CloudFormation

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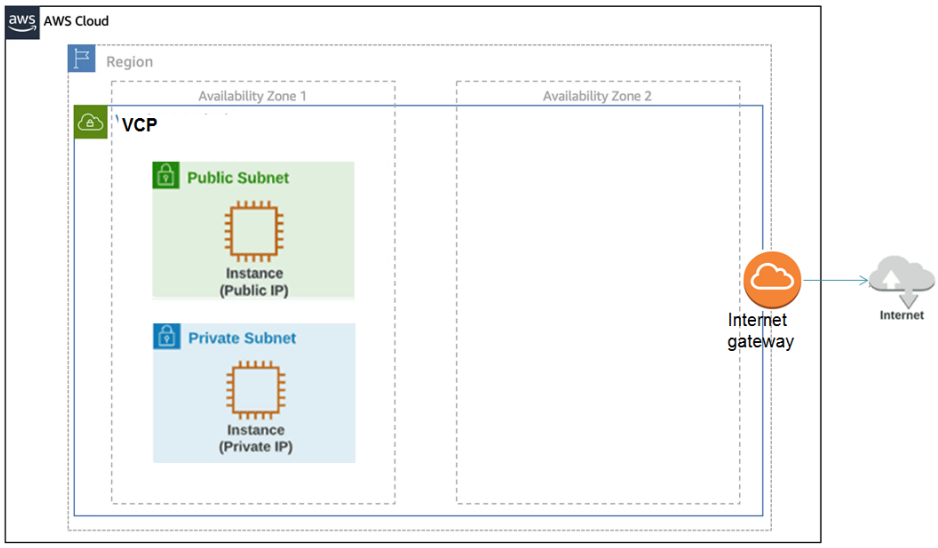
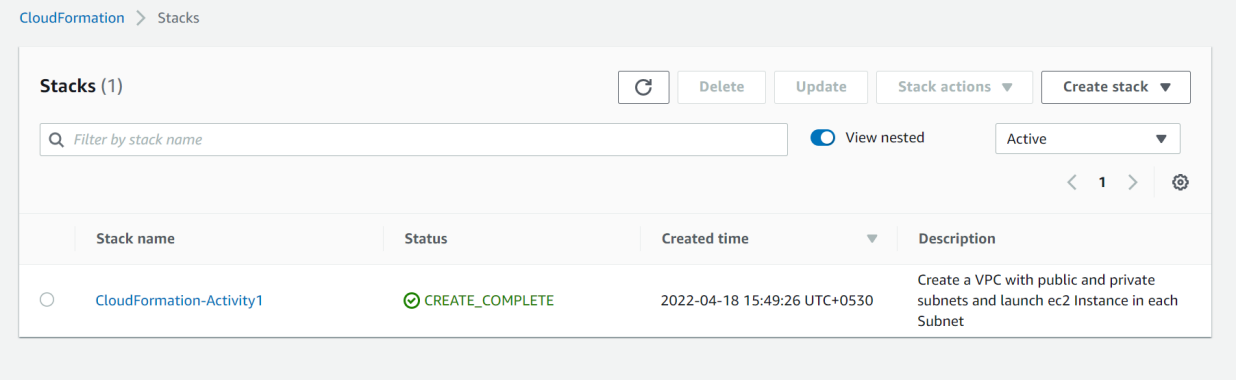
Problem Statement:- Develop a AWS CloudFormation Template which will Create a VPC, add one public subnet and one private subnet. Also launch one instance in public and private subnet. You should be able to ssh to the instance.

Architectures with AWS VPC, Internet gateway, EC2, Public and Privet subnet



1. Stack



2. Events

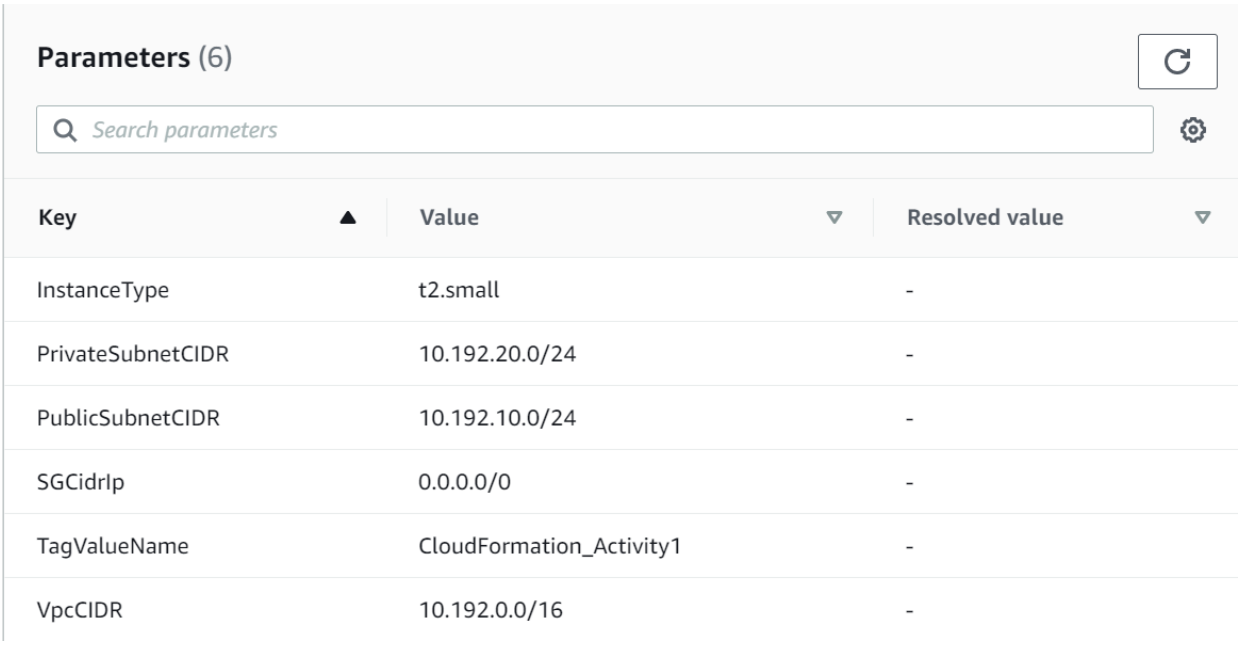
Timestamp	Logical ID	Status	Status reason
2022-04-18 15:52:46 UTC+0530	CloudFormation-Activity1	CREATE_COMPLETE	-
2022-04-18 15:52:44 UTC+0530	PrivateRoute	CREATE_COMPLETE	-
2022-04-18 15:52:28 UTC+0530	PrivateRoute	CREATE_IN_PROGRESS	Resource creation Initiated
2022-04-18 15:52:27 UTC+0530	PrivateRoute	CREATE_IN_PROGRESS	-
2022-04-18 15:52:24 UTC+0530	NatGateway	CREATE_COMPLETE	-
2022-04-18 15:50:51 UTC+0530	NatGateway	CREATE_IN_PROGRESS	Resource creation Initiated
2022-04-18 15:50:51 UTC+0530	NatGateway	CREATE_IN_PROGRESS	-
2022-04-18 15:50:48 UTC+0530	EIPforNatGateway	CREATE_COMPLETE	-
2022-04-18 15:50:48 UTC+0530	PublicRoute	CREATE_COMPLETE	-
2022-04-18 15:50:47 UTC+0530	EIPforNatGateway	CREATE_IN_PROGRESS	Resource creation Initiated

Timestamp	Logical ID	Status	Status reason
2022-04-18 15:50:38 UTC+0530	PublicEC2Instance	CREATE_COMPLETE	-
2022-04-18 15:50:36 UTC+0530	PrivateEC2Instance	CREATE_COMPLETE	-
2022-04-18 15:50:32 UTC+0530	PublicRoute	CREATE_IN_PROGRESS	Resource creation Initiated
2022-04-18 15:50:32 UTC+0530	EIPforNatGateway	CREATE_IN_PROGRESS	-
2022-04-18 15:50:31 UTC+0530	PublicRoute	CREATE_IN_PROGRESS	-
2022-04-18 15:50:29 UTC+0530	VPCGatewayAttachment	CREATE_COMPLETE	-
2022-04-18 15:50:23 UTC+0530	PublicSubnetRouteTableAssociation	CREATE_COMPLETE	-
2022-04-18 15:50:13 UTC+0530	VPCGatewayAttachment	CREATE_IN_PROGRESS	Resource creation Initiated
2022-04-18 15:50:13 UTC+0530	VPCGatewayAttachment	CREATE_IN_PROGRESS	-
2022-04-18 15:50:12 UTC+0530	PrivateSubnetRouteTableAssociatio	CREATE_COMPLETE	-
2022-04-18 15:50:11 UTC+0530	PrivateSubnetRouteTableAssociation	CREATE_IN_PROGRESS	Resource creation Initiated
2022-04-18 15:50:11 UTC+0530	PublicSubnetRouteTableAssociation	CREATE_IN_PROGRESS	Resource creation Initiated
2022-04-18 15:50:10 UTC+0530	InternetGateway	CREATE_COMPLETE	-
2022-04-18 15:50:08 UTC+0530	PrivateSubnetRouteTableAssociation	CREATE_IN_PROGRESS	-

Timestamp	Logical ID	Status	Status reason
2022-04-18 15:50:08 UTC+0530	PublicSubnetRouteTableAssociation	CREATE_IN_PROGRESS	-
2022-04-18 15:50:05 UTC+0530	PublicRouteTable	CREATE_COMPLETE	-
2022-04-18 15:50:05 UTC+0530	PublicEC2Instance	CREATE_IN_PROGRESS	Resource creation Initiated
2022-04-18 15:50:05 UTC+0530	PrivateRouteTable	CREATE_COMPLETE	-
2022-04-18 15:50:03 UTC+0530	PrivateEC2Instance	CREATE_IN_PROGRESS	Resource creation Initiated
2022-04-18 15:50:02 UTC+0530	PublicEC2Instance	CREATE_IN_PROGRESS	-
2022-04-18 15:50:00 UTC+0530	PrivateEC2Instance	CREATE_IN_PROGRESS	-
2022-04-18 15:49:59 UTC+0530	PublicSubnet	CREATE_COMPLETE	-
2022-04-18 15:49:58 UTC+0530	InstanceSecurityGroup	CREATE_COMPLETE	-
2022-04-18 15:49:57 UTC+0530	InstanceSecurityGroup	CREATE_IN_PROGRESS	Resource creation Initiated
2022-04-18 15:49:57 UTC+0530	PrivateSubnet	CREATE_COMPLETE	-
2022-04-18 15:49:55 UTC+0530	PublicSubnet	CREATE_IN_PROGRESS	Resource creation Initiated
2022-04-18 15:49:53 UTC+0530	PrivateSubnet	CREATE_IN_PROGRESS	Resource creation Initiated
2022-04-18 15:49:53 UTC+0530	PrivateRouteTable	CREATE_IN_PROGRESS	Resource creation Initiated
2022-04-18 15:49:52 UTC+0530	PublicRouteTable	CREATE_IN_PROGRESS	Resource creation Initiated

Timestamp	Logical ID	Status	Status reason
2022-04-18 15:49:51 UTC+0530	PublicSubnet	CREATE_IN_PROGRESS	-
2022-04-18 15:49:51 UTC+0530	PrivateSubnet	CREATE_IN_PROGRESS	-
2022-04-18 15:49:51 UTC+0530	InstanceSecurityGroup	CREATE_IN_PROGRESS	-
2022-04-18 15:49:50 UTC+0530	PublicRouteTable	CREATE_IN_PROGRESS	-
2022-04-18 15:49:50 UTC+0530	PrivateRouteTable	CREATE_IN_PROGRESS	-
2022-04-18 15:49:48 UTC+0530	VPC	CREATE_COMPLETE	-
2022-04-18 15:49:33 UTC+0530	InternetGateway	CREATE_IN_PROGRESS	Resource creation Initiated
2022-04-18 15:49:32 UTC+0530	VPC	CREATE_IN_PROGRESS	Resource creation Initiated
2022-04-18 15:49:31 UTC+0530	VPC	CREATE_IN_PROGRESS	-
2022-04-18 15:49:31 UTC+0530	InternetGateway	CREATE_IN_PROGRESS	-
2022-04-18 15:49:26 UTC+0530	CloudFormation-Activity1	CREATE_IN_PROGRESS	User Initiated

3. Parameters



Parameters (6)

Search parameters

Key	Value	Resolved value
InstanceType	t2.small	-
PrivateSubnetCIDR	10.192.20.0/24	-
PublicSubnetCIDR	10.192.10.0/24	-
SGCidrIp	0.0.0.0/0	-
TagValueName	CloudFormation_Activity1	-
VpcCIDR	10.192.0.0/16	-

4. Resources

Resources (16)

Search resources

Logical ID	Physical ID	Type	Status
EIPforNatGateway	52.7.115.80	AWS::EC2::EIP	CREATE_COMPLETE
InstanceSecurityGroup	sg-0443ded5d2536132a	AWS::EC2::SecurityGroup	CREATE_COMPLETE
InternetGateway	igw-0ed63fc5475436526	AWS::EC2::InternetGateway	CREATE_COMPLETE
NatGateway	nat-0c0bf3b8e399950ec	AWS::EC2::NatGateway	CREATE_COMPLETE
PrivateEC2Instance	i-0d73fea789bcff9ae	AWS::EC2::Instance	CREATE_COMPLETE
PrivateRoute	Cloud-Priva-3MPRT2CPTJ63	AWS::EC2::Route	CREATE_COMPLETE
PrivateRouteTable	rtb-040c224abc7158804	AWS::EC2::RouteTable	CREATE_COMPLETE
PrivateSubnet	subnet-082081dbe0404c8d8	AWS::EC2::Subnet	CREATE_COMPLETE
PrivateSubnetRouteTableAssociation	rtbassoc-0b84a171f6fa98235	AWS::EC2::SubnetRouteTableAssociation	CREATE_COMPLETE
PublicEC2Instance	i-04dbb7d3403360e12	AWS::EC2::Instance	CREATE_COMPLETE
PublicRoute	Cloud-Publi-1P9LY2UNWSC0Y	AWS::EC2::Route	CREATE_COMPLETE
PublicRouteTable	rtb-0553267638c26ead6	AWS::EC2::RouteTable	CREATE_COMPLETE
PublicSubnet	subnet-0f616ec90b62ca49f	AWS::EC2::Subnet	CREATE_COMPLETE
PublicSubnetRouteTableAssociation	rtbassoc-05c46253312ec5ece	AWS::EC2::SubnetRouteTableAssociation	CREATE_COMPLETE
VPC	vpc-005b4bc26b23c5604	AWS::EC2::VPC	CREATE_COMPLETE
VPCGatewayAttachment	Cloud-VPCGa-1VL6V7889FIHW	AWS::EC2::VPCGatewayAttachment	CREATE_COMPLETE

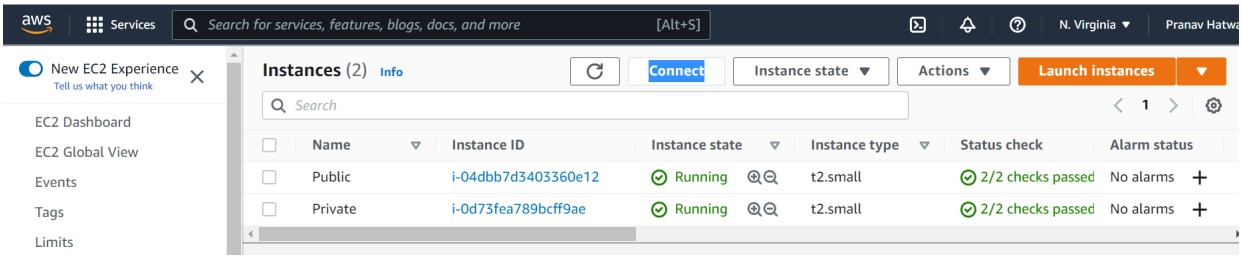
5. Outputs

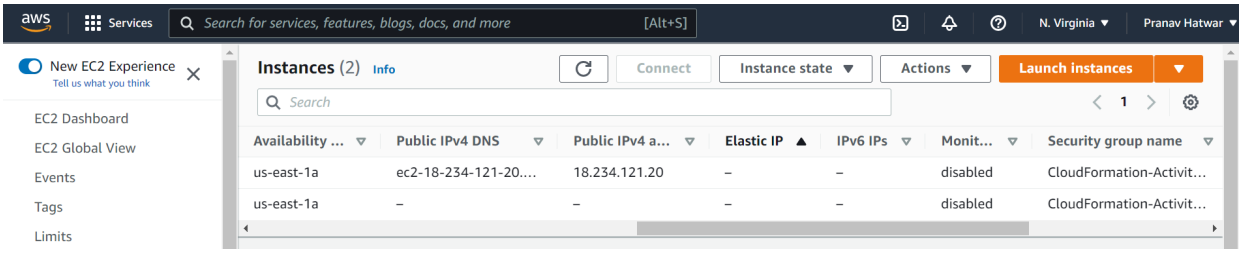
Outputs (5)

Search outputs

Key	Value	Description
PrivateEc2	i-0d73fea789bcff9ae,10.192.20.47	InstanceId,PrivateIp
PrivateSubnet	subnet-082081dbe0404c8d8	Private SubnetId
PublicEc2	i-04dbb7d3403360e12,18.234.121.20,10.192.10.69	InstanceId,PublicIp,PrivateIp
PublicSubnet	subnet-0f616ec90b62ca49f	Public SubnetId
VPC	vpc-005b4bc26b23c5604	VPC ID

6. Ec2





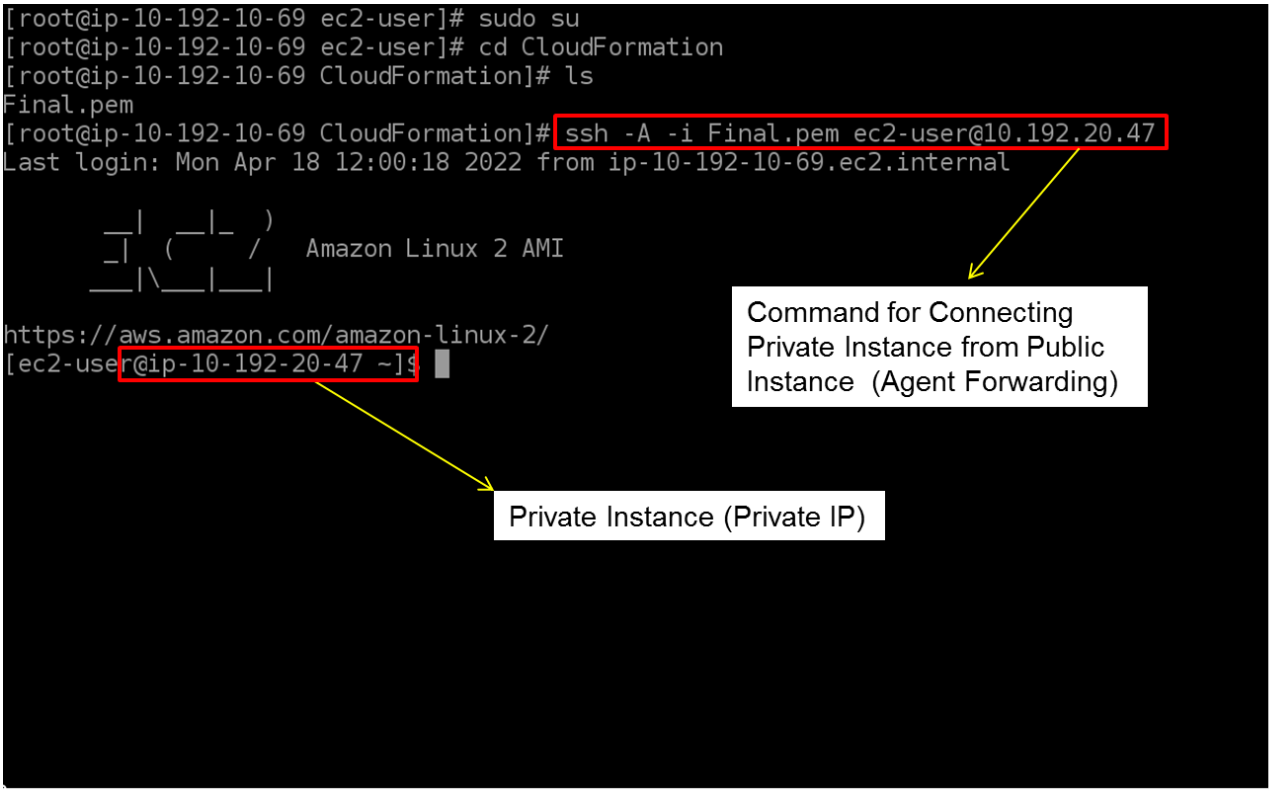
7. SSH to the Public Instance.

```
Last login: Mon Apr 18 12:01:50 2022 from ec2-18-206-107-25.compute-1.amazonaws.com

       __|  __|_  )
       _|  (     /   Amazon Linux 2 AMI
      ___|\___|___|

https://aws.amazon.com/amazon-linux-2/
[ec2-user@ip-10-192-10-69 ~]$
```

i-04dbb7d3403360e12 (Public)

Public IPs: 18.234.121.20 Private IPs: 10.192.10.69

8. SSH to the Private Instance.



i-04dbb7d3403360e12 (Public)

Public IPs: 18.234.121.20 Private IPs: 10.192.10.69

9. CloudFormation Template

```
## ================== VERSION ================== #
AWSTemplateFormatVersion: 2010-09-09

## ================== DESCRIPTION ================== #
Description: >-
  Create a VPC with public and private subnets and launch ec2 Instance in each Subnet

## ================== PARAMETERS ================== #
Parameters:
  VpcCIDR:
    Description: IP Address with CIDR notation for VPC
    Type: String
    Default: 10.192.0.0/16
  PublicSubnetCIDR:
```

```
    Description: IP Address with CIDR notation for the public subnet
    Type: String
    Default: 10.192.10.0/24
  PrivateSubnetCIDR:
    Description: IP Address with CIDR notation for the private subnet
    Type: String
    Default: 10.192.20.0/24
  TagValueName:
    Description: Tag value name is "CloudFormation_Activity1"
    Type: String
    Default: CloudFormation_Activity1
  InstanceType:
    Type: String
    Description: Select the Instance type from the list
    AllowedValues:
      - t2.nano
      - t2.micro
      - t2.small
      - t2.medium
      - t2.large
      - t2.xlarge
      - t2.2xlarge
    Default: t2.small
  SGCidrIp:
    Description: The IP address range that can be used to SSH to the EC2 instances
    Type: String
    MinLength: 9
    MaxLength: 18
    Default: 0.0.0.0/0
    AllowedPattern: (\d{1,3})\.(\d{1,3})\.(\d{1,3})\.(\d{1,3})/(\d{1,2})
    ConstraintDescription: must be a valid IP CIDR range of the form x.x.x.x/x.

## ================== MAPPINGS================== #
Mappings:
  RegionToAMIMapping:
    us-east-1:
      "HVM64": "ami-03ededff12e34e59e"
```

```
    us-west-1:
      "HVM64": "ami-0bdb828fd58c52235"
    eu-west-1:
      "HVM64": "ami-047bb4163c506cd98"
    ap-southeast-1:
      "HVM64": "ami-08569b978cc4dfa10"
    ap-northeast-1:
      "HVM64": "ami-06cd52961ce9f0d85"
    ap-south-1:
      "HVM64": "ami-04893cdb768d0f9ee"

## ================== RESOURCES ================== #
Resources:
  #Create a VPC
  VPC:
    Type: AWS::EC2::VPC
    Properties:
      CidrBlock: !Ref VpcCIDR
      EnableDnsSupport: true
      EnableDnsHostnames: true
      Tags:
      - Key: Name
        Value:  !Ref TagValueName

  # Create a Internet Gateway
  InternetGateway:
    Type: AWS::EC2::InternetGateway
    Properties:
      Tags:
      - Key: Name
        Value:  !Ref TagValueName

  # Attaching the Internet Gateway to the VPC
  VPCGatewayAttachment:
    Type: AWS::EC2::VPCGatewayAttachment
    Properties:
      VpcId: !Ref VPC
```

```
    InternetGatewayId: !Ref InternetGateway

# Create a public route table for the VPC
PublicRouteTable:
  Type: AWS::EC2::RouteTable
  Properties:
    VpcId: !Ref VPC
    Tags:
    - Key: Name
      Value: PublicRouteTable

# Associate the public route table with the Internet Gateway
PublicRoute:
  Type: AWS::EC2::Route
  DependsOn: VPCGatewayAttachment
  Properties:
    RouteTableId: !Ref PublicRouteTable
    DestinationCidrBlock: 0.0.0.0/0
    GatewayId: !Ref InternetGateway

# Create a public subnet
PublicSubnet:
  Type: AWS::EC2::Subnet
  Properties:
    VpcId: !Ref VPC
    AvailabilityZone: !Select [ 0, !GetAZs '' ]
    CidrBlock: !Ref PublicSubnetCIDR
    MapPublicIpOnLaunch: true
    Tags:
    - Key: Name
      Value: PublicSubnet

# Associate the public route table with the public subnet
PublicSubnetRouteTableAssociation:
  Type: AWS::EC2::SubnetRouteTableAssociation
  Properties:
    RouteTableId: !Ref PublicRouteTable
```

```
    SubnetId: !Ref PublicSubnet

# Specify an Elastic IP (EIP) address for a NAT Gateway
EIPforNatGateway:
  Type: AWS::EC2::EIP
  DependsOn: VPCGatewayAttachment
  Properties:
    Domain: vpc
    Tags:
    - Key: Name
      Value:  !Ref TagValueName

# Create a NAT Gateway in the public subnet
NatGateway:
  Type: AWS::EC2::NatGateway
  Properties:
    AllocationId: !GetAtt EIPforNatGateway.AllocationId
    SubnetId: !Ref PublicSubnet
    Tags:
    - Key: Name
      Value:  !Ref TagValueName

# Create a private route table
PrivateRouteTable:
  Type: AWS::EC2::RouteTable
  Properties:
    VpcId: !Ref VPC
    Tags:
    - Key: Name
      Value: PrivateRouteTable

# Associate the private route table with the Nat Gateway
PrivateRoute:
  Type: AWS::EC2::Route
  DependsOn: VPCGatewayAttachment
  Properties:
    RouteTableId: !Ref PrivateRouteTable
```

```
    DestinationCidrBlock: 0.0.0.0/0
    NatGatewayId: !Ref NatGateway

  # Create a private subnet
  PrivateSubnet:
    Type: AWS::EC2::Subnet
    Properties:
      VpcId: !Ref VPC
      AvailabilityZone: !Select [ 0, !GetAZs '' ]
      CidrBlock: !Ref PrivateSubnetCIDR
      MapPublicIpOnLaunch: false
      Tags:
      - Key: Name
        Value: PrivateSubnet

  #  Associate the private route table with the private subnet
  PrivateSubnetRouteTableAssociation:
    Type: AWS::EC2::SubnetRouteTableAssociation
    Properties:
      RouteTableId: !Ref PrivateRouteTable
      SubnetId: !Ref PrivateSubnet

 # Create a Instance in private subnet
  PrivateEC2Instance:
    Type: AWS::EC2::Instance
    Properties:
      ImageId: !FindInMap [RegionToAMIMapping, !Ref AWS::Region, HVM64]
      InstanceType: !Ref InstanceType
      SubnetId: !Ref PrivateSubnet
      KeyName: Final
      SecurityGroupIds:
        - !Ref InstanceSecurityGroup
      Tags:
        - Key: Name
          Value: Private

  # Create a Instance in public subnet
```

```
  PublicEC2Instance:
    Type: AWS::EC2::Instance
    Properties:
      ImageId: !FindInMap [RegionToAMIMapping, !Ref AWS::Region, HVM64]
      InstanceType: !Ref InstanceType
      SubnetId: !Ref PublicSubnet
      KeyName: Final
      SecurityGroupIds:
        - !Ref InstanceSecurityGroup
      Tags:
        - Key: Name
          Value: Public

 # Create a SecurityGroup
  InstanceSecurityGroup:
    Type: AWS::EC2::SecurityGroup
    Properties:
      GroupDescription: Enable SSH access via port 22
      VpcId: !Ref VPC
      SecurityGroupIngress:
      - IpProtocol: tcp
        FromPort: 22
        ToPort: 22
        CidrIp: 0.0.0.0/0
      - IpProtocol: tcp
        FromPort: 80
        ToPort: 80
        CidrIp: 0.0.0.0/0

## ================== OUTPUTS ================== #
Outputs:
  VPC:
    Description: VPC ID
    Value: !Ref VPC
  PublicSubnet:
    Description: Public SubnetId
    Value: !Ref PublicSubnet
```

```
  PrivateSubnet:
    Description: Private SubnetId
    Value:  !Ref PrivateSubnet
  PublicEc2:
    Description: InstanceId,PublicIp,PrivateIp
    Value: !Join [ ",", [!Ref PublicEC2Instance,!GetAtt  PublicEC2Instance.PublicIp , !GetAtt
PublicEC2Instance.PrivateIp]]
  PrivateEc2:
    Description: InstanceId,PrivateIp
    Value: !Join [ ",", [!Ref PrivateEC2Instance, !GetAtt PrivateEC2Instance.PrivateIp]]
```