## Overview:

We will be building a fleet of Auto Scaling web servers serving a simple web page. In order to build our fleet of web servers we will be creating the following resources:

* Two Security Groups
  + An ELB Security Group
  + A web server / Backend Security Group
* A Load Balancer
* An EC2 Keypair
* A Launch Configuration
* An Auto Scaling Group

## Create Security Groups:

1. Go to the AWS EC2 Console and select “Security Groups” from the left-hand navigation bar.
2. Click “Create Security Group”
   1. Security group name: wwwelb-asg-yourname
   2. Description: wwwelb-asg-yourname
   3. VPC: use default VPC
   4. Security group rules:
      1. Inbound:
         1. Type: HTTP
         2. Protocol: TCP
         3. Port Range: 80
         4. Source: Anywhere / 0.0.0.0/0
      2. Outbound:
         1. *If you wish to test: this rule may be able to be modified to allow only port 80 to the “www-asg” Security Group – the ELBs should not need to* ***initiate*** *outbound traffic*
   5. Security group name: www-asg-yourname
   6. Description: www-asg-yourname
   7. VPC: use default VPC
   8. Security group rules:
      1. Inbound:
         1. Rule 1:
            1. Type: HTTP
            2. Protocol: TCP
            3. Port Range: 80
            4. Source: wwwelb-asg-yourname
         2. Rule 2:
            1. Type: SSH
            2. Protocol: TCP
            3. Port Range: 22
            4. Source: Anywhere / 0.0.0.0/0
      2. Outbound:
         1. *If you wish to test: this rule should be able to modified to port 80 to world – port 80 required for apt-get to complete install of Apache.*

## Create Load Balancer:

1. Go to the AWS EC2 Console and select “Load Balancer” from the left-hand navigation bar.
2. Click “Create Load Blancer”:
   1. Load Balancer name: wwwelb-asg-yourname
   2. Create LB Inside: My Default VPC
   3. Create an internal load balancer: unchecked
   4. Enable advanced VPC configuration: checked
   5. Listener Configuration:
      1. Load Balancer Protocol: HTTP
      2. Load Balancer Port: 80
      3. Instance Protocol: HTTP
      4. Instance Port: 80
   6. Selected Subnets:
      1. Choose all available subnets.
      2. Click “Next: Assign Security Groups”
   7. Assign Security Groups:
      1. Select the “wwwelb-asg-yourname” Security Group
      2. Click “Next: Configure Security Settings”
   8. Configure Configure Settings:
      1. You’ll be shown an “improve load balancer security screen”
      2. Click “Next: Configure Health Check”
   9. Configure Health Check:  
      *Leave as default.*
      1. Ping Protocol: HTTP
      2. Ping Port: 80
      3. Ping Path: /index.html
      4. Response Timeout: 5 seconds
      5. Health Check Interval: 30 seconds
      6. Unhealthy Threshold: 2
      7. Healthy Threshold: 10
      8. Click “Next: Add Instances”
   10. Add EC2 Instances:
       1. Do not add any instances at this time.
       2. Availability Zone Distribution:
          1. Enable Cross-Zone Load Balancing: checked
          2. Enable Connection Draining: checked
       3. Click “Next: Add Tags”
          1. Key: Name
          2. Value: yourname
          3. Click “Create Tag”
          4. Click “Review and Create”
       4. Review:
          1. Click “Create”

## Create an EC2 Keypair (if necessary):

1. Go to the AWS EC2 Console and select “Keypairs” from the left-hand navigation bar.
2. Click “Create Key Pair”
   1. Key pair name: yourname
   2. Click “Create”
3. The keypair will be automatically downloaded.

## Create a Launch Configuration:

1. Go to the AWS EC2 Console and select “Launch Configurations” from the left-hand navigation bar.
2. Click “Create Launch Configuration”
   1. Choose AMI:
      1. AMI: choose AMI ID: ami-5189a661 and press “Select”
   2. Choose Instance Type:
      1. Instance Type: t2.micro (*m3.medium if you wish to use spot pricing*)
      2. Click “Next: Configure details”
   3. Configure Details:
      1. Name: www-asg-yourname-$date
      2. Purchase option: *feel free to check “Request Spot Instances” if you wish. You should bid slightly more than the current spot pricing. To view Spot Pricing history:*
         1. *go to the AWS EC2 Console and select “Spot Requests”*
         2. *click the “Pricing History” button*
      3. IAM role: None (*the IAM role could potentially allow an application running on this instance to access AWS resources*)
      4. Monitoring:
         1. Enable CloudWatch detailed monitoring: unchecked
      5. Advanced Details:
         1. User data:
            1. Paste in the contents of the file: simple-web-server.sh
         2. IP Address Type: Only assign a public IP address to instances launched in the default VPC and subnet. (default)
      6. Click “Next: Add Storage”
   4. Add Storage:
      1. Click “Next: Configure Security Group”
   5. Configure Security Group:
      1. Assign a Security Group:
         1. Select an existing security group
            1. Choose the “www-asg-yourname” group that you had previously created
      2. Click “Review”
   6. Review:
      1. Confirm all attributes set correctly.
      2. Click “Create launch configuration”
   7. Select Keypair:
      1. Choose a keypair that you had created previously.

## Create an Auto Scaling Group:

1. Go to the AWS EC2 Console and select “Auto Scaling Groups” from the left-hand navigation bar.
2. Click “Create Auto Scaling group”
3. The “Create Auto Scaling Group” template will be presented.
   1. Select “Create an Auto Scaling group from an existing launch configuration”
      1. Select the Launch Configuration” you had created previously.
      2. Press “Next Step”
   2. Conifgure Auto Scaling group details:
      1. Launch Configuration: <confirm this is the launch configuration you had created previously>
      2. Group Name: www-asg-yourname
      3. Group size: 1
      4. Network: select the “default” VPC
      5. Subnet: choose all Subnets
      6. Advanced Details:
         1. Load Balancing:
            1. Receive traffic from Elastic Load Balancer(s): checked
            2. Choose the Elastic Load Balancer you had created previously (wwwelb-asg-youname)
         2. Health Check Type: EC2
         3. Health Check Grace Period: 300 seconds
      7. Click “Configure scaling policies”
         1. Keep this group at its initial size: checked
         2. Click “Next: Configure Notifications”
      8. Configure Notifications:
         1. Click “Next: Configure Tags”
      9. Configure Tags:
         1. Key=Name
         2. Value=yourname
         3. Tag New Instances = checked
         4. Click “Review”
      10. Review
          1. Review Settings
          2. Click “Create Auto Scaling group”

## Confirm Correct Operation:

**Confirm Auto Scaling has launched an EC2 Instance:**

1. Go to the AWS EC2 Console and select “Auto Scaling Groups”
2. Select your Auto Scaling Group (name: www-asg-yourname)
3. Click on the “Scaling History” tab:
   1. Confirm that an EC2 instance has been launched.
4. Click the “Instances” tab:
   1. Configure that an EC2 Instance is listed here.

**Confirm that the instance has been attached to the ELB:**

1. Go to the AWS EC2 Console and select “Load Balancers”
2. Select your Elastic Load Blancer (name: wwwelb-asg-yourname)
3. Click on the “Description” tab:
   1. Status should read: “1 of 1 instances in service”

**Confirm that the Instance is serving traffic:**

1. Go to the AWS EC2 Console and select “Load Balancers”
2. Select your Elastic Load Blancer (name: wwwelb-asg-yourname)
3. Click on the “Description” tab:
   1. Copy the “DNS Name” and paste this into a web browser.
   2. The “Server Information” page should be returned.

## Scale!!!

At this point, we have built an elastic and scalable infrastructure – our infrastructure and “application” may be simple, but we can scale servers in and out of service easily.

1. Go to the AWS EC2 Console and select “Auto Scaling Groups”
2. Select your Auto Scaling Group (name: www-asg-yourname)
3. Click on the “Details” tab and click “Edit”
   1. Change the “Desired” and “Max” capacity to 3.
   2. Click “Save”

## Watch Scaling Happen!

1. Go to the AWS EC2 Console and select “Load Balancers”
2. Select your Elastic Load Blancer (name: wwwelb-asg-yourname)
3. Click on the “Description” tab:
   1. Status should read: “1 of 3 instances in service” (*if the instances are still coming into service*) or “3 of 3 instances in service”

## Confirm all Instances in Service:

1. Go to the AWS EC2 Console and select “Load Balancers”
2. Select your Elastic Load Blancer (name: wwwelb-asg-yourname)
3. Click on the “Description” tab:
   1. Copy the “DNS Name” and paste this into a web browser.
   2. The “Server Information” page should be returned – the values should change as requests are directed at different instances.