Workshop I – EC2, ELB, and Autoscaling

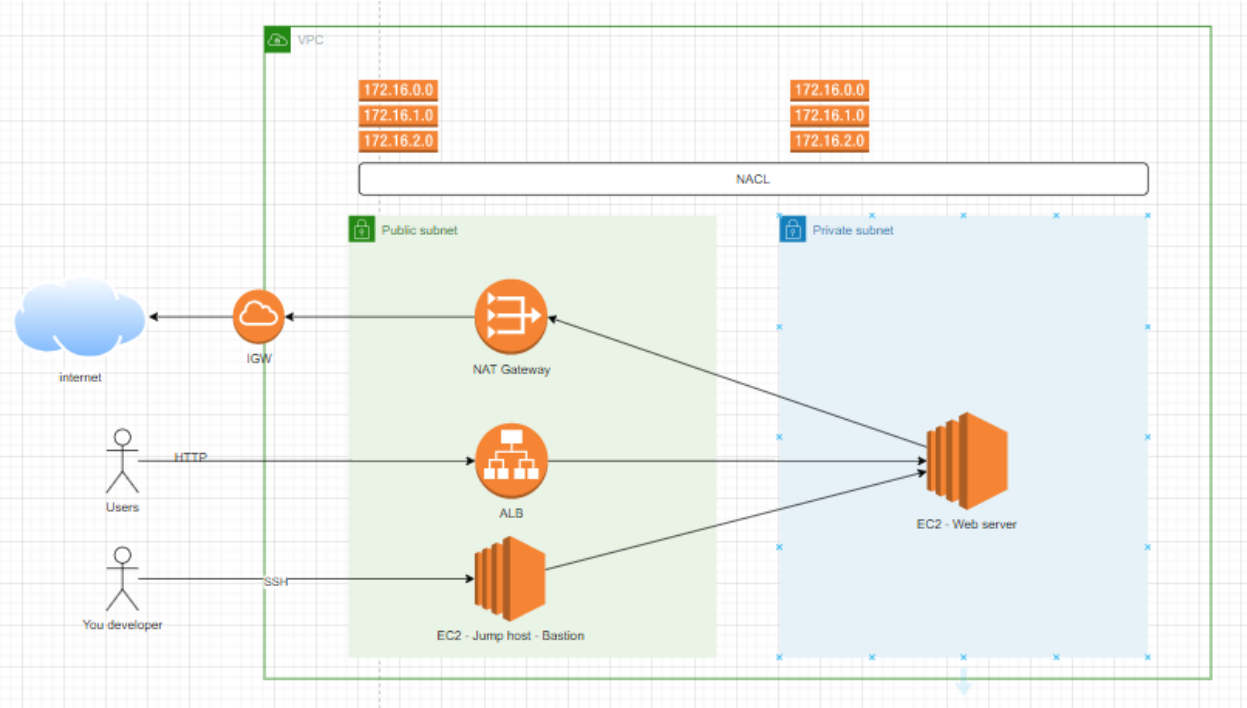
Today's task:

1. Create a web server inside private subnet. Create ALB in public.
    a. You need to create a NAT gateway first to have internet access in private subnet so it can download required packages from the internet.
        i. NAT will be created in public subnet.
        ii. Create a RouteTable for private subnets. Associate private subnets with it.
        iii. Add a route to the RouteTable for private subnets that points to your NAT gateway.
        iv. NAT is an expensive VPC component. Make sure that you delete after you have done the task and taken screenshots.
        v. When create NAT, you assign an Elastic IP to it. Elastic IP costs when it is NOT used. But free if you are using it. After NAT gateway deletion, you must release the elastic IP otherwise you will get charged.
2. Create a web app in EC2 inside ASG behind an ALB

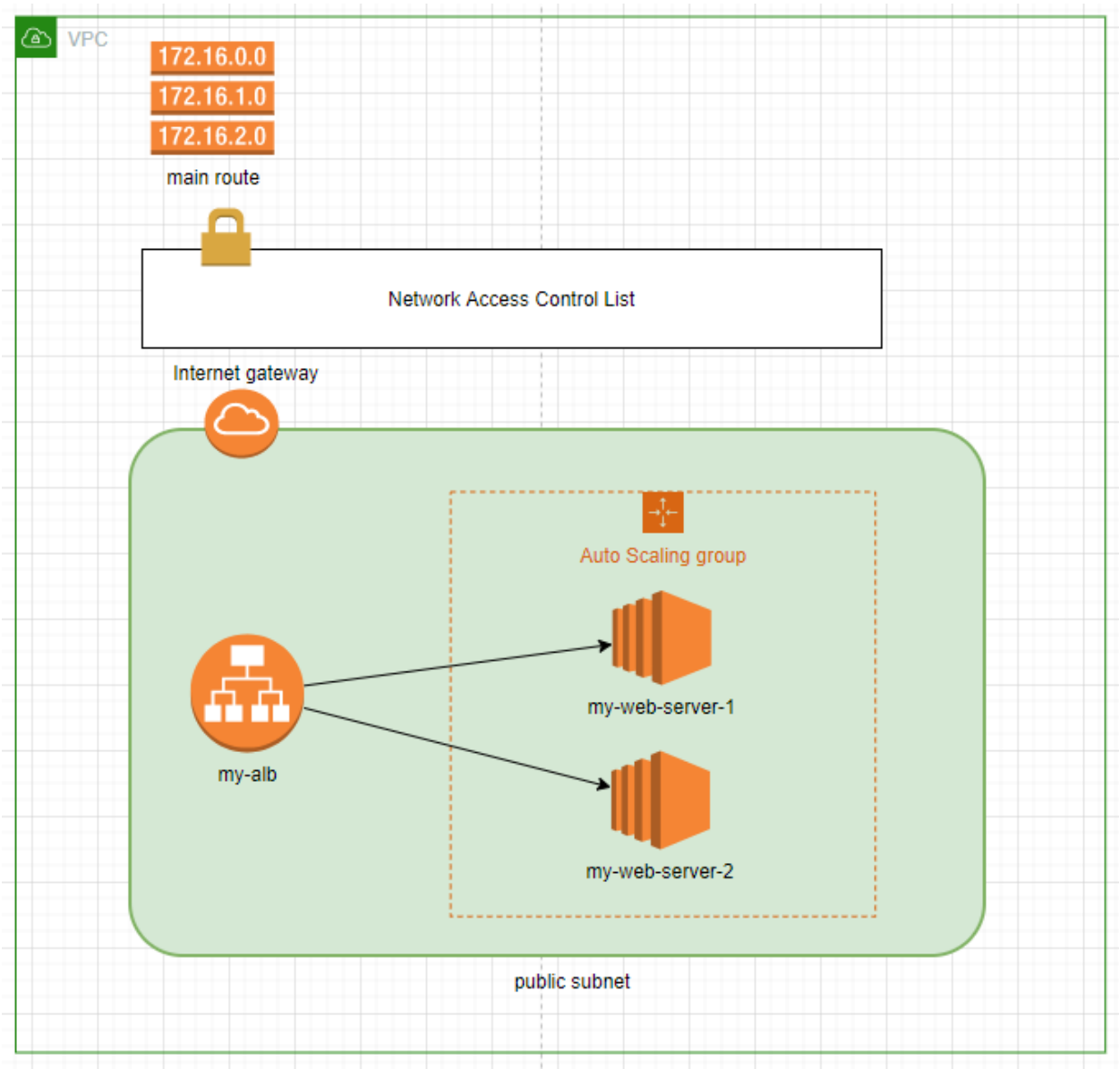
Submit items below in one pdf file:

1. Screenshot of ASG after it successfully creates EC2 instances
2. Screenshot of TG
3. Screenshot of the app with your name using ALB DNS.

Architecture of the task with NAT gateway.



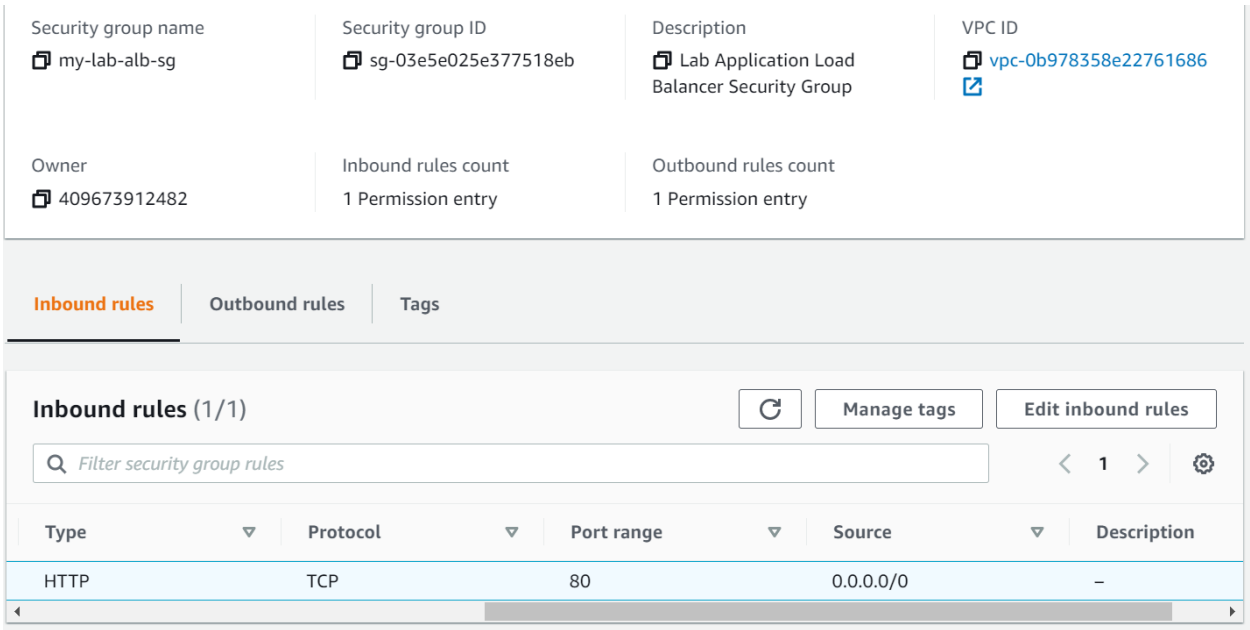
Architecture of the task with ASG.



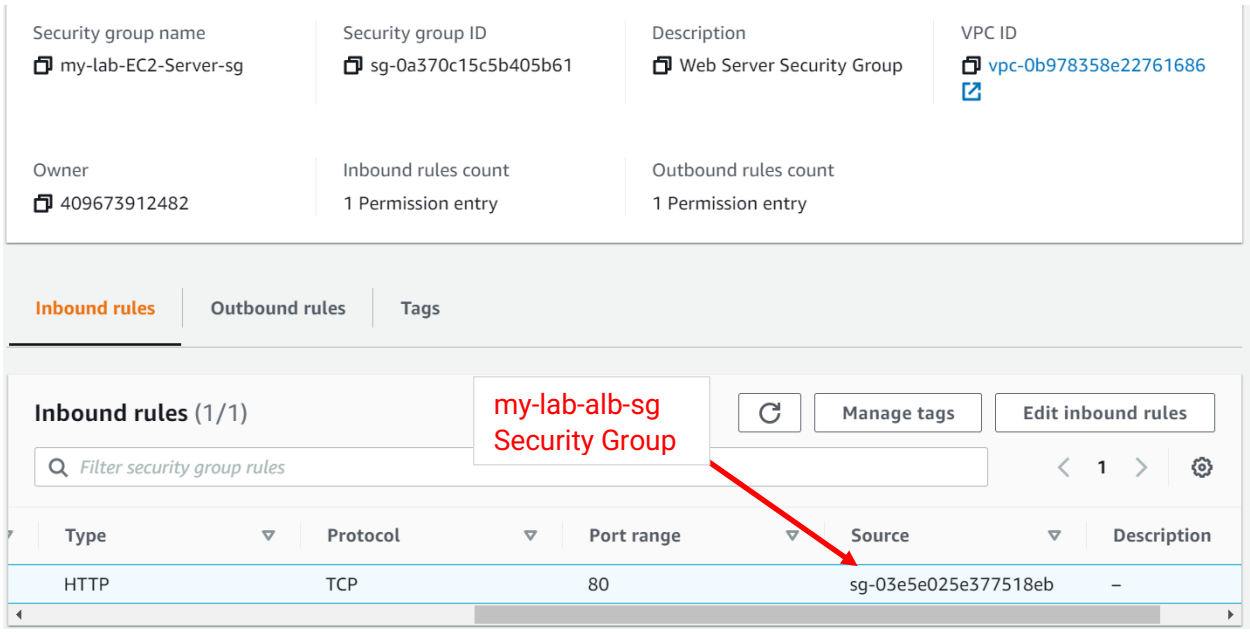
Instruction 1. Create Security Goups

- Create a SG for the ALB which is open to the world.
- Create a SG for web servers that allows ALB's SG.

Create Application Load Balancer Security Group (Outbound Rule is Default - All Traffic)



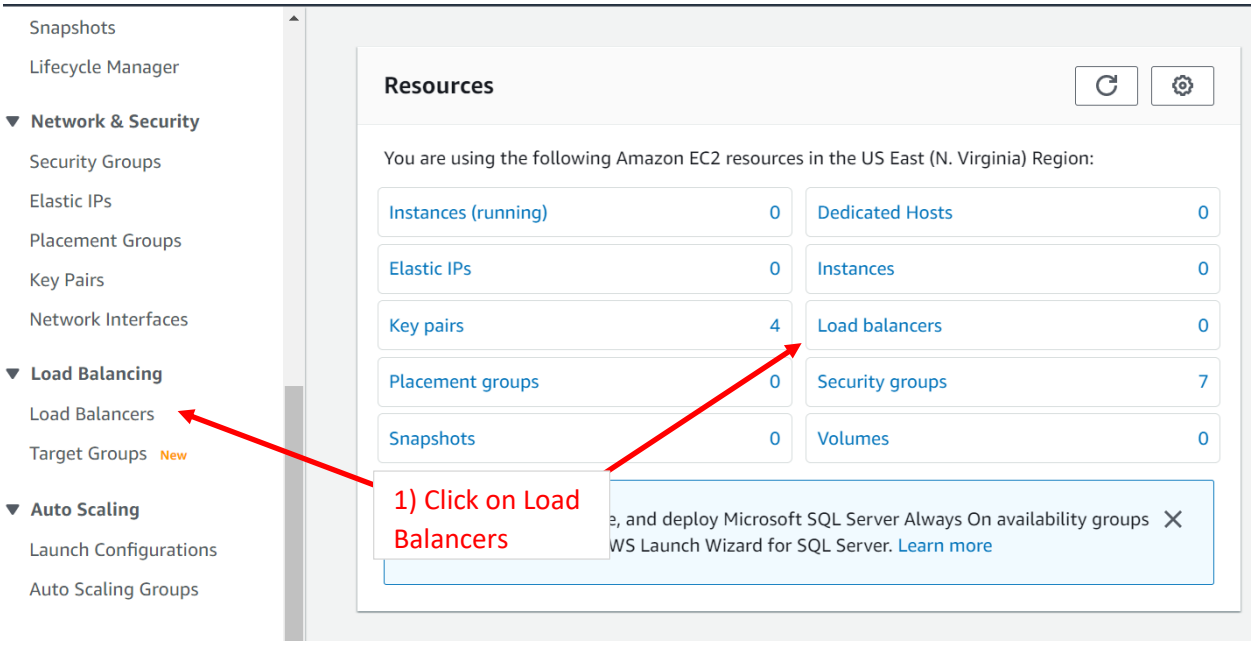
Create EC2 Web Server Security Group (Outbound Rule is Default - All Traffic)



Instruction 2. Create an ALB

- Create the default http:80 listener.
- Select VPC and public subnets.
- Select the ALB's SG that you created in Task 1.
- Create a target group, type as Instance. Don't register targets for now.

Go to the Load Balancers Display from the EC2 Dashboard



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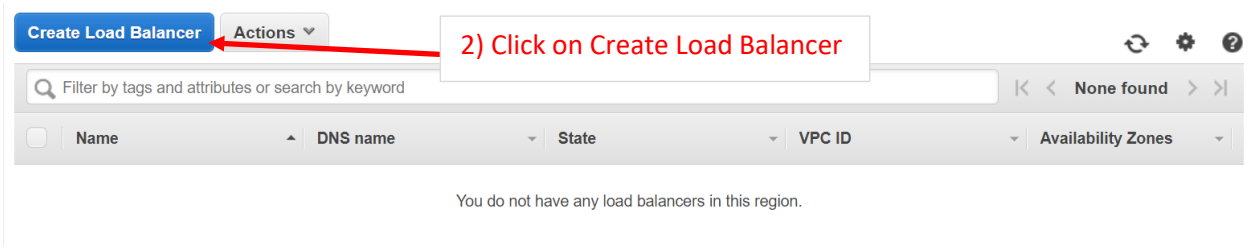

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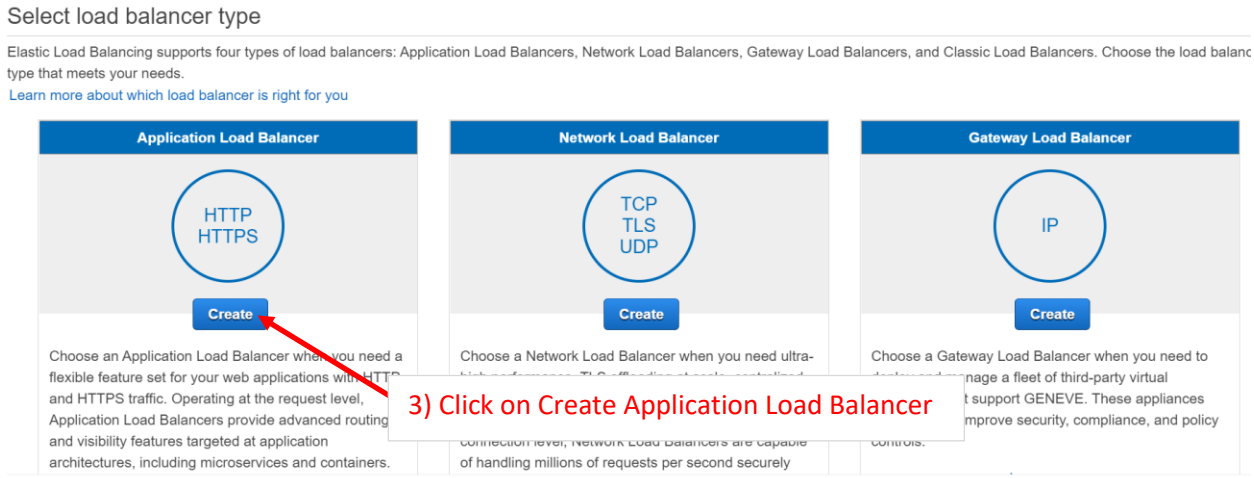

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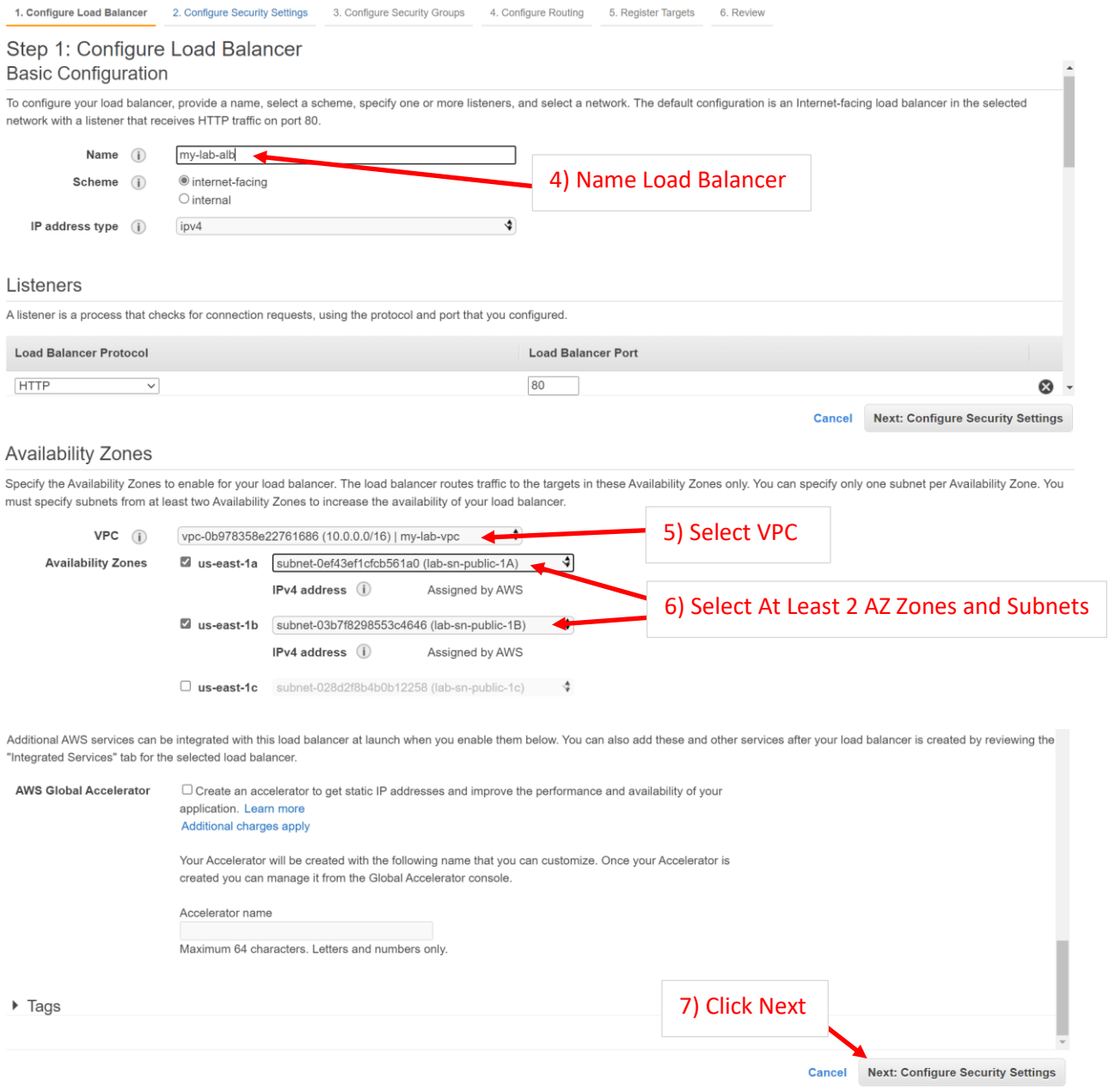
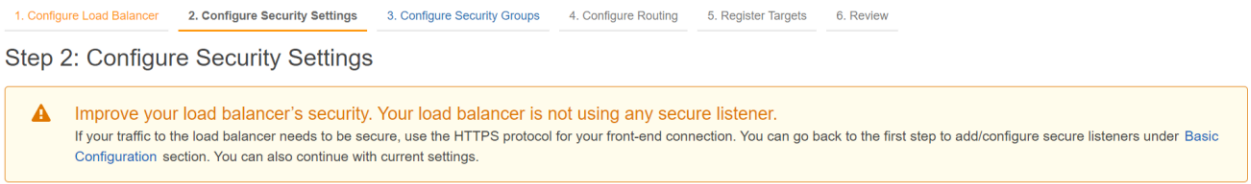

1. Configure Load Balancer
2. Configure Security Settings
3. Configure Security Groups
4. Configure Routing
5. Register Targets
6. Review
Step 1: Configure Load Balancer
Basic Configuration
To configure your load balancer, provide a name, select a scheme, specify one or more listeners, and select a network. The default configuration is an Internet-facing load balancer in the selected network with a listener that receives HTTP traffic on port 80.
Name
my-lab-alb
Scheme
internet-facing
internal
IP address type
ipv4
4) Name Load Balancer
Listeners
A listener is a process that checks for connection requests, using the protocol and port that you configured.
Load Balancer Protocol
Load Balancer Port
HTTP
80
Cancel
Next: Configure Security Settings
Availability Zones
Specify the Availability Zones to enable for your load balancer. The load balancer routes traffic to the targets in these Availability Zones only. You can specify only one subnet per Availability Zone. You must specify subnets from at least two Availability Zones to increase the availability of your load balancer.
VPC
vpc-0b978358e22761686 (10.0.0.0/16) | my-lab-vpc
5) Select VPC
Availability Zones
us-east-1a
subnet-0ef43ef1cfcb561a0 (lab-sn-public-1A)
IPv4 address
Assigned by AWS
us-east-1b
subnet-03b7f8298553c4646 (lab-sn-public-1B)
IPv4 address
Assigned by AWS
6) Select At Least 2 AZ Zones and Subnets
us-east-1c
subnet-028d2f8b4b0b12258 (lab-sn-public-1c)
Additional AWS services can be integrated with this load balancer at launch when you enable them below. You can also add these and other services after your load balancer is created by reviewing the "Integrated Services" tab for the selected load balancer.
AWS Global Accelerator
Create an accelerator to get static IP addresses and improve the performance and availability of your application. Learn more
Additional charges apply
Your Accelerator will be created with the following name that you can customize. Once your Accelerator is created you can manage it from the Global Accelerator console.
Accelerator name
Maximum 64 characters. Letters and numbers only.
Tags
7) Click Next
Cancel
Next: Configure Security Settings

...


1. Configure Load Balancer
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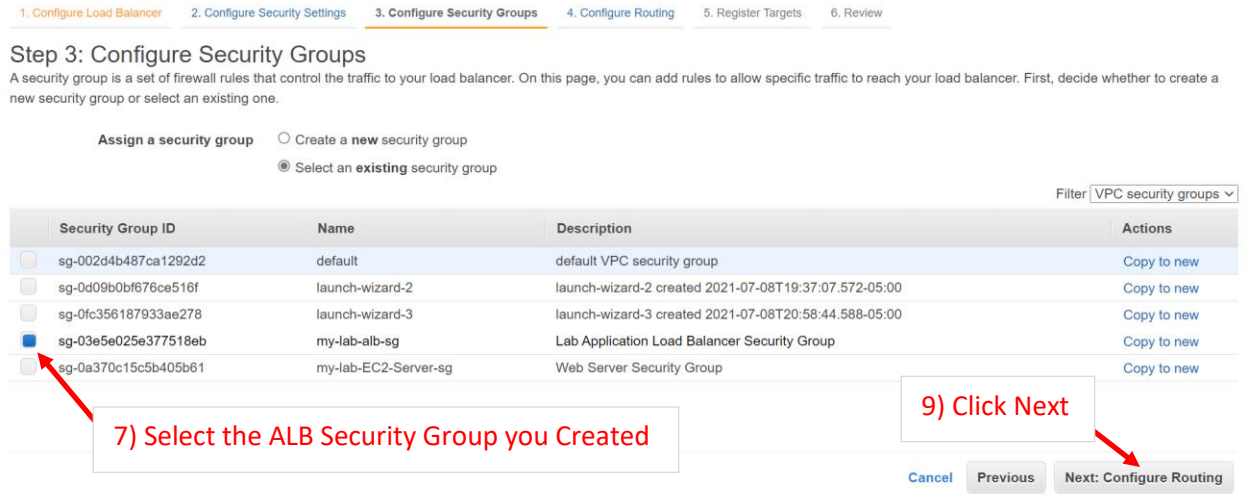
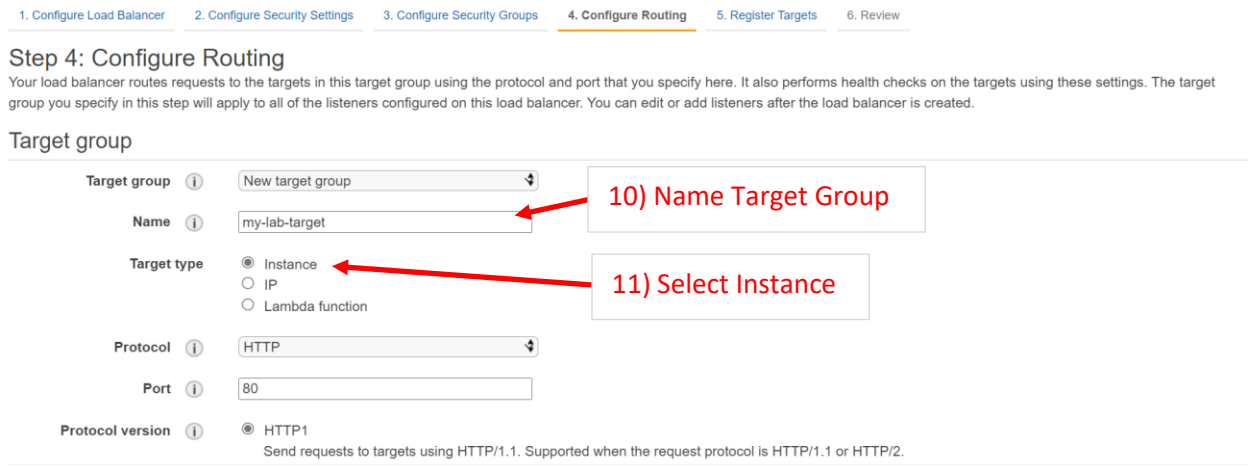
3. Configure Security Groups
4. Configure Routing
5. Register Targets
6. Review
Step 2: Configure Security Settings
Improve your load balancer's security. Your load balancer is not using any secure listener.
If your traffic to the load balancer needs to be secure, use the HTTPS protocol for your front-end connection. You can go back to the first step to add/configure secure listeners under Basic Configuration section. You can also continue with current settings.

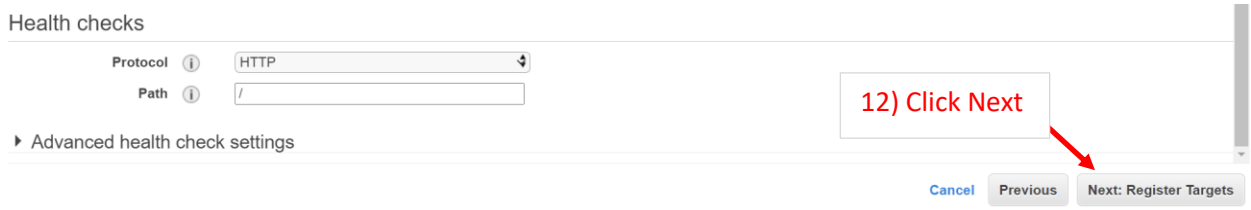

8) Click Next
Cancel
Previous
Next: Configure Security Groups

...


1. Configure Load Balancer
2. Configure Security Settings
3. Configure Security Groups
4. Configure Routing
5. Register Targets
6. Review
Step 3: Configure Security Groups
A security group is a set of firewall rules that control the traffic to your load balancer. On this page, you can add rules to allow specific traffic to reach your load balancer. First, decide whether to create a new security group or select an existing one.
Assign a security group
Create a new security group
Select an existing security group
Filter VPC security groups
Security Group ID
Name
Description
Actions
sg-002d4b487ca1292d2 default default VPC security group Copy to new
sg-0d09b0bf676ce516f launch-wizard-2 launch-wizard-2 created 2021-07-08T19:37:07.572-05:00 Copy to new
sg-0fc356187933ae278 launch-wizard-3 launch-wizard-3 created 2021-07-08T20:58:44.588-05:00 Copy to new
sg-03e5e025e377518eb my-lab-alb-sg Lab Application Load Balancer Security Group Copy to new
sg-0a370c15c5b405b61 my-lab-EC2-Server-sg Web Server Security Group Copy to new
7) Select the ALB Security Group you Created
9) Click Next
Cancel
Previous
Next: Configure Routing

...


1. Configure Load Balancer
2. Configure Security Settings
3. Configure Security Groups
4. Configure Routing
5. Register Targets
6. Review
Step 4: Configure Routing
Your load balancer routes requests to the targets in this target group using the protocol and port that you specify here. It also performs health checks on the targets using these settings. The target group you specify in this step will apply to all of the listeners configured on this load balancer. You can edit or add listeners after the load balancer is created.
Target group
Target group
New target group
Name
my-lab-target
10) Name Target Group
Target type
Instance
IP
Lambda function
11) Select Instance
Protocol
HTTP
Port
80
Protocol version
HTTP1
Send requests to targets using HTTP/1.1. Supported when the request protocol is HTTP/1.1 or HTTP/2.



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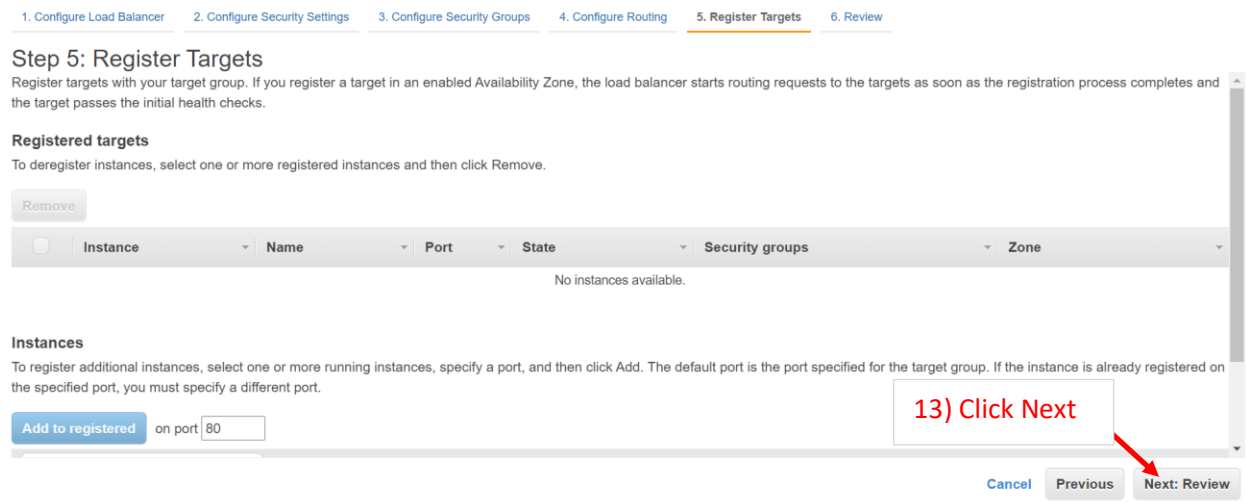

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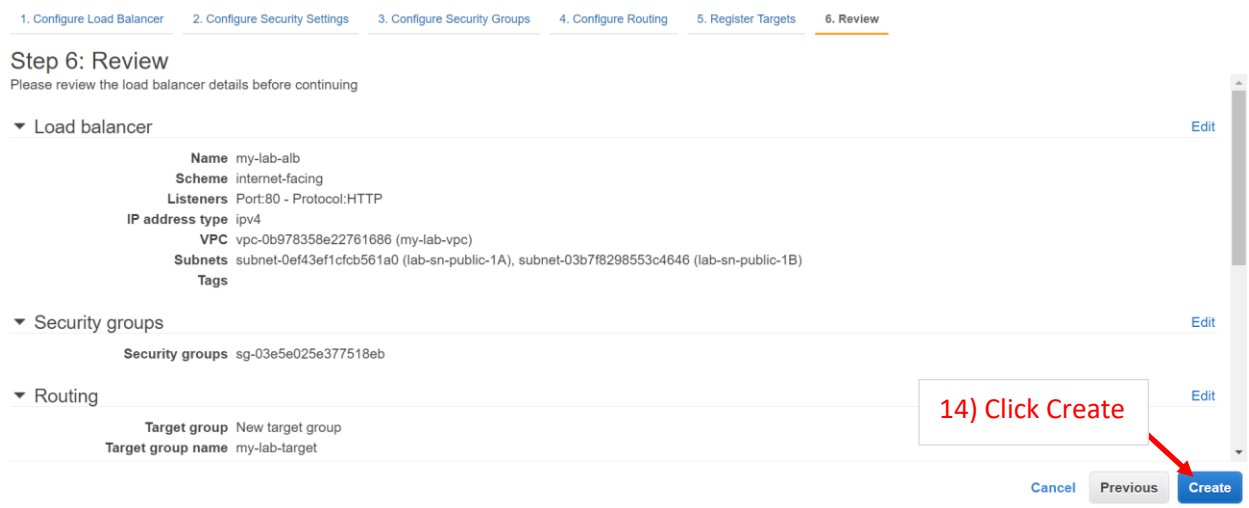
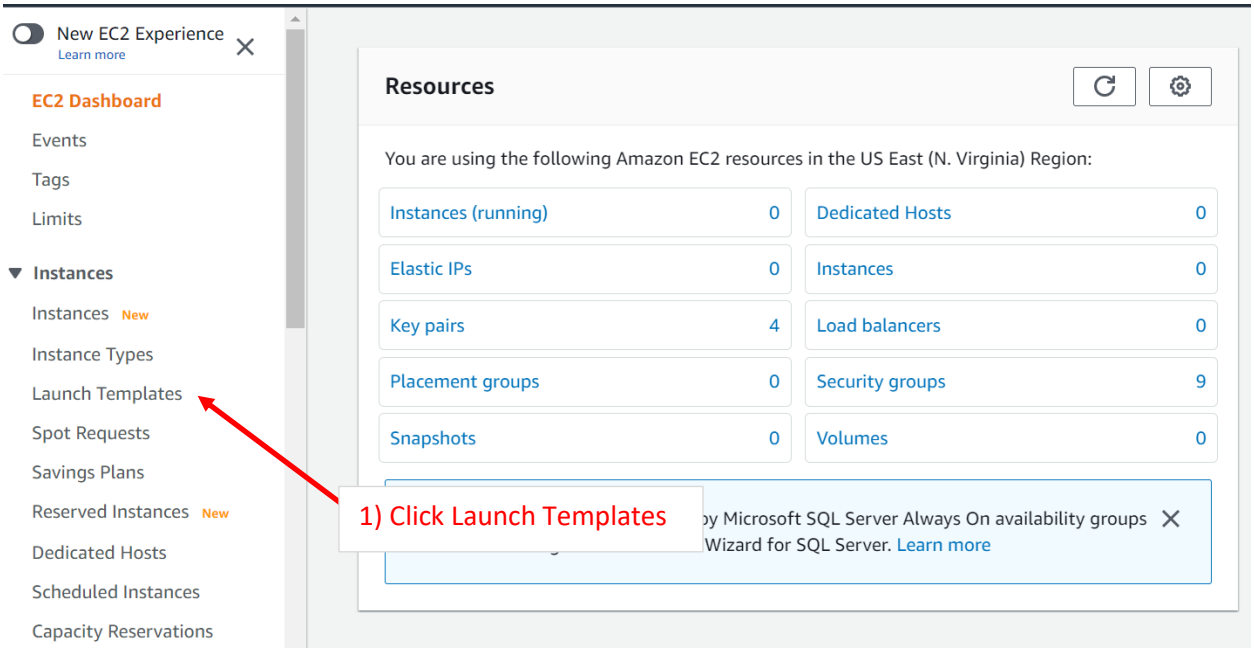


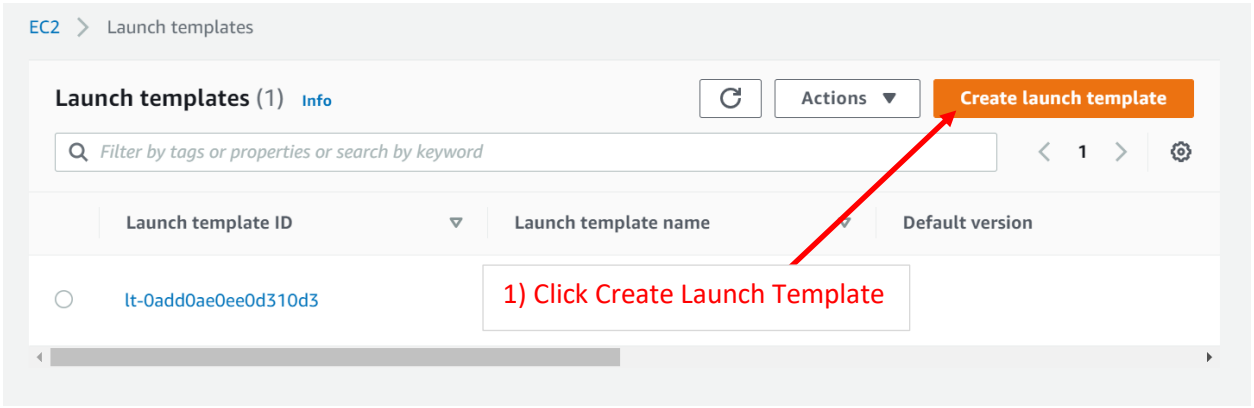
Instruction 3. Create a launch template

- Select the web server's SG created in Task 1.
- Expand advanced and enter the user data below.

Go to Launch Templates Display from EC2 Display



Create Launch Template



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EC2 > Launch templates > Create launch template

Create launch template

Creating a launch template allows you to create a saved instance configuration that can be reused, shared and launched at a later time. Templates can have multiple versions.

Launch template name and description

2) Name Template

Launch template name - *required*

my-lab-server

Must be unique to this account. Max 128 chars. No spaces or special characters like '&', '*', '@'.

Template version description

A prod webserver for MyApp

Max 255 chars

Selecting Guidance will show more Details

Auto Scaling guidance **Info**

Select this if you intend to use this template with EC2 Auto Scaling

☑ Provide guidance to help me set up a template that I can use with EC2 Auto Scaling

▶ **Template tags**

▶ **Source template**

Launch template contents

Specify the details of your launch template below. Leaving a field blank will result in the field not being included in the launch template.

▼ Amazon machine image (AMI) - required Info

3) Select AMI

AMI - *required*

Amazon Linux 2 AMI (HVM), SSD Volume Type
ami-0dc2d3e4c0f9ebd18
Catalog: Quick Start virtualization: hvm architecture: 64-bit (x86)

▼ Instance type Info

4) Select Instance Type

Instance type

t2.micro Free tier eligible
Family: t2 1 vCPU 1 GiB Memory
On-Demand Linux pricing: 0.0116 USD per Hour
On-Demand Windows pricing: 0.0162 USD per Hour

Compare instance types

Key pair (login) Info

You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

Key pair name

Don't include in launch template

Create new key pair

Network settings

Networking platform Info

Virtual Private Cloud (VPC)
Launch into a virtual network in your own logically isolated area within the AWS Cloud

EC2-Classic
Launch into a single flat network that you share with other customers.

Security groups

Select security groups

my-lab-EC2-Server-sg sg-0a370c15c5b405b61
VPC: vpc-0b978358e22761686

5) Select Server security Group you Created

Storage (volumes) Info

Volume 1 (AMI Root) (8 GiB, EBS, General purpose SSD (gp2))
AMI Volumes are not included in the template unless modified

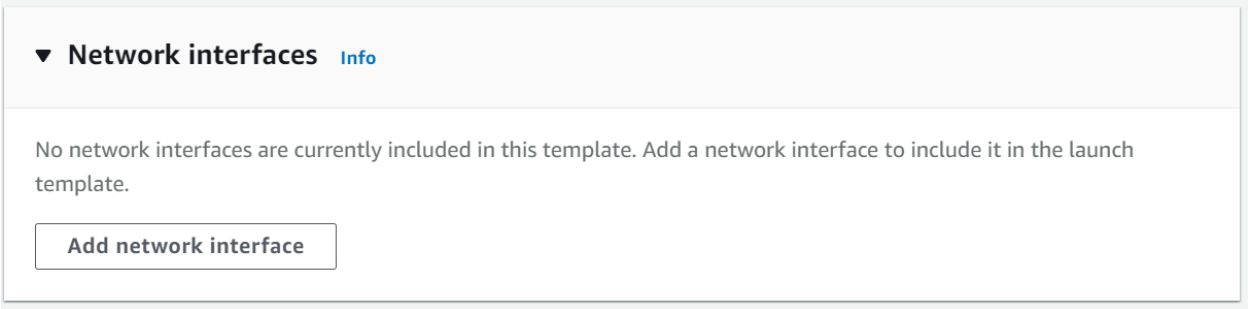
Add new volume

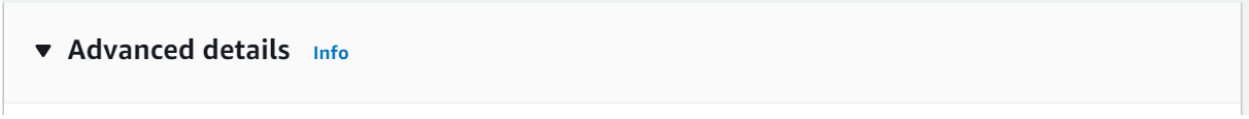
Resource tags Info

No resource tags are currently included in this template. Add a resource tag to include it in the launch template.

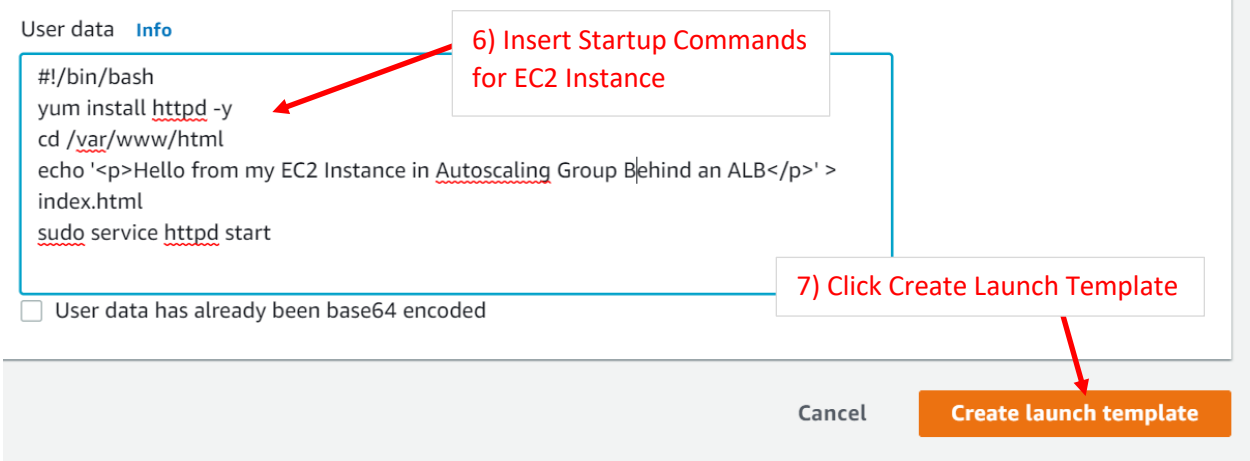
Add tag

50 remaining (Up to 50 tags maximum)





... User Data at Bottom of Advanced Details



EC2 Instance Startup Commands

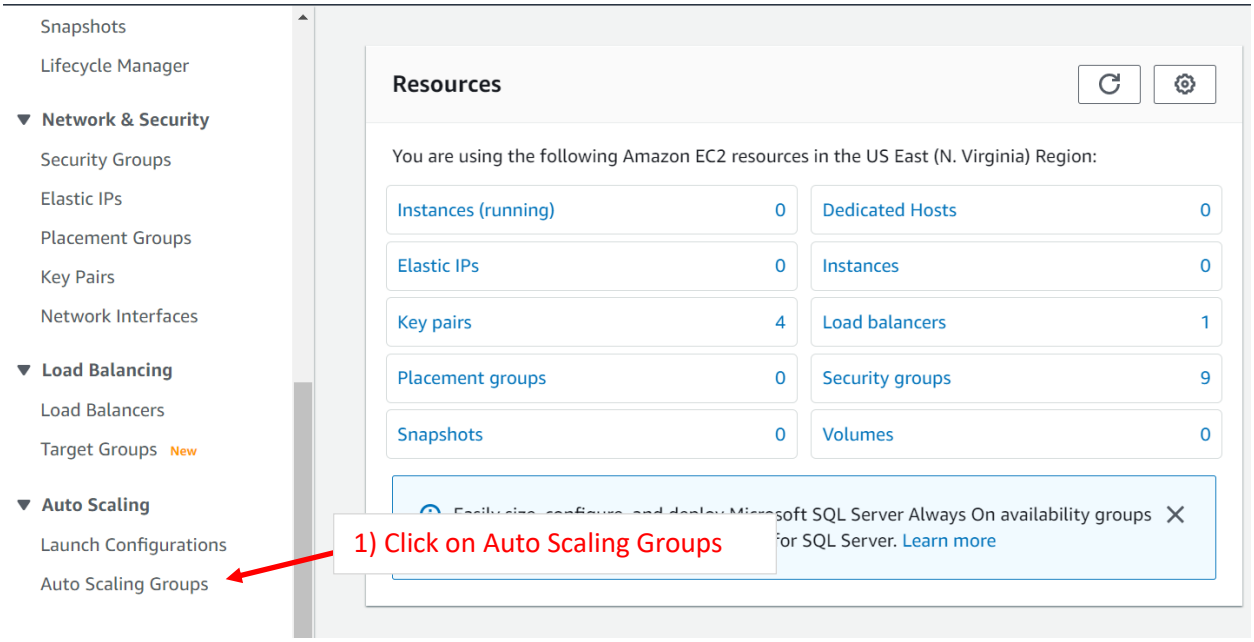
```
#!/bin/bash
yum install httpd -y
cd /var/www/html
echo '<p>Hello from the instance in autoscaling group behind an ALB</p>' >
index.html
sudo service httpd start
```

#!/bin/bash --> tells the OS to invoke the specified shell to execute the script commands

Instruction 4. Create Auto Scaling Group

- Select the launch template.
- Select the custom VPC and public subnets.
- Click on attach to an existing load balancer and select the default TG (Target Group) of the ALB.
- Desired capacity 2, min is 1, max is 3. Set target tracking scaling policy on the CPU utilization with any value from 10 to 90. AWS AutoScaling tries to maintain the CPU utilization at that level. If it exceeds, scales outs.

Go to Auto Scaling Display from EC2 Display



Create Auto Scaling Group

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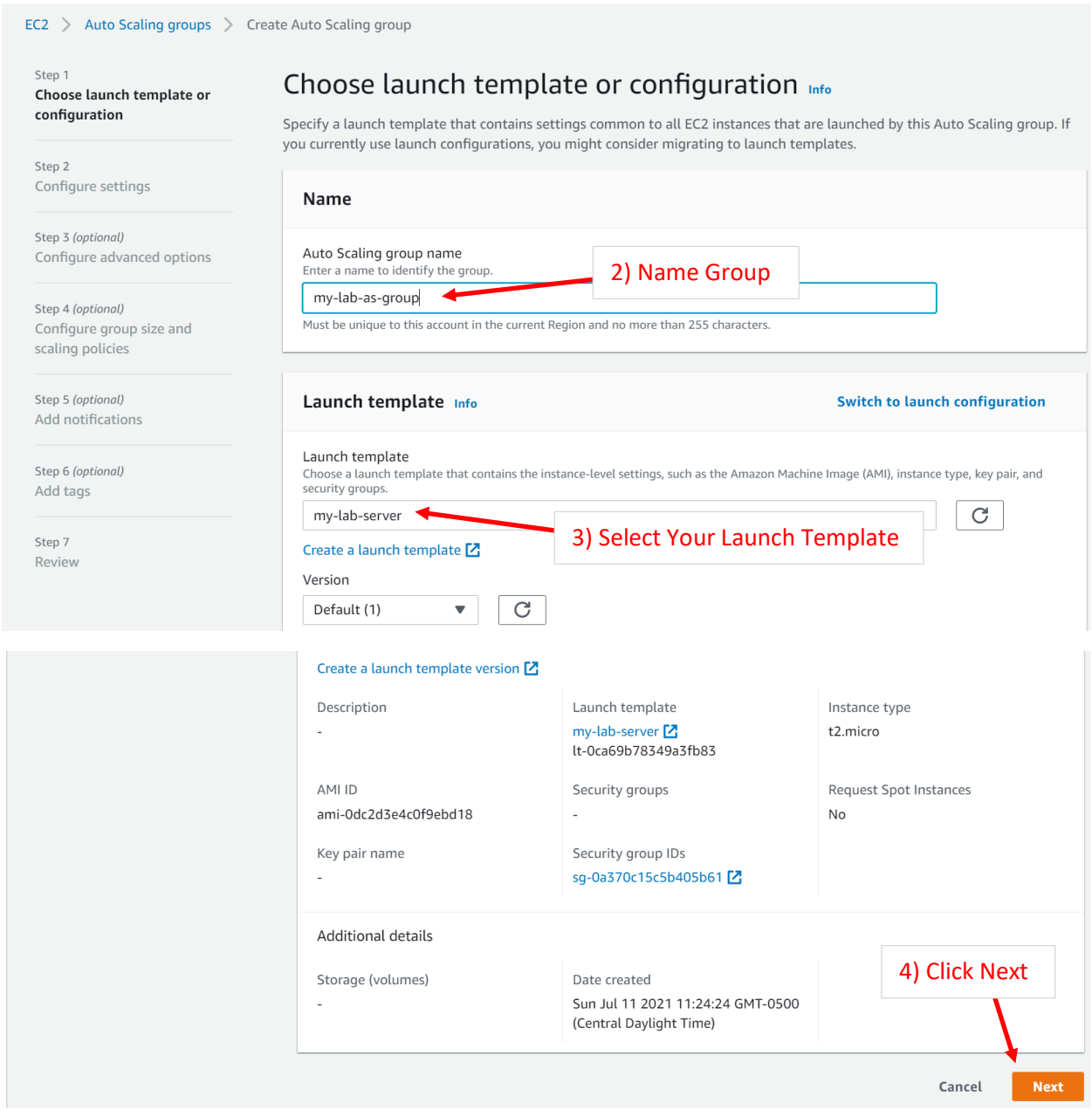
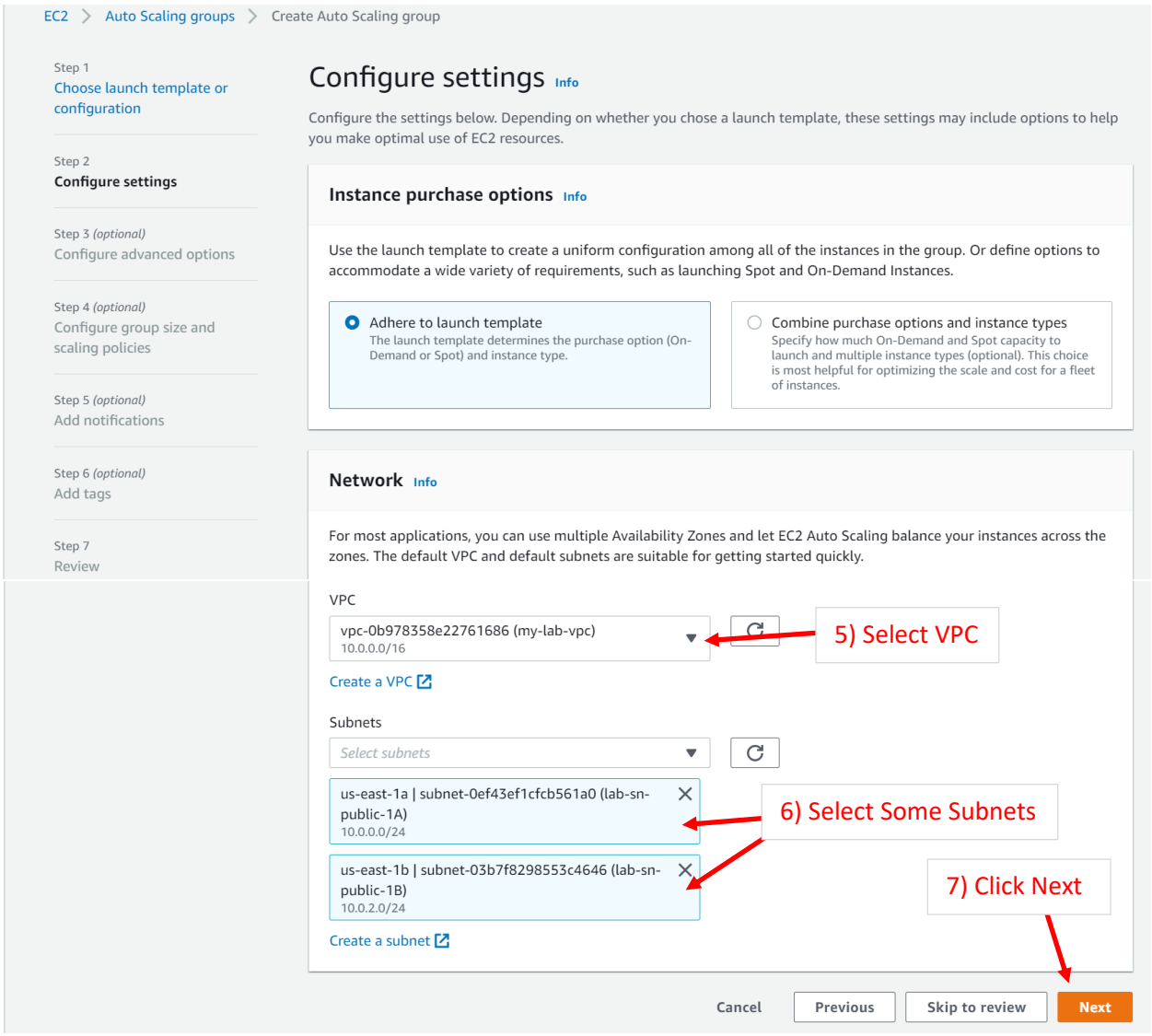
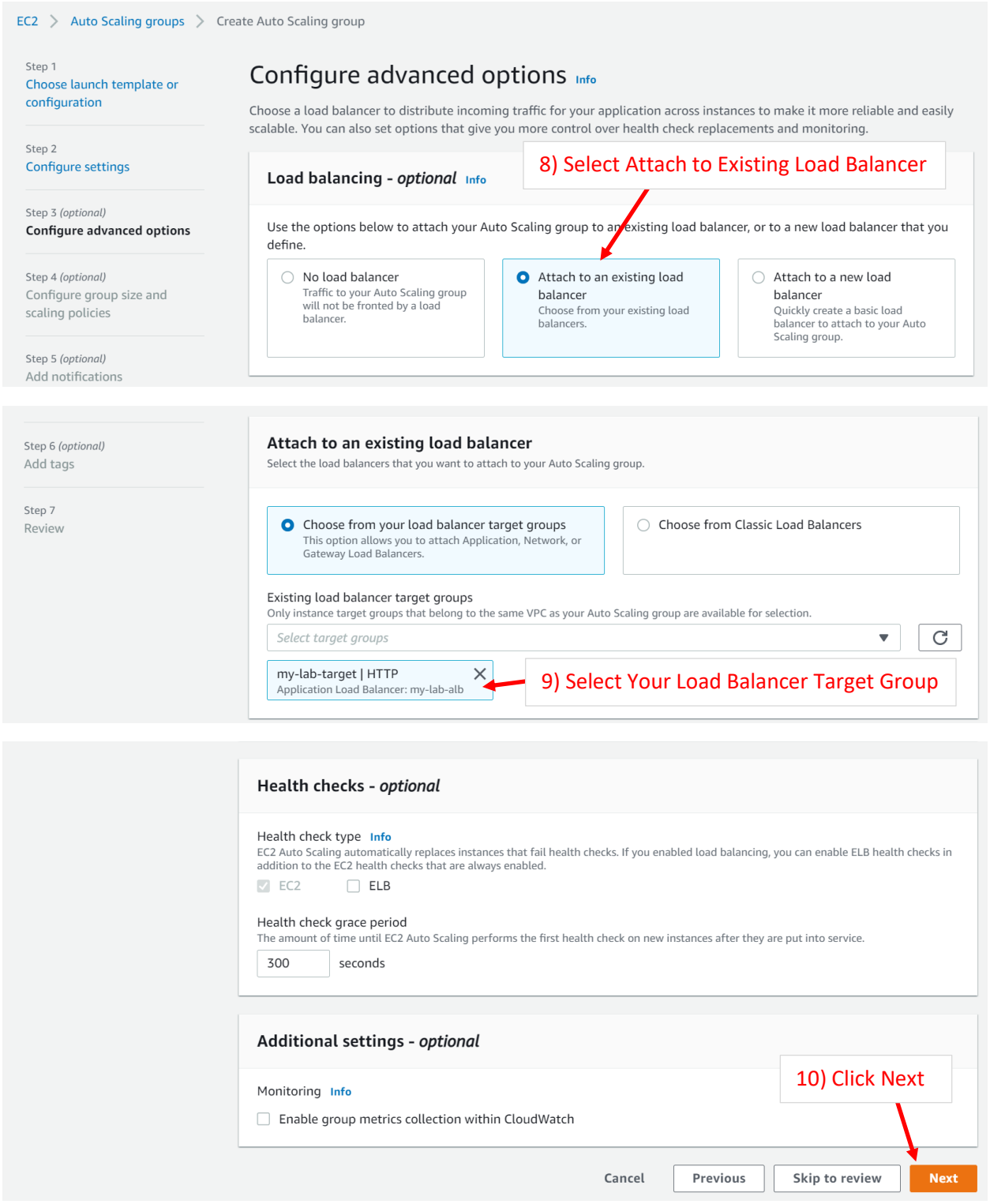

EC2 > Auto Scaling groups > Create Auto Scaling group
Step 1
Choose launch template or configuration
Step 2
Configure settings
Step 3 (optional)
Configure advanced options
Step 4 (optional)
Configure group size and scaling policies
Step 5 (optional)
Add notifications
Step 6 (optional)
Add tags
Step 7
Review
Choose launch template or configuration Info
Specify a launch template that contains settings common to all EC2 instances that are launched by this Auto Scaling group. If you currently use launch configurations, you might consider migrating to launch templates.
Name
Auto Scaling group name
Enter a name to identify the group.
my-lab-as-group
2) Name Group
Must be unique to this account in the current Region and no more than 255 characters.
Launch template Info
Switch to launch configuration
Launch template
Choose a launch template that contains the instance-level settings, such as the Amazon Machine Image (AMI), instance type, key pair, and security groups.
my-lab-server
3) Select Your Launch Template
Create a launch template
Version
Default (1)
Create a launch template version
Description
-
Launch template
my-lab-server
lt-0ca69b78349a3fb83
Instance type
t2.micro
AMI ID
ami-0dc2d3e4c0f9ebd18
Security groups
-
Request Spot Instances
No
Key pair name
-
Security group IDs
sg-0a370c15c5b405b61
Additional details
Storage (volumes)
-
Date created
Sun Jul 11 2021 11:24:24 GMT-0500 (Central Daylight Time)
4) Click Next
Cancel
Next

...


EC2 > Auto Scaling groups > Create Auto Scaling group
Step 1
Choose launch template or configuration
Step 2
Configure settings
Step 3 (optional)
Configure advanced options
Step 4 (optional)
Configure group size and scaling policies
Step 5 (optional)
Add notifications
Step 6 (optional)
Add tags
Step 7
Review
Configure settings Info
Configure the settings below. Depending on whether you chose a launch template, these settings may include options to help you make optimal use of EC2 resources.
Instance purchase options Info
Use the launch template to create a uniform configuration among all of the instances in the group. Or define options to accommodate a wide variety of requirements, such as launching Spot and On-Demand Instances.
Adhere to launch template
The launch template determines the purchase option (On-Demand or Spot) and instance type.
Combine purchase options and instance types
Specify how much On-Demand and Spot capacity to launch and multiple instance types (optional). This choice is most helpful for optimizing the scale and cost for a fleet of instances.
Network Info
For most applications, you can use multiple Availability Zones and let EC2 Auto Scaling balance your instances across the zones. The default VPC and default subnets are suitable for getting started quickly.
VPC
vpc-0b978358e22761686 (my-lab-vpc)
10.0.0.0/16
5) Select VPC
Create a VPC
Subnets
Select subnets
us-east-1a | subnet-0ef43ef1cfcb561a0 (lab-sn-public-1A)
10.0.0.0/24
us-east-1b | subnet-03b7f8298553c4646 (lab-sn-public-1B)
10.0.2.0/24
6) Select Some Subnets
7) Click Next
Create a subnet
Cancel
Previous
Skip to review
Next

...


EC2 > Auto Scaling groups > Create Auto Scaling group
Step 1
Choose launch template or configuration
Step 2
Configure settings
Step 3 (optional)
Configure advanced options
Step 4 (optional)
Configure group size and scaling policies
Step 5 (optional)
Add notifications
Configure advanced options Info
Choose a load balancer to distribute incoming traffic for your application across instances to make it more reliable and easily scalable. You can also set options that give you more control over health check replacements and monitoring.
Load balancing - optional Info
8) Select Attach to Existing Load Balancer
Use the options below to attach your Auto Scaling group to an existing load balancer, or to a new load balancer that you define.
No load balancer
Traffic to your Auto Scaling group will not be fronted by a load balancer.
Attach to an existing load balancer
Choose from your existing load balancers.
Attach to a new load balancer
Quickly create a basic load balancer to attach to your Auto Scaling group.
Step 6 (optional)
Add tags
Step 7
Review
Attach to an existing load balancer
Select the load balancers that you want to attach to your Auto Scaling group.
Choose from your load balancer target groups
This option allows you to attach Application, Network, or Gateway Load Balancers.
Choose from Classic Load Balancers
Existing load balancer target groups
Only instance target groups that belong to the same VPC as your Auto Scaling group are available for selection.
Select target groups
my-lab-target | HTTP
Application Load Balancer: my-lab-alb
9) Select Your Load Balancer Target Group
Health checks - optional
Health check type Info
EC2 Auto Scaling automatically replaces instances that fail health checks. If you enabled load balancing, you can enable ELB health checks in addition to the EC2 health checks that are always enabled.
EC2
ELB
Health check grace period
The amount of time until EC2 Auto Scaling performs the first health check on new instances after they are put into service.
300
seconds
Additional settings - optional
10) Click Next
Monitoring Info
Enable group metrics collection within CloudWatch
Cancel
Previous
Skip to review
Next

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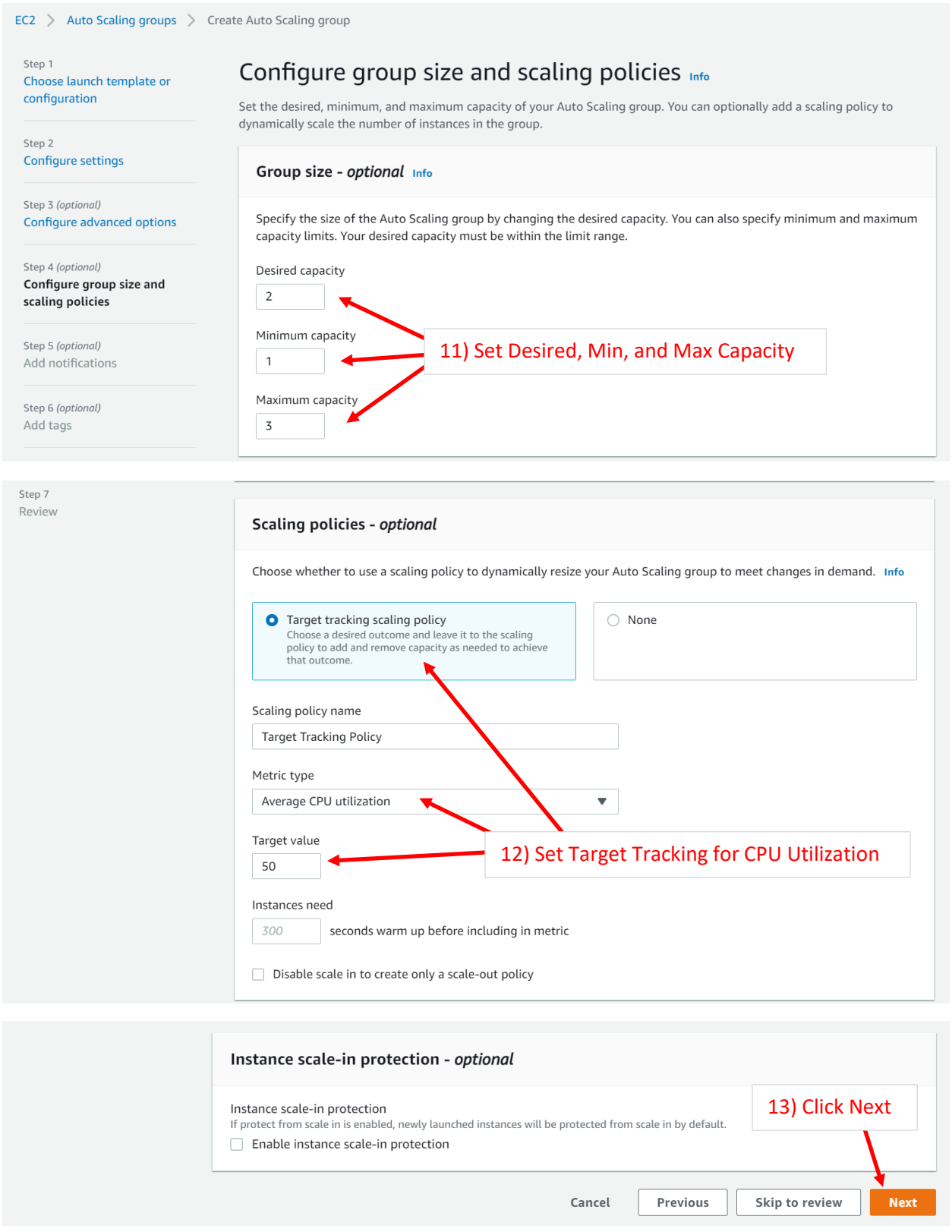
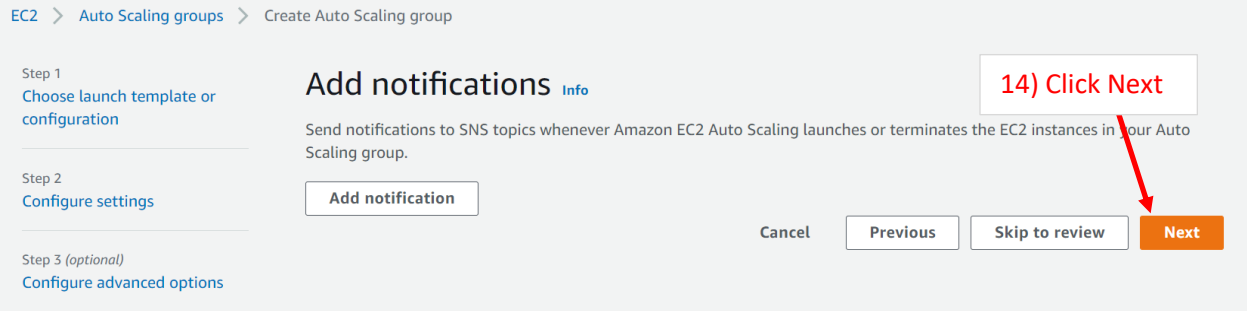

EC2 > Auto Scaling groups > Create Auto Scaling group
Step 1
Choose launch template or configuration
Step 2
Configure settings
Step 3 (optional)
Configure advanced options
Step 4 (optional)
Configure group size and scaling policies
Step 5 (optional)
Add notifications
Step 6 (optional)
Add tags
Step 7
Review
Configure group size and scaling policies Info
Set the desired, minimum, and maximum capacity of your Auto Scaling group. You can optionally add a scaling policy to dynamically scale the number of instances in the group.
Group size - optional Info
Specify the size of the Auto Scaling group by changing the desired capacity. You can also specify minimum and maximum capacity limits. Your desired capacity must be within the limit range.
Desired capacity
2
Minimum capacity
1
Maximum capacity
3
11) Set Desired, Min, and Max Capacity
Scaling policies - optional
Choose whether to use a scaling policy to dynamically resize your Auto Scaling group to meet changes in demand. Info
Target tracking scaling policy
Choose a desired outcome and leave it to the scaling policy to add and remove capacity as needed to achieve that outcome.
None
Scaling policy name
Target Tracking Policy
Metric type
Average CPU utilization
Target value
50
12) Set Target Tracking for CPU Utilization
Instances need
300
seconds warm up before including in metric
Disable scale in to create only a scale-out policy
Instance scale-in protection - optional
Instance scale-in protection
If protect from scale in is enabled, newly launched instances will be protected from scale in by default.
Enable instance scale-in protection
13) Click Next
Cancel
Previous
Skip to review
Next

...



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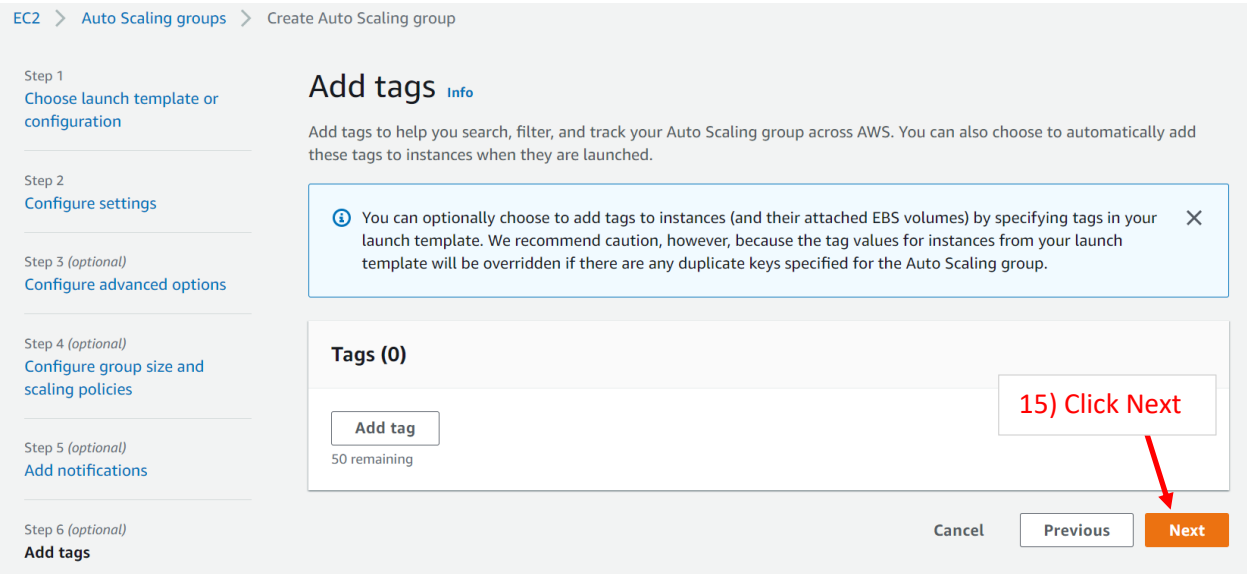
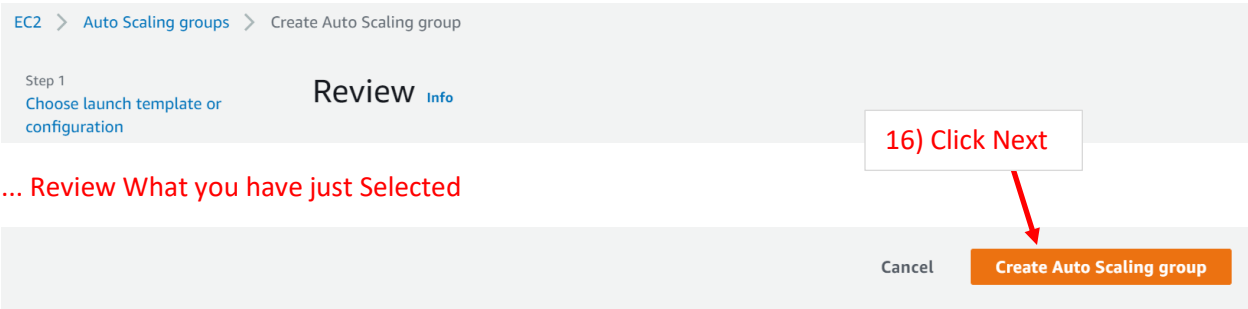


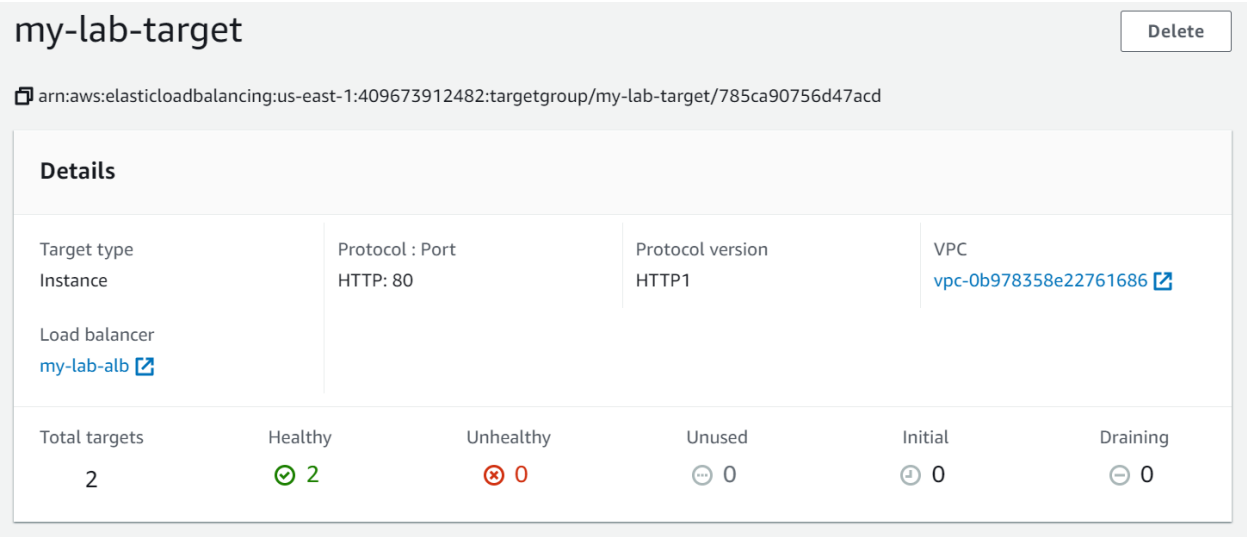
...

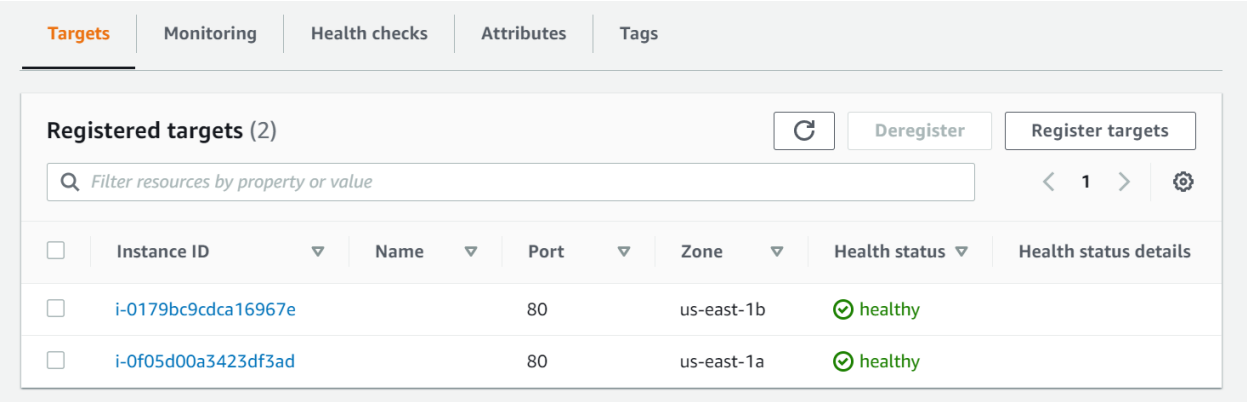


... Review What you have just Selected

Instruction 5. Verify and Test the ALB

View the Health Check on your the Target Group Details. Both Instances Should be Healthy





DNS on Load Balancer Display. Each EC2 will have a public address but you cannot access due to security group settings.

Test DNS with Web Browser