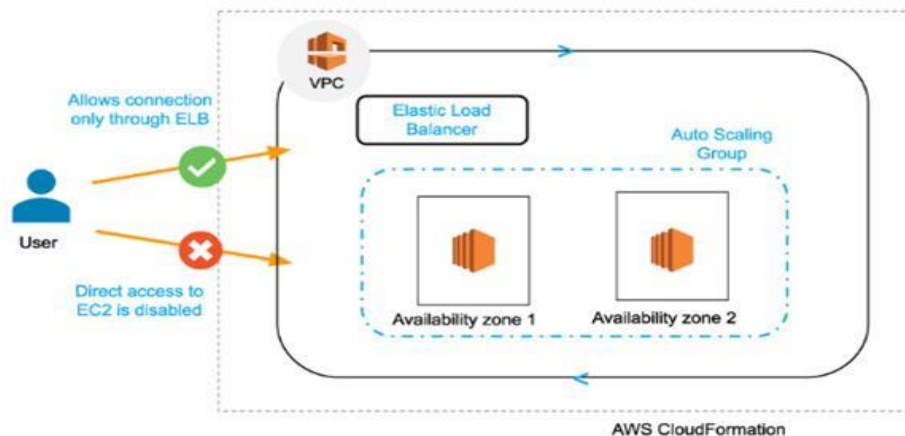


## ASSIGNMENT ON CLOUD FORMATION

Ques-Create a VPC with 2 public subnets, 2 private subnets in two different availability zones. Create an autoscaling group (with 2 ec2 instances running from two private subnets). The EC2 instances in the autoscaling group should have apache webserver installed and run on port 80. Create an Application load balancer and add the instances as target group. After successfully created the stack, you should get an URL of application load balancer which can be browsed from a browser to access the contents of EC2 instances.

Sol:-



Code for the cloud formation:

```
{
  "AWSTemplateFormatVersion": "2010-09-09",
  "Description": "My simple EC2 instance",
  "Parameters": {
    "KeyName": {
      "Description": "Name of an existing EC2 KeyPair",
      "Type": "AWS::EC2::KeyPair::KeyName",
      "Default": "puttykey",
      "ConstraintDescription": "must be the name of an existing EC2 KeyPair."
    },
    "InstanceType": {
      "Description": "WebServer EC2 instance type",
      "Type": "String",
```

"Default": "t2.micro",

"AllowedValues": [

    "t1.micro",

    "t2.nano",

    "t2.micro",

    "t2.small",

    "t2.medium",

    "t2.large",

    "m1.small",

    "m1.medium",

    "m1.large",

    "m1.xlarge",

    "m2.xlarge",

    "m2.2xlarge",

    "m2.4xlarge",

    "m3.medium",

    "m3.large",

    "m3.xlarge",

    "m3.2xlarge",

    "m4.large",

    "m4.xlarge",

    "m4.2xlarge",

    "m4.4xlarge",

    "m4.10xlarge",

    "c1.medium",

    "c1.xlarge",

    "c3.large",

"c3.xlarge",  
"c3.2xlarge",  
"c3.4xlarge",  
"c3.8xlarge",  
"c4.large",  
"c4.xlarge",  
"c4.2xlarge",  
"c4.4xlarge",  
"c4.8xlarge",  
"g2.2xlarge",  
"g2.8xlarge",  
"r3.large",  
"r3.xlarge",  
"r3.2xlarge",  
"r3.4xlarge",  
"r3.8xlarge",  
"i2.xlarge",  
"i2.2xlarge",  
"i2.4xlarge",  
"i2.8xlarge",  
"d2.xlarge",  
"d2.2xlarge",  
"d2.4xlarge",  
"d2.8xlarge",  
"hi1.4xlarge",  
"hs1.8xlarge",  
"cr1.8xlarge",

```

    "cc2.8xlarge",
    "cg1.4xlarge"
  ],
  "ConstraintDescription": "must be a valid EC2 instance type."
},
"SSHLocation" : {
  "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})"
},
"CIDRVpc" : {
  "Description" : "The IP address range that can be used to SSH to the EC2 instances",
  "Type": "String",
  "Default" : "10.0.0.0/16"
}
},
"Mappings": {
  "AWSInstanceType2Arch": {
    "t1.micro": {
      "Arch": "HVM64"
    },
    "t2.nano": {
      "Arch": "HVM64"
    }
  }
}

```

```
},  
"t2.micro": {  
  "Arch": "HVM64"  
},  
"t2.small": {  
  "Arch": "HVM64"  
},  
"t2.medium": {  
  "Arch": "HVM64"  
},  
"t2.large": {  
  "Arch": "HVM64"  
},  
"m1.small": {  
  "Arch": "HVM64"  
},  
"m1.medium": {  
  "Arch": "HVM64"  
},  
"m1.large": {  
  "Arch": "HVM64"  
},  
"m1.xlarge": {  
  "Arch": "HVM64"  
},  
"m2.xlarge": {  
  "Arch": "HVM64"
```

```
},  
"m2.2xlarge": {  
  "Arch": "HVM64"  
},  
"m2.4xlarge": {  
  "Arch": "HVM64"  
},  
"m3.medium": {  
  "Arch": "HVM64"  
},  
"m3.large": {  
  "Arch": "HVM64"  
},  
  
"m3.xlarge": {  
  "Arch": "HVM64"  
},  
"m3.2xlarge": {  
  "Arch": "HVM64"  
},  
"m4.large": {  
  "Arch": "HVM64"  
},  
"m4.xlarge": {  
  "Arch": "HVM64"  
},  
"m4.2xlarge": {
```

```
    "Arch": "HVM64"
  },
  "m4.4xlarge": {
    "Arch": "HVM64"
  },
  "m4.10xlarge": {
    "Arch": "HVM64"
  },
  "c1.medium": {
    "Arch": "HVM64"
  },
  "c1.xlarge": {
    "Arch": "HVM64"
  },
  "c3.large": {
    "Arch": "HVM64"
  },
  "c3.xlarge": {
    "Arch": "HVM64"
  },
  "c3.2xlarge": {
    "Arch": "HVM64"
  },
  "c3.4xlarge": {
    "Arch": "HVM64"
  },
  "c3.8xlarge": {
```

```
    "Arch": "HVM64"
  },
  "c4.large": {
    "Arch": "HVM64"
  },
  "c4.xlarge": {
    "Arch": "HVM64"
  },
  "c4.2xlarge": {
    "Arch": "HVM64"
  },
  "c4.4xlarge": {
    "Arch": "HVM64"
  },
  "c4.8xlarge": {
    "Arch": "HVM64"
  },
  "g2.2xlarge": {
    "Arch": "HVMG2"
  },
  "g2.8xlarge": {
    "Arch": "HVMG2"
  },
  "r3.large": {
    "Arch": "HVM64"
  },
  "r3.xlarge": {
```



```
    "Arch": "HVM64"
  },
  "r3.2xlarge": {
    "Arch": "HVM64"
  },
  "r3.4xlarge": {
    "Arch": "HVM64"
  },
  "r3.8xlarge": {
    "Arch": "HVM64"
  },
  "i2.xlarge": {
    "Arch": "HVM64"
  },
  "i2.2xlarge": {
    "Arch": "HVM64"
  },
  "i2.4xlarge": {
    "Arch": "HVM64"
  },
  "i2.8xlarge": {
    "Arch": "HVM64"
  },
  "d2.xlarge": {
    "Arch": "HVM64"
  },
  "d2.2xlarge": {
```

```
    "Arch": "HVM64"
  },
  "d2.4xlarge": {
    "Arch": "HVM64"
  },
  "d2.8xlarge": {
    "Arch": "HVM64"
  },
  "hi1.4xlarge": {
    "Arch": "HVM64"
  },
  "hs1.8xlarge": {
    "Arch": "HVM64"
  },
  "cr1.8xlarge": {
    "Arch": "HVM64"
  },
  "cc2.8xlarge": {
    "Arch": "HVM64"
  }
},
"AWSInstanceType2NATArch": {
  "t1.micro": {
    "Arch": "NATHVM64"
  },
  "t2.nano": {
    "Arch": "NATHVM64"
```

```
},  
"t2.micro": {  
  "Arch": "NATHVM64"  
},  
"t2.small": {  
  "Arch": "NATHVM64"  
},  
"t2.medium": {  
  "Arch": "NATHVM64"  
},  
"t2.large": {  
  "Arch": "NATHVM64"  
},  
"m1.small": {  
  "Arch": "NATHVM64"  
},  
"m1.medium": {  
  "Arch": "NATHVM64"  
},  
"m1.large": {  
  "Arch": "NATHVM64"  
},  
"m1.xlarge": {  
  "Arch": "NATHVM64"  
},  
"m2.xlarge": {  
  "Arch": "NATHVM64"
```

```
},  
"m2.2xlarge": {  
  "Arch": "NATHVM64"  
},  
"m2.4xlarge": {  
  "Arch": "NATHVM64"  
},  
"m3.medium": {  
  "Arch": "NATHVM64"  
},  
"m3.large": {  
  "Arch": "NATHVM64"  
},  
"m3.xlarge": {  
  "Arch": "NATHVM64"  
},  
"m3.2xlarge": {  
  "Arch": "NATHVM64"  
},  
"m4.large": {  
  "Arch": "NATHVM64"  
},  
"m4.xlarge": {  
  "Arch": "NATHVM64"  
},  
"m4.2xlarge": {  
  "Arch": "NATHVM64"
```

```
},  
"m4.4xlarge": {  
  "Arch": "NATHVM64"  
},  
"m4.10xlarge": {  
  "Arch": "NATHVM64"  
},  
"c1.medium": {  
  "Arch": "NATHVM64"  
},  
"c1.xlarge": {  
  "Arch": "NATHVM64"  
},  
"c3.large": {  
  "Arch": "NATHVM64"  
},  
"c3.xlarge": {  
  "Arch": "NATHVM64"  
},  
"c3.2xlarge": {  
  "Arch": "NATHVM64"  
},  
"c3.4xlarge": {  
  "Arch": "NATHVM64"  
},  
"c3.8xlarge": {  
  "Arch": "NATHVM64"
```

```
},  
"c4.large": {  
  "Arch": "NATHVM64"  
},  
"c4.xlarge": {  
  "Arch": "NATHVM64"  
},  
"c4.2xlarge": {  
  "Arch": "NATHVM64"  
},  
"c4.4xlarge": {  
  "Arch": "NATHVM64"  
},  
"c4.8xlarge": {  
  "Arch": "NATHVM64"  
},  
"g2.2xlarge": {  
  "Arch": "NATHVMG2"  
},  
"g2.8xlarge": {  
  "Arch": "NATHVMG2"  
},  
"r3.large": {  
  "Arch": "NATHVM64"  
},  
"r3.xlarge": {  
  "Arch": "NATHVM64"
```

```
},  
"r3.2xlarge": {  
  "Arch": "NATHVM64"  
},  
"r3.4xlarge": {  
  "Arch": "NATHVM64"  
},  
"r3.8xlarge": {  
  "Arch": "NATHVM64"  
},  
"i2.xlarge": {  
  "Arch": "NATHVM64"  
},  
"i2.2xlarge": {  
  "Arch": "NATHVM64"  
},  
"i2.4xlarge": {  
  "Arch": "NATHVM64"  
},  
"i2.8xlarge": {  
  "Arch": "NATHVM64"  
},  
"d2.xlarge": {  
  "Arch": "NATHVM64"  
},  
"d2.2xlarge": {  
  "Arch": "NATHVM64"
```

```
    },
    "d2.4xlarge": {
      "Arch": "NATHVM64"
    },
    "d2.8xlarge": {
      "Arch": "NATHVM64"
    },
    "hi1.4xlarge": {
      "Arch": "NATHVM64"
    },
    "hs1.8xlarge": {
      "Arch": "NATHVM64"
    },
    "cr1.8xlarge": {
      "Arch": "NATHVM64"
    },
    "cc2.8xlarge": {
      "Arch": "NATHVM64"
    }
  },
  "AWSRegionArch2AMI": {
    "us-east-1": {
      "HVM64": "ami-0080e4c5bc078760e",
      "HVMG2": "ami-0aeb704d503081ea6"
    },
    "us-west-2": {
      "HVM64": "ami-01e24be29428c15b2",
```



```
    "HVMG2": "ami-0fe84a5b4563d8f27"
  },
  "us-west-1": {
    "HVM64": "ami-0ec6517f6edbf8044",
    "HVMG2": "ami-0a7fc72dc0e51aa77"
  },
  "eu-west-1": {
    "HVM64": "ami-08935252a36e25f85",
    "HVMG2": "ami-0d5299b1c6112c3c7"
  },
  "eu-west-2": {
    "HVM64": "ami-01419b804382064e4",
    "HVMG2": "NOT_SUPPORTED"
  },
  "eu-west-3": {
    "HVM64": "ami-0dd7e7ed60da8fb83",
    "HVMG2": "NOT_SUPPORTED"
  },
  "eu-central-1": {
    "HVM64": "ami-0cfbf4f6db41068ac",
    "HVMG2": "ami-0aa1822e3eb913a11"
  },
  "eu-north-1": {
    "HVM64": "ami-86fe70f8",
    "HVMG2": "ami-32d55b4c"
  },
  "ap-northeast-1": {
```

```
    "HVM64": "ami-00a5245b4816c38e6",
    "HVMG2": "ami-09d0e0e099ecabba2"
  },
  "ap-northeast-2": {
    "HVM64": "ami-00dc207f8ba6dc919",
    "HVMG2": "NOT_SUPPORTED"
  },
  "ap-northeast-3": {
    "HVM64": "ami-0b65f69a5c11f3522",
    "HVMG2": "NOT_SUPPORTED"
  },
  "ap-southeast-1": {
    "HVM64": "ami-05b3bcf7f311194b3",
    "HVMG2": "ami-0e46ce0d6a87dc979"
  },
  "ap-southeast-2": {
    "HVM64": "ami-02fd0b06f06d93dfc",
    "HVMG2": "ami-0c0ab057a101d8ff2"
  },
  "ap-south-1": {
    "HVM64": "ami-0ad42f4f66f6c1cc9",
    "HVMG2": "ami-0244c1d42815af84a"
  },
  "us-east-2": {
    "HVM64": "ami-0cd3dfa4e37921605",
    "HVMG2": "NOT_SUPPORTED"
  },
}
```

```
"ca-central-1": {
  "HVM64": "ami-07423fb63ea0a0930",
  "HVMG2": "NOT_SUPPORTED"
},
"sa-east-1": {
  "HVM64": "ami-05145e0b28ad8e0b2",
  "HVMG2": "NOT_SUPPORTED"
},
"cn-north-1": {
  "HVM64": "ami-053617c9d818c1189",
  "HVMG2": "NOT_SUPPORTED"
},
"cn-northwest-1": {
  "HVM64": "ami-0f7937761741dc640",
  "HVMG2": "NOT_SUPPORTED"
}
},
"Resources" : {
  "VPC": {
    "Type": "AWS::EC2::VPC",
    "Properties": {
      "CidrBlock": { "Ref" : "CIDRVpc" },
      "EnableDnsSupport": "true",
      "EnableDnsHostnames": "false",
      "InstanceTenancy": "default"
    }
  }
}
```

```
    },  
    "InternetGateway" : {  
        "Type" : "AWS::EC2::InternetGateway"  
    },  
    "AttachGateway" : {  
        "Type" : "AWS::EC2::VPCGatewayAttachment",  
        "Properties" : {  
            "VpcId" : { "Ref" : "VPC" },  
            "InternetGatewayId" : { "Ref" : "InternetGateway" }  
        }  
    },  
    "PublicRouteTable" : {  
        "Type" : "AWS::EC2::RouteTable",  
        "Properties" : {  
            "VpcId" : { "Ref" : "VPC" }  
        }  
    },  
    "PublicRoute" : {  
        "Type" : "AWS::EC2::Route",  
        "DependsOn" : "AttachGateway",  
        "Properties" : {  
            "RouteTableId" : { "Ref" : "PublicRouteTable" },  
            "DestinationCidrBlock" : "0.0.0.0/0",  
            "GatewayId" : { "Ref" : "InternetGateway" }  
        }  
    },  
    "PublicSubnet1": {
```

```

    "Type": "AWS::EC2::Subnet",

    "Properties": {

        "AvailabilityZone": {

            "Fn::Select" : [ "0", { "Fn::GetAZs" : { "Ref" : "AWS::Region" } } ]

        },

        "CidrBlock": "10.0.0.0/24",

        "MapPublicIpOnLaunch": "true",

        "VpcId": {

            "Ref": "VPC"

        }

    }

},

"PublicSubnet1RouteTableAssociation" : {

    "Type" : "AWS::EC2::SubnetRouteTableAssociation",

    "Properties" : {

        "SubnetId" : { "Ref" : "PublicSubnet1" },

        "RouteTableId" : { "Ref" : "PublicRouteTable" }

    }

},

"PublicSubnet2": {

    "Type": "AWS::EC2::Subnet",

    "Properties": {

        "AvailabilityZone": {

            "Fn::Select" : [ "1", { "Fn::GetAZs" : { "Ref" : "AWS::Region" } } ]

        },

        "CidrBlock": "10.0.1.0/24",

        "MapPublicIpOnLaunch": "true",

```

```
    "VpcId": {
      "Ref": "VPC"
    }
  },
  "PublicSubnet2RouteTableAssociation" : {
    "Type" : "AWS::EC2::SubnetRouteTableAssociation",
    "Properties" : {
      "SubnetId" : { "Ref" : "PublicSubnet2" },
      "RouteTableId" : { "Ref" : "PublicRouteTable" }
    }
  },
  "PublicNetworkAcl" : {
    "Type" : "AWS::EC2::NetworkAcl",
    "Properties" : {
      "VpcId" : { "Ref" : "VPC" }
    }
  },
  "InboundHTTPPublicNetworkAclEntry" : {
    "Type" : "AWS::EC2::NetworkAclEntry",
    "Properties" : {
      "NetworkAclId" : { "Ref" : "PublicNetworkAcl" },
      "RuleNumber" : "100",
      "Protocol" : "6",
      "RuleAction" : "allow",
      "Egress" : "false",
      "CidrBlock" : "0.0.0.0/0",
```

```
    "PortRange" : {"From" : "80", "To" : "80"}  
  }  
},
```

```
"InboundDynamicPortsPublicNetworkAclEntry" : {  
  "Type" : "AWS::EC2::NetworkAclEntry",  
  "Properties" : {  
    "NetworkAclId" : {"Ref" : "PublicNetworkAcl"},  
    "RuleNumber" : "101",  
    "Protocol" : "6",  
    "RuleAction" : "allow",  
    "Egress" : "false",  
    "CidrBlock" : "0.0.0.0/0",  
    "PortRange" : {"From" : "1024", "To" : "65535"}  
  }  
},
```

```
"OutboundHTTTPublicNetworkAclEntry" : {  
  "Type" : "AWS::EC2::NetworkAclEntry",  
  "Properties" : {  
    "NetworkAclId" : {"Ref" : "PublicNetworkAcl"},  
    "RuleNumber" : "100",  
    "Protocol" : "6",  
    "RuleAction" : "allow",  
    "Egress" : "true",  
    "CidrBlock" : "0.0.0.0/0",  
    "PortRange" : {"From" : "80", "To" : "80"}  
  }  
},
```

```
}  
  
,  
  
"OutBoundDynamicPortPublicNetworkAclEntry" : {  
  "Type" : "AWS::EC2::NetworkAclEntry",  
  "Properties" : {  
    "NetworkAclId" : {"Ref" : "PublicNetworkAcl"},  
    "RuleNumber" : "101",  
    "Protocol" : "6",  
    "RuleAction" : "allow",  
    "Egress" : "true",  
    "CidrBlock" : "0.0.0.0/0",  
    "PortRange" : {"From" : "1024", "To" : "65535"}  
  }  
},
```

```
"PublicSubnetNetworkAclAssociation" : {  
  "Type" : "AWS::EC2::SubnetNetworkAclAssociation",  
  "Properties" : {  
    "SubnetId" : { "Ref" : "PublicSubnet1" },  
    "NetworkAclId" : { "Ref" : "PublicNetworkAcl" }  
  }  
},
```

```
"PrivateSubnet1" : {  
  "Type" : "AWS::EC2::Subnet",  
  "Properties" : {
```



```

    "VpcId" : { "Ref" : "VPC" },
    "AvailabilityZone": {
        "Fn::Select" : [ "0", { "Fn::GetAZs" : { "Ref" : "AWS::Region" } } ]
    },
    "CidrBlock": "10.0.2.0/24"
}
},
"PrivateRouteTable" : {
    "Type" : "AWS::EC2::RouteTable",
    "Properties" : {
        "VpcId" : { "Ref" : "VPC" }
    }
},
"PrivateSubnet1RouteTableAssociation" : {
    "Type" : "AWS::EC2::SubnetRouteTableAssociation",
    "Properties" : {
        "SubnetId" : { "Ref" : "PrivateSubnet1" },
        "RouteTableId" : { "Ref" : "PrivateRouteTable" }
    }
},
"PrivateSubnet2" : {
    "Type" : "AWS::EC2::Subnet",
    "Properties" : {
        "VpcId" : { "Ref" : "VPC" },
        "AvailabilityZone": {
            "Fn::Select" : [ "1", { "Fn::GetAZs" : { "Ref" : "AWS::Region" } } ]
        },

```

```
        "CidrBlock": "10.0.3.0/24"
    }
},
"PrivateSubnet2RouteTableAssociation" : {
    "Type" : "AWS::EC2::SubnetRouteTableAssociation",
    "Properties" : {
        "SubnetId" : { "Ref" : "PrivateSubnet2" },
        "RouteTableId" : { "Ref" : "PrivateRouteTable" }
    }
},
"PrivateNetworkAcl" : {
    "Type" : "AWS::EC2::NetworkAcl",
    "Properties" : {
        "VpcId" : { "Ref" : "VPC" },
        "Tags" : [
            { "Key" : "Application", "Value" : { "Ref" : "AWS::StackId" } },
            { "Key" : "Network", "Value" : "Private" }
        ]
    }
},

"InboundPrivateNetworkAclEntry" : {
    "Type" : "AWS::EC2::NetworkAclEntry",
    "Properties" : {
        "NetworkAclId" : { "Ref" : "PrivateNetworkAcl" },
        "RuleNumber" : "100",
        "Protocol" : "6",
```

```
    "RuleAction" : "allow",
    "Egress" : "false",
    "CidrBlock" : "0.0.0.0/0",
    "PortRange" : {"From" : "0", "To" : "65535"}
  }
},
```

```
"OutBoundPrivateNetworkAclEntry" : {
  "Type" : "AWS::EC2::NetworkAclEntry",
  "Properties" : {
    "NetworkAclId" : {"Ref" : "PrivateNetworkAcl"},
    "RuleNumber" : "100",
    "Protocol" : "6",
    "RuleAction" : "allow",
    "Egress" : "true",
    "CidrBlock" : "0.0.0.0/0",
    "PortRange" : {"From" : "0", "To" : "65535"}
  }
},
```

```
"PrivateSubnet1NetworkAclAssociation" : {
  "Type" : "AWS::EC2::SubnetNetworkAclAssociation",
  "Properties" : {
    "SubnetId" : { "Ref" : "PrivateSubnet1" },
    "NetworkAclId" : { "Ref" : "PrivateNetworkAcl" }
  }
},
```

```
"WebServerGroup" : {  
  "Type" : "AWS::AutoScaling::AutoScalingGroup",  
  "Properties" : {  
    "VPCZoneIdentifier" : [ { "Ref" : "PrivateSubnet1" }, { "Ref" : "PrivateSubnet2" } ],  
    "LaunchConfigurationName" : { "Ref" : "LaunchConfig" },  
    "MinSize" : "2",  
    "MaxSize" : "4",  
    "TargetGroupARNs" : [ { "Ref" : "ALBTargetGroup" } ]  
  }  
},  
"LaunchConfig" : {  
  "Type" : "AWS::AutoScaling::LaunchConfiguration",  
  "Metadata" : {  
    "Comment" : "Install a simple application",  
    "AWS::CloudFormation::Init" : {  
      "config" : {  
        "packages" : {  
          "yum" : {  
            "httpd" : []  
          }  
        },  
        "services" : {  
          "sysvinit" : {  
            "httpd" : { "enabled" : "true", "ensureRunning" : "true" }  
          }  
        }  
      }  
    }  
  }  
}
```

```

    }

    },

    "Properties" : {

        "KeyName" : { "Ref" : "KeyName" },

        "ImageId" : { "Fn::FindInMap" : [ "AWSRegionArch2AMI", { "Ref" : "AWS::Region" },

            { "Fn::FindInMap" : [ "AWSInstanceType2Arch", { "Ref" : "InstanceType" }, "Arch" ] } ]

    },

    "InstanceType" : { "Ref" : "InstanceType" },

    "UserData" : { "Fn::Base64" : { "Fn::Join" : [ "", [

        "#!/bin/bash -xe\n",

        "yum update -y aws-cfn-bootstrap\n",

        "\n",

        "/opt/aws/bin/cfn-init -v ",

        "    --stack ", { "Ref" : "AWS::StackName" },

        "    --resource LaunchConfig ",

        "    --region ", { "Ref" : "AWS::Region" }, "\n"

    ]]]}

    }

    },

    "ApplicationLoadBalancer" : {

        "Type" : "AWS::ElasticLoadBalancingV2::LoadBalancer",

        "Properties" : {

            "Subnets" : [ { "Ref" : "PublicSubnet1" }, { "Ref" : "PublicSubnet2" } ]

        }

    },

    "ALBListener" : {

        "Type" : "AWS::ElasticLoadBalancingV2::Listener",

        "Properties" : {

```

```
"DefaultActions" : [{
  "Type" : "forward",
  "TargetGroupArn" : { "Ref" : "ALBTargetGroup" }
}],
"LoadBalancerArn" : { "Ref" : "ApplicationLoadBalancer" },
"Port" : "80",
"Protocol" : "HTTP"
}
},
"ALBTargetGroup" : {
  "Type" : "AWS::ElasticLoadBalancingV2::TargetGroup",
  "Properties" : {
    "HealthCheckIntervalSeconds" : 30,
    "HealthCheckTimeoutSeconds" : 5,
    "HealthyThresholdCount" : 3,
    "Port" : 80,
    "Protocol" : "HTTP",
    "UnhealthyThresholdCount" : 5,
    "VpcId" : { "Ref" : "VPC" },
    "TargetType" : "instance"
  }
},
"LoadBalancerSecurityGroup" : {
  "Type" : "AWS::EC2::SecurityGroup",
  "Properties" : {
    "GroupDescription" : "Enable HTTP access on port 80",
    "VpcId" : { "Ref" : "VPC" },

```

```

    "SecurityGroupIngress" : [ {
        "IpProtocol" : "tcp",
        "FromPort" : "80",
        "ToPort" : "80",
        "CidrIp" : "0.0.0.0/0"
    } ],
    "SecurityGroupEgress" : [ {
        "IpProtocol" : "tcp",
        "FromPort" : "80",
        "ToPort" : "80",
        "CidrIp" : "0.0.0.0/0"
    } ]
}
}
},

"Outputs" : {
    "URL" : {
        "Description" : "URL of the website",
        "Value" : { "Fn::Join" : [ "", [ "http://", { "Fn::GetAtt" : [ "ApplicationLoadBalancer", "DNSName" ] } ] }
    }
}

{
    "AWSTemplateFormatVersion": "2010-09-09",
    "Description": "My simple EC2 instance",
    "Parameters": {
        "KeyName": {

```

```
"Description": "Name of an existing EC2 KeyPair",  
"Type": "AWS::EC2::KeyPair::KeyName",  
"Default": "puttykey",  
"ConstraintDescription": "must be the name of an existing EC2 KeyPair."  
},  
"InstanceType": {  
  "Description": "WebServer EC2 instance type",  
  "Type": "String",  
  "Default": "t2.micro",  
  "AllowedValues": [  
    "t1.micro",  
    "t2.nano",  
    "t2.micro",  
    "t2.small",  
    "t2.medium",  
    "t2.large",  
    "m1.small",  
    "m1.medium",  
    "m1.large",  
    "m1.xlarge",  
    "m2.xlarge",  
    "m2.2xlarge",  
    "m2.4xlarge",  
    "m3.medium",  
    "m3.large",  
    "m3.xlarge",  
    "m3.2xlarge",
```



"m4.large",  
"m4.xlarge",  
"m4.2xlarge",  
"m4.4xlarge",  
"m4.10xlarge",  
"c1.medium",  
"c1.xlarge",  
"c3.large",  
"c3.xlarge",  
"c3.2xlarge",  
"c3.4xlarge",  
"c3.8xlarge",  
"c4.large",  
"c4.xlarge",  
"c4.2xlarge",  
"c4.4xlarge",  
"c4.8xlarge",  
"g2.2xlarge",  
"g2.8xlarge",  
"r3.large",  
"r3.xlarge",  
"r3.2xlarge",  
"r3.4xlarge",  
"r3.8xlarge",  
"i2.xlarge",  
"i2.2xlarge",  
"i2.4xlarge",

```
    "i2.8xlarge",
    "d2.xlarge",
    "d2.2xlarge",
    "d2.4xlarge",
    "d2.8xlarge",
    "hi1.4xlarge",
    "hs1.8xlarge",
    "cr1.8xlarge",
    "cc2.8xlarge",
    "cg1.4xlarge"
  ],
  "ConstraintDescription": "must be a valid EC2 instance type."
},
"SSHLocation" : {
  "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})"
},
"CIDRVpc" : {
  "Description" : "The IP address range that can be used to SSH to the EC2 instances",
  "Type": "String",
  "Default" : "10.0.0.0/16"
}
```

```
},  
"Mappings": {  
  "AWSInstanceType2Arch": {  
    "t1.micro": {  
      "Arch": "HVM64"  
    },  
    "t2.nano": {  
      "Arch": "HVM64"  
    },  
    "t2.micro": {  
      "Arch": "HVM64"  
    },  
    "t2.small": {  
      "Arch": "HVM64"  
    },  
    "t2.medium": {  
      "Arch": "HVM64"  
    },  
    "t2.large": {  
      "Arch": "HVM64"  
    },  
    "m1.small": {  
      "Arch": "HVM64"  
    },  
    "m1.medium": {  
      "Arch": "HVM64"  
    },  
    "m1.xlarge": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge": {  
      "Arch": "HVM64"  
    },  
    "m2.2xlarge": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.2": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.4": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.8": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.16": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.32": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.64": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.128": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.256": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.512": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.1024": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.2048": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.4096": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.8192": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.16384": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.32768": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.65536": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.131072": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.262144": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.524288": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.1048576": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.2097152": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.4194304": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.8388608": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.16777216": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.33554432": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.67108864": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.134217728": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.268435456": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.536870912": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.1073741824": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.2147483648": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.4294967296": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.8589934592": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.17179869184": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.34359738368": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.68719476736": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.137438953472": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.274877906944": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.549755813888": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.1099511627776": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.2199023255552": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.4398046511104": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.8796093022208": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.17592186044416": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.35184372088832": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.70368744177664": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.140737488355328": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.281474976710656": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.562949953421312": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.1125899906842624": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.2251799813685248": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.4503599627370496": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.9007199254740992": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.18014398509481984": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.36028797018963968": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.72057594037927936": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.144115188075855872": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.288230376151711744": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.576460752303423488": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.1152921504606846976": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.2305843009213693952": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.4611686018427387904": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.9223372036854775808": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.18446744073709551616": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.36893488147419103232": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.73786976294838206464": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.147573952589676412928": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.295147905179352825856": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.590295810358705651712": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.1180591620717411303424": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.2361183241434822606848": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.4722366482869645213696": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.9444732965739290427392": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.18889465931478580854784": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.37778931862957161709568": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.75557863725914323419136": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.151115727451828646838272": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.302231454903657293676544": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.604462909807314587353088": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.1208925819614629174706176": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.2417851639229258349412352": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.4835703278458516698824704": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.9671406556917033397649408": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.19342813113834066795298816": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.38685626227668133590597632": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.77371252455336267181195264": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.154742504910672534362390528": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.309485009821345068724781056": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.618970019642690137449562112": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.1237940039285380274899124224": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.2475880078570760549798248448": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.4951760157141521099596496896": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.9903520314283042199192993792": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.19807040628566084398385987584": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.39614081257132168796771975168": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.79228162514264337593543950336": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.158456325028528675187087900672": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.316912650057057350374175801344": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.633825300114114700748351602688": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.1267650600228229401496703205376": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.2535301200456458802993406410752": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.5070602400912917605986812821504": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.10141204801825835211973625643008": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.20282409603651670423947251286016": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.40564819207303340847894502572032": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.81129638414606681695789005144064": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.162259276829213363391578010288128": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.324518553658426726783156020576256": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.649037107316853453566312041152512": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.1298074214633706907132624082305024": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.2596148429267413814265248164610048": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.5192296858534827628530496329220096": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.10384593717069655257060992658440192": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.20769187434139310514121985316880384": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.41538374868278621028243970633760768": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.83076749736557242056487941267521536": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.166153499473114484112975882535043072": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.332306998946228968225951765070086144": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.664613997892457936451903530140172288": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.1329227995784915872903807060280344576": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.2658455991569831745807614120560689152": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.5316911983139663491615228241121378304": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.10633823966279326983230456482242756608": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.21267647932558653966460912964485513216": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.42535295865117307932921825928971026432": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.85070591730234615865843651857942052864": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.170141183460469231731687303715884105728": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.340282366920938463463374607431768211456": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.680564733841876926926749214863536422912": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.1361129467683753853853498429727072845824": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.2722258935367507707706996859454145691648": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.5444517870735015415413993718908291383296": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.10889035741470030830827987437816582766592": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.21778071482940061661655974875633165533184": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.43556142965880123323311949751266331066368": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.87112285931760246646623899502532662132736": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.174224571863520493293247799005065324265472": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.348449143727040986586495598010130648530944": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.696898287454081973172991196020261297061888": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.1393796574908163946345982392040522594123776": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.2787593149816327892691964784081045188247552": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.5575186299632655785383929568162090376495104": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.11150372599265311570767859136324180752990208": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.22300745198530623141535718272648361505980416": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.44601490397061246283071436545296723011960832": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.89202980794122492566142873090593446023921664": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.178405961588244985132285746181186892047843328": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.356811923176489970264571492362373784095686656": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.713623846352979940529142984724747568191373312": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.1427247692705959881058285969449495136382746624": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.2854495385411919762116571938898990272765493248": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.5708990770823839524233143877797980545530986496": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.11417981541647679048466287755595961091061972992": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.22835963083295358096932575511191922182123945984": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.45671926166590716193865151022383844364247891968": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.91343852333181432387730302044767688728495783936": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.182687704666362864775460604089535377456991567872": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.365375409332725729550921208179070754913983135744": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.730750818665451459101842416358141509827966271488": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.1461501637330902918203684832716283019655932542976": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.2923003274661805836407369665432566039311865085952": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.5846006549323611672814739330865132078623730171904": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.11692013098647223345629478661730264157247460343808": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.23384026197294446691258957323460528314494920687616": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.46768052394588893382517914646921056628989841375232": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.93536104789177786765035829293842113257979682750464": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.187072209578355573530071658587684226515959365500928": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.374144419156711147060143317175368453031918731001856": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.748288838313422294120286634350736906063837462003712": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.1496577676626844588240573268701473812127674924007424": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.2993155353253689176481146537402947624255349848014848": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.5986310706507378352962293074805895248510699696029696": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.11972621413014756705924586149611790497021399392059392": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.23945242826029513411849172299223580994042798784118784": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.47890485652059026823698344598447161988085597568237568": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.95780971304118053647396689196894323976171195136475136": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.191561942608236107294793378393788647952342390272950272": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.383123885216472214589586756787577295904684780545900544": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.766247770432944429179173513575154591809369561091801088": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.1532495540865888858358347027150309183618739122183602176": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.3064991081731777716716694054300618367237478244367204352": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.6129982163463555433433388108601236734474956488734408704": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.12259964326927110866866776217202473468949912977468817408": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.24519928653854221733733552434404946937899825954937634816": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.49039857307708443467467104868809893875799651909875269632": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.98079714615416886934934209737619787751599303819750539264": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.196159429230833773869868419475239575503198607639501078528": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.392318858461667547739736838950479151006397215279002157056": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.784637716923335095479473677900958302012794430558004314112": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.1569275433846670190958947355801916604025588861116008628224": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.3138550867693340381917894711603833208051177722232017256448": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.6277101735386680763835789423207666416102355444464034512896": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.12554203470773361527671578846415332832204710888928069025792": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.25108406941546723055343157692830665664409421777856138051584": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.50216813883093446110686315385661331328818843555712276103168": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.100433627766186892221372630771322662657637687111424552206336": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.200867255532373784442745261542645325315275374222849104412672": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.401734511064747568885490523085290650630550748445698208825344": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.803469022129495137770981046170581301261101496891396417650688": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.1606938044258990275541962092341162602522202993782792835301376": {  
      "Arch": "HVM64"  
    },  
    "m2.xlarge.3213876088517980551083924184682325205044405987565585670602752": {  
      "Arch": "HVM6
```

```
"m1.large": {  
  "Arch": "HVM64"  
},  
"m1.xlarge": {  
  "Arch": "HVM64"  
},  
"m2.xlarge": {  
  "Arch": "HVM64"  
},  
"m2.2xlarge": {  
  "Arch": "HVM64"  
},  
"m2.4xlarge": {  
  "Arch": "HVM64"  
},  
"m3.medium": {  
  "Arch": "HVM64"  
},  
"m3.large": {  
  "Arch": "HVM64"  
},  
"m3.xlarge": {  
  "Arch": "HVM64"  
},  
"m3.2xlarge": {  
  "Arch": "HVM64"  
},
```

```
"m4.large": {  
  "Arch": "HVM64"  
},  
"m4.xlarge": {  
  "Arch": "HVM64"  
},  
"m4.2xlarge": {  
  "Arch": "HVM64"  
},  
"m4.4xlarge": {  
  "Arch": "HVM64"  
},  
"m4.10xlarge": {  
  "Arch": "HVM64"  
},  
"c1.medium": {  
  "Arch": "HVM64"  
},  
"c1.xlarge": {  
  "Arch": "HVM64"  
},  
"c3.large": {  
  "Arch": "HVM64"  
},  
"c3.xlarge": {  
  "Arch": "HVM64"  
},
```

```
"c3.2xlarge": {  
  "Arch": "HVM64"  
},  
"c3.4xlarge": {  
  "Arch": "HVM64"  
},  
"c3.8xlarge": {  
  "Arch": "HVM64"  
},  
"c4.large": {  
  "Arch": "HVM64"  
},  
"c4.xlarge": {  
  "Arch": "HVM64"  
},  
"c4.2xlarge": {  
  "Arch": "HVM64"  
},  
"c4.4xlarge": {  
  "Arch": "HVM64"  
},  
"c4.8xlarge": {  
  "Arch": "HVM64"  
},  
"g2.2xlarge": {  
  "Arch": "HVMG2"  
},
```

```
"g2.8xlarge": {  
  "Arch": "HVMG2"  
},  
"r3.large": {  
  "Arch": "HVM64"  
},  
"r3.xlarge": {  
  "Arch": "HVM64"  
},  
"r3.2xlarge": {  
  "Arch": "HVM64"  
},  
"r3.4xlarge": {  
  "Arch": "HVM64"  
},  
"r3.8xlarge": {  
  "Arch": "HVM64"  
},  
"i2.xlarge": {  
  "Arch": "HVM64"  
},  
"i2.2xlarge": {  
  "Arch": "HVM64"  
},  
"i2.4xlarge": {  
  "Arch": "HVM64"  
},
```

```
"i2.8xlarge": {  
  "Arch": "HVM64"  
},  
"d2.xlarge": {  
  "Arch": "HVM64"  
},  
"d2.2xlarge": {  
  "Arch": "HVM64"  
},  
"d2.4xlarge": {  
  "Arch": "HVM64"  
},  
"d2.8xlarge": {  
  "Arch": "HVM64"  
},  
"hi1.4xlarge": {  
  "Arch": "HVM64"  
},  
"hs1.8xlarge": {  
  "Arch": "HVM64"  
},  
"cr1.8xlarge": {  
  "Arch": "HVM64"  
},  
"cc2.8xlarge": {  
  "Arch": "HVM64"  
}
```



```
},  
  
"AWSInstanceType2NATArch": {  
  "t1.micro": {  
    "Arch": "NATHVM64"  
  },  
  
  "t2.nano": {  
    "Arch": "NATHVM64"  
  },  
  
  "t2.micro": {  
    "Arch": "NATHVM64"  
  },  
  
  "t2.small": {  
    "Arch": "NATHVM64"  
  },  
  
  "t2.medium": {  
    "Arch": "NATHVM64"  
  },  
  
  "t2.large": {  
    "Arch": "NATHVM64"  
  },  
  
  "m1.small": {  
    "Arch": "NATHVM64"  
  },  
  
  "m1.medium": {  
    "Arch": "NATHVM64"  
  },  
  
  "m1.large": {
```

```
    "Arch": "NATHVM64"  
  },  
  "m1.xlarge": {  
    "Arch": "NATHVM64"  
  },  
  "m2.xlarge": {  
    "Arch": "NATHVM64"  
  },  
  "m2.2xlarge": {  
    "Arch": "NATHVM64"  
  },  
  "m2.4xlarge": {  
    "Arch": "NATHVM64"  
  },  
  "m3.medium": {  
    "Arch": "NATHVM64"  
  },  
  "m3.large": {  
    "Arch": "NATHVM64"  
  },  
  "m3.xlarge": {  
    "Arch": "NATHVM64"  
  },  
  "m3.2xlarge": {  
    "Arch": "NATHVM64"  
  },  
  "m4.large": {
```

```
    "Arch": "NATHVM64"
  },
  "m4.xlarge": {
    "Arch": "NATHVM64"
  },
  "m4.2xlarge": {
    "Arch": "NATHVM64"
  },
  "m4.4xlarge": {
    "Arch": "NATHVM64"
  },
  "m4.10xlarge": {
    "Arch": "NATHVM64"
  },
  "c1.medium": {
    "Arch": "NATHVM64"
  },
  "c1.xlarge": {
    "Arch": "NATHVM64"
  },
  "c3.large": {
    "Arch": "NATHVM64"
  },
  "c3.xlarge": {
    "Arch": "NATHVM64"
  },
  "c3.2xlarge": {
```

```
    "Arch": "NATHVM64"  
  },  
  "c3.4xlarge": {  
    "Arch": "NATHVM64"  
  },  
  "c3.8xlarge": {  
    "Arch": "NATHVM64"  
  },  
  "c4.large": {  
    "Arch": "NATHVM64"  
  },  
  "c4.xlarge": {  
    "Arch": "NATHVM64"  
  },  
  "c4.2xlarge": {  
    "Arch": "NATHVM64"  
  },  
  "c4.4xlarge": {  
    "Arch": "NATHVM64"  
  },  
  "c4.8xlarge": {  
    "Arch": "NATHVM64"  
  },  
  "g2.2xlarge": {  
    "Arch": "NATHVMG2"  
  },  
  "g2.8xlarge": {
```

```
    "Arch": "NATHVMG2"  
  },  
  "r3.large": {  
    "Arch": "NATHVM64"  
  },  
  "r3.xlarge": {  
    "Arch": "NATHVM64"  
  },  
  "r3.2xlarge": {  
    "Arch": "NATHVM64"  
  },  
  "r3.4xlarge": {  
    "Arch": "NATHVM64"  
  },  
  "r3.8xlarge": {  
    "Arch": "NATHVM64"  
  },  
  "i2.xlarge": {  
    "Arch": "NATHVM64"  
  },  
  "i2.2xlarge": {  
    "Arch": "NATHVM64"  
  },  
  "i2.4xlarge": {  
    "Arch": "NATHVM64"  
  },  
  "i2.8xlarge": {
```

```
    "Arch": "NATHVM64"
  },
  "d2.xlarge": {
    "Arch": "NATHVM64"
  },
  "d2.2xlarge": {
    "Arch": "NATHVM64"
  },
  "d2.4xlarge": {
    "Arch": "NATHVM64"
  },
  "d2.8xlarge": {
    "Arch": "NATHVM64"
  },
  "hi1.4xlarge": {
    "Arch": "NATHVM64"
  },
  "hs1.8xlarge": {
    "Arch": "NATHVM64"
  },
  "cr1.8xlarge": {
    "Arch": "NATHVM64"
  },
  "cc2.8xlarge": {
    "Arch": "NATHVM64"
  }
},
```

```
"AWSRegionArch2AMI": {  
  "us-east-1": {  
    "HVM64": "ami-0080e4c5bc078760e",  
    "HVMG2": "ami-0aeb704d503081ea6"  
  },  
  "us-west-2": {  
    "HVM64": "ami-01e24be29428c15b2",  
    "HVMG2": "ami-0fe84a5b4563d8f27"  
  },  
  "us-west-1": {  
    "HVM64": "ami-0ec6517f6edbf8044",  
    "HVMG2": "ami-0a7fc72dc0e51aa77"  
  },  
  "eu-west-1": {  
    "HVM64": "ami-08935252a36e25f85",  
    "HVMG2": "ami-0d5299b1c6112c3c7"  
  },  
  "eu-west-2": {  
    "HVM64": "ami-01419b804382064e4",  
    "HVMG2": "NOT_SUPPORTED"  
  },  
  "eu-west-3": {  
    "HVM64": "ami-0dd7e7ed60da8fb83",  
    "HVMG2": "NOT_SUPPORTED"  
  },  
  "eu-central-1": {  
    "HVM64": "ami-0cfbf4f6db41068ac",
```

```
    "HVMG2": "ami-0aa1822e3eb913a11"
  },
  "eu-north-1": {
    "HVM64": "ami-86fe70f8",
    "HVMG2": "ami-32d55b4c"
  },
  "ap-northeast-1": {
    "HVM64": "ami-00a5245b4816c38e6",
    "HVMG2": "ami-09d0e0e099ecabba2"
  },
  "ap-northeast-2": {
    "HVM64": "ami-00dc207f8ba6dc919",
    "HVMG2": "NOT_SUPPORTED"
  },
  "ap-northeast-3": {
    "HVM64": "ami-0b65f69a5c11f3522",
    "HVMG2": "NOT_SUPPORTED"
  },
  "ap-southeast-1": {
    "HVM64": "ami-05b3bcf7f311194b3",
    "HVMG2": "ami-0e46ce0d6a87dc979"
  },
  "ap-southeast-2": {
    "HVM64": "ami-02fd0b06f06d93dfc",
    "HVMG2": "ami-0c0ab057a101d8ff2"
  },
  "ap-south-1": {
```



```
    "HVM64": "ami-0ad42f4f66f6c1cc9",
    "HVMG2": "ami-0244c1d42815af84a"
  },
  "us-east-2": {
    "HVM64": "ami-0cd3dfa4e37921605",
    "HVMG2": "NOT_SUPPORTED"
  },
  "ca-central-1": {
    "HVM64": "ami-07423fb63ea0a0930",
    "HVMG2": "NOT_SUPPORTED"
  },
  "sa-east-1": {
    "HVM64": "ami-05145e0b28ad8e0b2",
    "HVMG2": "NOT_SUPPORTED"
  },
  "cn-north-1": {
    "HVM64": "ami-053617c9d818c1189",
    "HVMG2": "NOT_SUPPORTED"
  },
  "cn-northwest-1": {
    "HVM64": "ami-0f7937761741dc640",
    "HVMG2": "NOT_SUPPORTED"
  }
}

"Resources" : {
  "VPC": {
```

```
    "Type": "AWS::EC2::VPC",

    "Properties": {

        "CidrBlock": { "Ref" : "CIDRVpc" },

        "EnableDnsSupport": "true",

        "EnableDnsHostnames": "false",

        "InstanceTenancy": "default"

    }

},

"InternetGateway" : {

    "Type" : "AWS::EC2::InternetGateway"

},

"AttachGateway" : {

    "Type" : "AWS::EC2::VPCGatewayAttachment",

    "Properties" : {

        "VpcId" : { "Ref" : "VPC" },

        "InternetGatewayId" : { "Ref" : "InternetGateway" }

    }

},

"PublicRouteTable" : {

    "Type" : "AWS::EC2::RouteTable",

    "Properties" : {

        "VpcId" : { "Ref" : "VPC" }

    }

},

"PublicRoute" : {

    "Type" : "AWS::EC2::Route",

    "DependsOn" : "AttachGateway",
```

```

"Properties" : {
  "RouteTableId" : { "Ref" : "PublicRouteTable" },
  "DestinationCidrBlock" : "0.0.0.0/0",
  "GatewayId" : { "Ref" : "InternetGateway" }
}
},
"PublicSubnet1": {
  "Type": "AWS::EC2::Subnet",
  "Properties": {
    "AvailabilityZone": {
      "Fn::Select" : [ "0", { "Fn::GetAZs" : { "Ref" : "AWS::Region" } } ]
    },
    "CidrBlock": "10.0.0.0/24",
    "MapPublicIpOnLaunch": "true",
    "VpcId": {
      "Ref": "VPC"
    }
  }
},
"PublicSubnet1RouteTableAssociation" : {
  "Type" : "AWS::EC2::SubnetRouteTableAssociation",
  "Properties" : {
    "SubnetId" : { "Ref" : "PublicSubnet1" },
    "RouteTableId" : { "Ref" : "PublicRouteTable" }
  }
},
"PublicSubnet2": {

```

```

    "Type": "AWS::EC2::Subnet",

    "Properties": {

        "AvailabilityZone": {

            "Fn::Select" : [ "1", { "Fn::GetAZs" : { "Ref" : "AWS::Region" } } ]

        },

        "CidrBlock": "10.0.1.0/24",

        "MapPublicIpOnLaunch": "true",

        "VpcId": {

            "Ref": "VPC"

        }

    }

},

"PublicSubnet2RouteTableAssociation" : {

    "Type" : "AWS::EC2::SubnetRouteTableAssociation",

    "Properties" : {

        "SubnetId" : { "Ref" : "PublicSubnet2" },

        "RouteTableId" : { "Ref" : "PublicRouteTable" }

    }

},

"PublicNetworkAcl" : {

    "Type" : "AWS::EC2::NetworkAcl",

    "Properties" : {

        "VpcId" : { "Ref" : "VPC" }

    }

},

"InboundHTTPPublicNetworkAclEntry" : {

    "Type" : "AWS::EC2::NetworkAclEntry",

```

```
"Properties" : {  
  "NetworkAclId" : {"Ref" : "PublicNetworkAcl"},  
  "RuleNumber" : "100",  
  "Protocol" : "6",  
  "RuleAction" : "allow",  
  "Egress" : "false",  
  "CidrBlock" : "0.0.0.0/0",  
  "PortRange" : {"From" : "80", "To" : "80"}  
}  
,
```

```
"InboundDynamicPortsPublicNetworkAclEntry" : {  
  "Type" : "AWS::EC2::NetworkAclEntry",  
  "Properties" : {  
    "NetworkAclId" : {"Ref" : "PublicNetworkAcl"},  
    "RuleNumber" : "101",  
    "Protocol" : "6",  
    "RuleAction" : "allow",  
    "Egress" : "false",  
    "CidrBlock" : "0.0.0.0/0",  
    "PortRange" : {"From" : "1024", "To" : "65535"}  
  }  
},
```

```
"OutboundHTTTPublicNetworkAclEntry" : {  
  "Type" : "AWS::EC2::NetworkAclEntry",  
  "Properties" : {
```

```
"NetworkAclId" : {"Ref" : "PublicNetworkAcl"},
"RuleNumber" : "100",
"Protocol" : "6",
"RuleAction" : "allow",
"Egress" : "true",
"CidrBlock" : "0.0.0.0/0",
"PortRange" : {"From" : "80", "To" : "80"}
}
},
```

```
"OutBoundDynamicPortPublicNetworkAclEntry" : {
  "Type" : "AWS::EC2::NetworkAclEntry",
  "Properties" : {
    "NetworkAclId" : {"Ref" : "PublicNetworkAcl"},
    "RuleNumber" : "101",
    "Protocol" : "6",
    "RuleAction" : "allow",
    "Egress" : "true",
    "CidrBlock" : "0.0.0.0/0",
    "PortRange" : {"From" : "1024", "To" : "65535"}
  }
},
```

```
"PublicSubnetNetworkAclAssociation" : {
  "Type" : "AWS::EC2::SubnetNetworkAclAssociation",
  "Properties" : {
    "SubnetId" : { "Ref" : "PublicSubnet1" },
```

```

    "NetworkAclId" : { "Ref" : "PublicNetworkAcl" }
  }
},

"PrivateSubnet1" : {
  "Type" : "AWS::EC2::Subnet",
  "Properties" : {
    "VpcId" : { "Ref" : "VPC" },
    "AvailabilityZone": {
      "Fn::Select" : [ "0", { "Fn::GetAZs" : { "Ref" : "AWS::Region" } } ]
    },
    "CidrBlock": "10.0.2.0/24"
  }
},

"PrivateRouteTable" : {
  "Type" : "AWS::EC2::RouteTable",
  "Properties" : {
    "VpcId" : { "Ref" : "VPC" }
  }
},

"PrivateSubnet1RouteTableAssociation" : {
  "Type" : "AWS::EC2::SubnetRouteTableAssociation",
  "Properties" : {
    "SubnetId" : { "Ref" : "PrivateSubnet1" },
    "RouteTableId" : { "Ref" : "PrivateRouteTable" }
  }
},

```

```

"PrivateSubnet2" : {
  "Type" : "AWS::EC2::Subnet",
  "Properties" : {
    "VpcId" : { "Ref" : "VPC" },
    "AvailabilityZone": {
      "Fn::Select" : [ "1", { "Fn::GetAZs" : { "Ref" : "AWS::Region" } } ]
    },
    "CidrBlock": "10.0.3.0/24"
  }
},
"PrivateSubnet2RouteTableAssociation" : {
  "Type" : "AWS::EC2::SubnetRouteTableAssociation",
  "Properties" : {
    "SubnetId" : { "Ref" : "PrivateSubnet2" },
    "RouteTableId" : { "Ref" : "PrivateRouteTable" }
  }
},
"PrivateNetworkAcl" : {
  "Type" : "AWS::EC2::NetworkAcl",
  "Properties" : {
    "VpcId" : { "Ref" : "VPC" },
    "Tags" : [
      { "Key" : "Application", "Value" : { "Ref" : "AWS::StackId" } },
      { "Key" : "Network", "Value" : "Private" }
    ]
  }
},

```



```
"InboundPrivateNetworkAclEntry" : {  
  "Type" : "AWS::EC2::NetworkAclEntry",  
  "Properties" : {  
    "NetworkAclId" : {"Ref" : "PrivateNetworkAcl"},  
    "RuleNumber" : "100",  
    "Protocol" : "6",  
    "RuleAction" : "allow",  
    "Egress" : "false",  
    "CidrBlock" : "0.0.0.0/0",  
    "PortRange" : {"From" : "0", "To" : "65535"}  
  }  
},
```

```
"OutBoundPrivateNetworkAclEntry" : {  
  "Type" : "AWS::EC2::NetworkAclEntry",  
  "Properties" : {  
    "NetworkAclId" : {"Ref" : "PrivateNetworkAcl"},  
    "RuleNumber" : "100",  
    "Protocol" : "6",  
    "RuleAction" : "allow",  
    "Egress" : "true",  
    "CidrBlock" : "0.0.0.0/0",  
    "PortRange" : {"From" : "0", "To" : "65535"}  
  }  
},
```

```
"PrivateSubnet1NetworkAclAssociation" : {  
  "Type" : "AWS::EC2::SubnetNetworkAclAssociation",  
  "Properties" : {  
    "SubnetId" : { "Ref" : "PrivateSubnet1" },  
    "NetworkAclId" : { "Ref" : "PrivateNetworkAcl" }  
  }  
},  
"WebServerGroup" : {  
  "Type" : "AWS::AutoScaling::AutoScalingGroup",  
  "Properties" : {  
    "VPCZoneIdentifier" : [ { "Ref" : "PrivateSubnet1" }, { "Ref" : "PrivateSubnet2" } ],  
    "LaunchConfigurationName" : { "Ref" : "LaunchConfig" },  
    "MinSize" : "2",  
    "MaxSize" : "4",  
    "TargetGroupARNs" : [ { "Ref" : "ALBTargetGroup" } ]  
  }  
},  
"LaunchConfig" : {  
  "Type" : "AWS::AutoScaling::LaunchConfiguration",  
  "Metadata" : {  
    "Comment" : "Install a simple application",  
    "AWS::CloudFormation::Init" : {  
      "config" : {  
        "packages" : {  
          "yum" : {  
            "httpd" : []  
          }  
        }  
      }  
    }  
  }  
}
```

```

    },
    "services" : {
        "sysvinit" : {
            "httpd" : { "enabled" : "true", "ensureRunning" : "true" }
        }
    }
},
"Properties" : {
    "KeyName" : { "Ref" : "KeyName" },
    "ImageId" : { "Fn::FindInMap" : [ "AWSRegionArch2AMI", { "Ref" : "AWS::Region" },
        { "Fn::FindInMap" : [ "AWSInstanceType2Arch", { "Ref" : "InstanceType" }, "Arch" ] } ]
},
    "InstanceType" : { "Ref" : "InstanceType" },
    "UserData" : { "Fn::Base64" : { "Fn::Join" : [ "", [
        "#!/bin/bash -xe\n",
        "yum update -y aws-cfn-bootstrap\n",
        "\n",
        "/opt/aws/bin/cfn-init -v ",
        "    --stack ", { "Ref" : "AWS::StackName" },
        "    --resource LaunchConfig ",
        "    --region ", { "Ref" : "AWS::Region" }, "\n"
    ] ] }
    ] }
},
    "ApplicationLoadBalancer" : {
        "Type" : "AWS::ElasticLoadBalancingV2::LoadBalancer",

```

```
"Properties" : {
  "Subnets" : [ { "Ref" : "PublicSubnet1" }, { "Ref" : "PublicSubnet2" } ]
}
},
"ALBListener" : {
  "Type" : "AWS::ElasticLoadBalancingV2::Listener",
  "Properties" : {
    "DefaultActions" : [{
      "Type" : "forward",
      "TargetGroupArn" : { "Ref" : "ALBTargetGroup" }
    }],
    "LoadBalancerArn" : { "Ref" : "ApplicationLoadBalancer" },
    "Port" : "80",
    "Protocol" : "HTTP"
  }
},
"ALBTargetGroup" : {
  "Type" : "AWS::ElasticLoadBalancingV2::TargetGroup",
  "Properties" : {
    "HealthCheckIntervalSeconds" : 30,
    "HealthCheckTimeoutSeconds" : 5,
    "HealthyThresholdCount" : 3,
    "Port" : 80,
    "Protocol" : "HTTP",
    "UnhealthyThresholdCount" : 5,
    "VpcId" : { "Ref" : "VPC" },
    "TargetType" : "instance"
  }
}
```

```

    }
  },
  "LoadBalancerSecurityGroup" : {
    "Type" : "AWS::EC2::SecurityGroup",
    "Properties" : {
      "GroupDescription" : "Enable HTTP access on port 80",
      "VpcId" : { "Ref" : "VPC" },
      "SecurityGroupIngress" : [ {
        "IpProtocol" : "tcp",
        "FromPort" : "80",
        "ToPort" : "80",
        "CidrIp" : "0.0.0.0/0"
      } ],
      "SecurityGroupEgress" : [ {
        "IpProtocol" : "tcp",
        "FromPort" : "80",
        "ToPort" : "80",
        "CidrIp" : "0.0.0.0/0"
      } ]
    }
  }
},

"Outputs" : {
  "URL" : {
    "Description" : "URL of the website",
    "Value" : { "Fn::Join" : [ "", [ "http://", { "Fn::GetAtt" : [ "ApplicationLoadBalancer", "DNSName" ] } ] ] }
  }
}

```

}  
}  
}