam123 / kubernetesproject Public

Dockerfile

324807f 21 hours ago 1 commit

Add a README

About
No description, website, or topics provided.

0 stars 1 watching 0 forks

Releases
No releases published Create a new release

Packages
No packages published Publish your first package

Languages
Dockerfile 100.0%

Edit a file in /etc/ansible/hosts in ansible server

Add lines

[Docks]

Private ip of controllerVM

Create a playbook with ansible.yml in sourcecode directory

Mkdir sourcecode

```

Ansible - root@ip-172-31-35-88:/sourcecode - Xshell 7 (Free for Home/School)
File Edit View Tools Tab Window Help
Session Manager 1 13.232.245.165:22 2 Jenkins 3 Ansible 4 ControllerVM
To add the current session, click on the left arrow button.
Session Manager
All Sessions
13.232.245.103
18.197.143.146
35.158.95.32
Ansible
Docker
Dockerserver
jenkin
Kubernetes
Test-Server
ssh://43.204.32.4:22
PLAY [all] *****
TASK [Gathering Facts] *****
[WARNING]: Platform linux on host 172.31.35.88 is using the discovered Python interpreter at /usr/bin/python, but future installation of another Python interpreter could change this. See https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information.
ok: [172.31.35.88]
TASK [create new deployment] *****
changed: [172.31.35.88]
TASK [create new service] *****
changed: [172.31.35.88]
PLAY RECAP
172.31.35.88 : ok=3    changed=2    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
[root@ip-172-31-35-88 sourcecode]# vim kuuclear
[1]+ Stopped                  vim kuuclear
[root@ip-172-31-35-88 sourcecode]# clear
[root@ip-172-31-35-88 sourcecode]# ls
docker.yml
[root@ip-172-31-35-88 sourcecode]# cat docker.yml
docker:
  - host: all
    command: true
    tasks:
      - name: delete old deployment
        command: kubectl delete -f /opt/deployment.yml
      # name: delete old service
      # command: kubectl delete -f /opt/service.yml
      - name: create new deployment
        command: kubectl apply -f /opt/deployment.yml
      - name: create new service
        command: kubectl apply -f /opt/service.yml
[root@ip-172-31-35-88 sourcecode]# ansible-playbook docker.yml
PLAY [all] *****

```

Create deployment and service file in /opt directory

The screenshot shows a Windows desktop environment with two terminal windows open and a taskbar at the bottom.

Top Terminal Window:

- Title Bar:** ControllerVM - Xshell 7 (Free for Home/School)
- Session Manager:** Shows sessions 1, 2, 3, and 4.
- Session 4 Content:**

```
ADD https://www.free-css.com/assets/files/free-css-templates/download/page258/luxury.zip /var/www/html/
WORKDIR /var/www/html
RUN unzip luxury.zip
RUN cp -rpf luxury/* .
RUN rm -rf luxury.luxury.zip
CMD ["/usr/sbin/httpd", "-D", "FOREGROUND"]
EXPOSE 80
[root@ip-172-31-35-88 opt]# ls
deployment.yaml Dockerfile service.yaml
[root@ip-172-31-35-88 opt]# cat deployment.yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: tester
spec:
  selector:
    matchLabels:
      app: tester
    replicas: 2
  strategy:
    type: RollingUpdate
  rollingUpdate:
    maxSurge: 1
    maxUnavailable: 1
  template:
    metadata:
      labels:
        app: tester
    spec:
      containers:
        - name: tester
          image: ankurhardwaj/
          imagePullPolicy: Always
        ports:
          - containerPort: 80
[root@ip-172-31-35-88 opt]# vim deployment.yaml
[root@ip-172-31-35-88 opt]# exit
exit
```

Bottom Terminal Window:

- Title Bar:** ControllerVM - root@ip-172-31-35-88/ - Xshell 7 (Free for Home/School)
- Session Manager:** Shows sessions 1, 2, 3, and 4.
- Session 4 Content:**

```
ssh ec2-user@43.204.32.42:22
To add the current session, click on the left arrow button.

[ec2-user@ip-172-31-35-88 ~]$ ssh ec2-user@43.204.32.42
Connecting to 43.204.32.42:22...
Connection established.
To escape to local shell, press 'Ctrl+Alt+'.

WARNING: The remote SSH server rejected X11 forwarding request.
Last failed login: Thu Aug  4 18:59:46 UTC 2022 from 42.111.161.235 on ssh:notty
There were 7 failed login attempts since the last successful login.
Last login: Thu Aug  4 09:37:12 2022 from 203.170.46.2

[ec2-user@ip-172-31-35-88 ~]$ cd ..
[ec2-user@ip-172-31-35-88 ~]$ cd ..
[ec2-user@ip-172-31-35-88 ~]$ cat /opt/service.yaml
apiVersion: v1
kind: Service
metadata:
  name: tester
  labels:
    app: tester
spec:
  selector:
    app: tester
    type: LoadBalancer
  ports:
    - port: 80
      targetPort: 80
[ec2-user@ip-172-31-35-88 ~]$
```

Taskbar: Shows the Start button, search bar, and pinned icons for various applications like File Explorer, Edge, and File History.

Jenkins Configurations:

Getting Started

Instance Configuration

Jenkins URL:

The Jenkins URL is used to provide the root URL for absolute links to various Jenkins resources. That means this value is required for proper operation of many Jenkins features including email notifications, PR status updates, and the `BUILD_URL` environment variable provided to build steps.

The proposed default value shown is **not saved yet** and is generated from the current request, if possible. The best practice is to set this value to the URL that users are expected to use. This will avoid confusion when sharing or viewing links.

Jenkins 2.346.2 Not now Save and Finish

Welcome to Jenkins!

Keep me signed in

Sign in

Install publish over ssh plugin

Installing Plugins/Upgrades

Preparation

- Checking internet connectivity
- Checking update center connectivity
- Success

JavaBeans Activation Framework (JAF) API	Success
JavaMail API	Success
Folders	Success
Mina SSHD API :: Common	Success
Mina SSHD API :: Core	Success
SSH server	Success
OWASP Markup Formatter	Success
Structs	Success
Token Macro	Success
Build Timeout	Success
Credentials	Success
Trilead API	Success
SSH Credentials	Success
Pipeline: Step API	Success
Plain Credentials	Success
Credentials Binding	Success
SCM API	Success

Configure ssh server

Set ansible and jenkins server hosts with their respective private ips and give correct credentials. Once check the server configurations success or not.

SSH Servers

SSH Server	Name
ansible	ansible

Hostname

Username

Remote Directory

Advanced...

Test Configuration

Save Apply

SSH Server

Name ?

Hostname ?

Username ?

Remote Directory ?

Source Code management configurations

Pulling sourcecode from my git repository

General Source Code Management Build Triggers Build Environment Build Post-build Actions

None

Git ?

Repositories ?

Repository URL ?

Credentials ?

Add Repository

Branches to build ?

Create webhook b/w jenkins and git

The screenshot shows the GitHub settings page for the repository 'AnjanaNandam123 / kubernetesproject'. The 'Webhooks' tab is selected. A single webhook is listed with the URL 'http://13.232.227.52:8080/github-w... (push)'. The GitHub interface includes a sidebar with various project management and security options.

Add build Configurations:

Configuring jenkin server to copy Dockerfile to /opt directory in ansible from jenkins

The screenshot shows the Jenkins job configuration for 'epamproject'. The 'Build' tab is active, showing the 'SSH Publishers' section. It includes fields for 'SSH Server Name' (set to 'jenkins'), 'Transfers' (with 'Transfer Set Source files' and 'Remote directory' fields), and an 'Exec command' field containing the command 'rsync -avh /var/lib/jenkins/workspace/epamproject/Dockerfile root@172.31.35.88:/opt'. Below the configuration are 'Save' and 'Apply' buttons.

Configuring ansible server to create a docker image and push into my docker repository

The screenshot shows the Jenkins job configuration interface for the 'epamproject' job. The 'Build' tab is selected, displaying the following configuration:

- SSH Server**: Name is set to 'ansible'.
- Transfers**:
 - Transfer Set**: Source files are listed as '\$JOB_NAME:\$BUILD_ID'.
 - Remove prefix**: The value is '\$JOB_NAME:\$BUILD_ID'.
 - Remote directory**: The value is '\$JOB_NAME:\$BUILD_ID'.
- Exec command**:

```
cd /opt
docker build -t $JOB_NAME:$BUILD_ID .
docker tag $JOB_NAME:$BUILD_ID arjana407/$JOB_NAME:$BUILD_ID
docker tag $JOB_NAME:$BUILD_ID arjana407/$JOB_NAME:latest
docker push arjana407/$JOB_NAME:$BUILD_ID
docker push arjana407/$JOB_NAME:latest
docker image rmi $JOB_NAME:$BUILD_ID
docker image rmi arjana407/$JOB_NAME:$BUILD_ID
docker image rmi arjana407/$JOB_NAME:latest
```

At the bottom, there is a note: "All of the transfer fields (except for Exec timeout) support substitution of Jenkins environment variables".

Buttons at the bottom: **Save** and **Apply**.

Add post build Configurations

Run ansible playbook to deploy my application in kubernetes cluster

Dashboard > epamproject >

General Source Code Management Build Triggers Build Environment Build Post-build Actions

SSH Publishers

SSH Server Name ? ansible Advanced...

Transfers

Transfer Set Source files ?

Remove prefix ?

Remote directory ?

Exec command ? ansible-playbook /sourcecode/docker.yml

Save Apply

Build Creation

Not secure | 13.232.227.52:8080

Jenkins

Dashboard >

+ New Item

All +

S	W	Name	Last Success	Last Failure	Last Duration
Green	Yellow	epamproject	7 min 39 sec #10	N/A	58 sec

Icon legend Atom feed for all Atom feed for failures Atom feed for just latest builds

Build Queue

No builds in the queue.

Build Executor Status

1 Idle
2 Idle

13.232.227.52:8080/job/epamproject/ REST API Jenkins 2.346.2

Type here to search

Windows Taskbar icons: Microsoft Edge, File Explorer, Jenkins, etc.

The screenshot shows the Jenkins interface with the URL 13.232.227.52:8080/job/epamproject/10/console. The page title is "Console Output". The left sidebar includes links for Back to Project, Status, Changes, Console Output (selected), View as plain text, Edit Build Information, Delete build '#10', Git Build Data, and Previous Build. The main content area displays the build log:

```
Started by user Anjana Nandam
Running as SYSTEM
Building in workspace /var/lib/jenkins/workspace/epamproject
The recommended Git tool is: NONE
No credentials specified
> git rev-parse --resolve-git-dir /var/lib/jenkins/workspace/epamproject/.git # timeout=10
Fetching changes from the remote Git repository
> git config remote.origin.url https://github.com/AnjanaNandam123/kubernetesproject.git # timeout=10
Fetching upstream changes from https://github.com/AnjanaNandam123/kubernetesproject.git
> git --version # timeout=10
> git -v version 2.37.1'
> git fetch --tags --force --progress -- https://github.com/AnjanaNandam123/kubernetesproject.git +refs/heads/*:refs/remotes/origin/* # timeout=10
> git rev-parse refs/remotes/origin/main^{commit} # timeout=10
Checking out Revision 324807faf1b422050d1ef0fdec3a5bb32ae2143b7 (refs/remotes/origin/main)
> git config core.sparsecheckout # timeout=10
> git checkout -f 324807faf1b422050d1ef0fdec3a5bb32ae2143b7 # timeout=10
Commit message: "Create Dockerfile"
> git rev-list --no-walk 324807faf1b422050d1ef0fdec3a5bb32ae2143b7 # timeout=10
SSH: Connecting from host [ip-172-31-43-136.ap-south-1.compute.internal]
SSH: Connecting with configuration [jenkins] ...
SSH: EXEC: completed after 201 ms
SSH: Disconnecting configuration [jenkins] ...
SSH: Transferred 0 file(s)
SSH: Connecting from host [ip-172-31-43-136.ap-south-1.compute.internal]
```

The screenshot shows the Jenkins interface with the URL 13.232.227.52:8080/job/epamproject/10/console. The page title is "Console Output". The left sidebar includes links for Back to Project, Status, Changes, Console Output (selected), View as plain text, Edit Build Information, Delete build '#10', Git Build Data, and Previous Build. The main content area displays the build log, which is identical to the one in the first screenshot.

```
Started by user Anjana Nandam
Running as SYSTEM
Building in workspace /var/lib/jenkins/workspace/epamproject
The recommended Git tool is: NONE
No credentials specified
> git rev-parse --resolve-git-dir /var/lib/jenkins/workspace/epamproject/.git # timeout=10
Fetching changes from the remote Git repository
> git config remote.origin.url https://github.com/AnjanaNandam123/kubernetesproject.git # timeout=10
Fetching upstream changes from https://github.com/AnjanaNandam123/kubernetesproject.git
> git --version # timeout=10
> git -v version 2.37.1'
> git fetch --tags --force --progress -- https://github.com/AnjanaNandam123/kubernetesproject.git +refs/heads/*:refs/remotes/origin/* # timeout=10
> git rev-parse refs/remotes/origin/main^{commit} # timeout=10
Checking out Revision 324807faf1b422050d1ef0fdec3a5bb32ae2143b7 (refs/remotes/origin/main)
> git config core.sparsecheckout # timeout=10
> git checkout -f 324807faf1b422050d1ef0fdec3a5bb32ae2143b7 # timeout=10
Commit message: "Create Dockerfile"
> git rev-list --no-walk 324807faf1b422050d1ef0fdec3a5bb32ae2143b7 # timeout=10
SSH: Connecting from host [ip-172-31-43-136.ap-south-1.compute.internal]
SSH: Connecting with configuration [jenkins] ...
SSH: EXEC: completed after 201 ms
SSH: Disconnecting configuration [jenkins] ...
SSH: Transferred 0 file(s)
SSH: Connecting from host [ip-172-31-43-136.ap-south-1.compute.internal]
SSH: Connecting with configuration [ansible] ...
SSH: EXEC: completed after 53,034 ms
SSH: Disconnecting configuration [ansible] ...
SSH: Transferred 0 file(s)
Build step 'Send files or execute commands over SSH' changed build result to SUCCESS
SSH: Connecting from host [ip-172-31-43-136.ap-south-1.compute.internal]
SSH: Connecting with configuration [ansible] ...
SSH: EXEC: completed after 4,403 ms
SSH: Disconnecting configuration [ansible] ...
SSH: Transferred 0 file(s)
Finished: SUCCESS
```

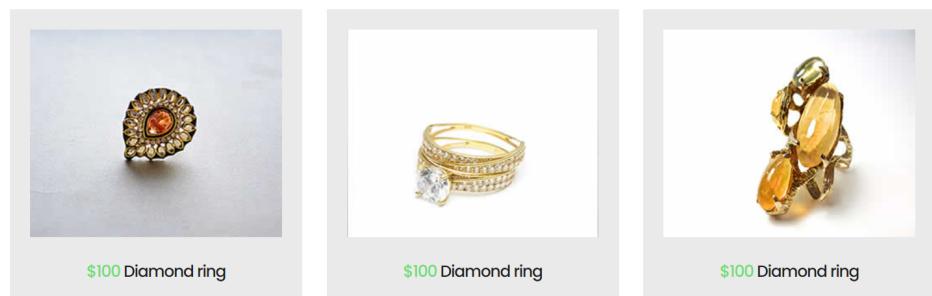


Running My application
From Master node

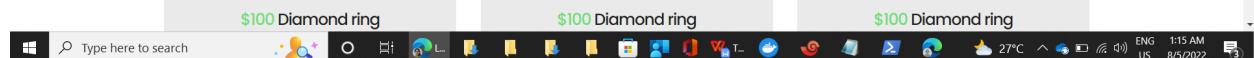
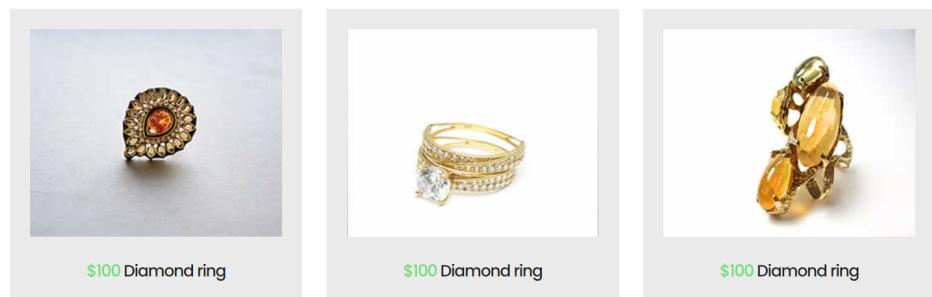


Jewellery

Lorem ipsum is simply dummy text of the printing and typesetting industry. Lorem ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and



From Slave Node



Attaching Cloudwatch as monitoring tool

The screenshot shows two browser windows side-by-side, both displaying the AWS CloudWatch Metrics dashboard for an EC2 instance.

Top Window (Overview View):

- Left Sidebar:** Shows navigation links for CloudWatch services like Alarms, Logs, Metrics, Application monitoring, and Insights.
- Alarms by AWS service:** Shows an alarm for EC2 named "disk_percentage_low" which is currently in an "In alarm" state. The metric threshold is set at 50% LogicalDisk % Free Space, with an alarm trigger at 49%.
- Recent alarms:** A list of recent alarms.
- Default Dashboard:** A section for creating a new default dashboard.
- Application Insights:** A section for getting started with Application Insights.

Bottom Window (Metrics View):

- Left Sidebar:** Same as the top window.
- Metric Widgets:** Four line charts showing average values over time.
 - NetworkOut: Average:** Bytes sent per second. Values fluctuate between 9.02k and 17.6k.
 - NetworkPacketsIn: Average:** Packets received per second. Values fluctuate between 5.8 and 102.
 - NetworkPacketsOut: Average:** Packets sent per second. Values fluctuate between 53.6 and 101.
 - StatusCheckFailed: Sum:** Status check failures. Values are mostly 0 or 1.
- Instance Details:** A table showing the instance configuration for "i-05761e556595a488".

InstanceId	Name	InstanceType	Monitor
i-05761e556595a488	jenkinsserver	t2.micro	disabled
- CloudWatch Metrics Footer:** Shows language selection, unified settings, and cookie preferences.

Screenshot of the AWS CloudWatch Metrics Alarm creation process, Step 1: Specify metric and conditions.

The screenshot shows a graph of LogicalDisk % Free Space over time (07/30 to 08/04). A red horizontal line is drawn at 20.0, indicating the threshold. The graph shows values fluctuating above and below this threshold.

Metric

Graph: This alarm will trigger when the blue line goes below the red line for 1 datapoints within 6 hours.

Namespace: AWS/EC2
Metric name: LogicalDisk % Free Space
InstanceId: aws_instance.my-machine.my-machine-0.id
InstanceType: t2.micro
instance: kubernetes
Statistic: Average

Feedback Looking for language selection? Find it in the new [Unified Settings](#). © 2022, Amazon Internet Services Private Ltd. or its affiliates. Privacy Terms Cookie preferences 27°C ENG 1:31 AM US 8/5/2022

Screenshot of the AWS CloudWatch Metrics Alarm creation process, Step 2: Configure actions.

The screenshot shows the "Threshold type" section selected. The "Static" option is chosen, with the condition "Use a value as a threshold". The threshold value is set to 50, and the comparison operator is "Lower/Equal" (\leq).

Threshold type

Static Use a value as a threshold
Anomaly detection Use a band as a threshold

Whenever LogicalDisk % Free Space is... Define the alarm condition.

Greater > threshold
Greater/Equal \geq threshold
Lower/Equal \leq threshold
Lower < threshold

than... Define the threshold value.
50 Must be a number

Additional configuration

Datapoints to alarm Define the number of datapoints within the evaluation period that must be breaching to cause the alarm to go to ALARM state.
1 out of 1

Missing data treatment How to treat missing data when evaluating the alarm.
Treat missing data as missing

Cancel Next Update alarm

Feedback Looking for language selection? Find it in the new [Unified Settings](#). © 2022, Amazon Internet Services Private Ltd. or its affiliates. Privacy Terms Cookie preferences 27°C ENG 1:32 AM US 8/5/2022