FRANKFURT UNIVERSITY OF APPLIED SCIENCES

Cluster of Web-Servers with AWS

Cloud Computing

Mauricio Altamirano Silva

Julia Johnson

Sefer Ul

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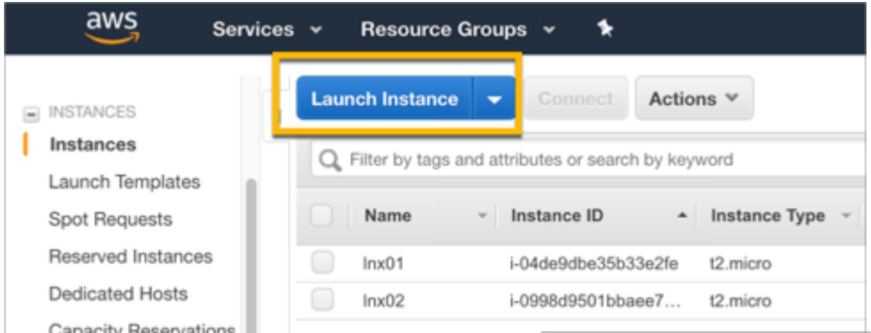
Agenda

- AWS
- Create EC2 (Elastic Compute Cloud)
- Create EBS (Elastic Block Storage)
- Cloning the EC2 & EBS
- Install and Configure NGINX
- Set up Let’s Encrypt with NGINX Server
- Create ELB (Elastic Load Balancer)
- Configure Domain Name with ELB
- Monitoring the Web-Server Cluster - *DEMO*

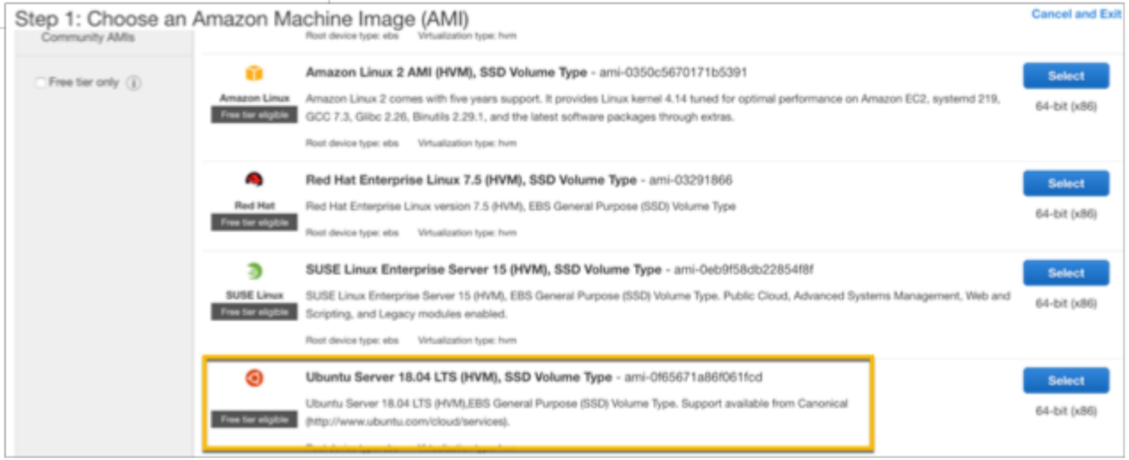
AWS (Amazon Web Services)

- Amazon Web Services provides on-demand **cloud computing platforms** to individuals, companies and governments, on a **paid subscription** basis.

Create EC2 (Elastic Compute Cloud)



Name	Instance ID	Instance Type
lnx01	i-04de9dbe35b33e2fe	t2.micro
lnx02	i-0998d9501bbaee7…	t2.micro



Step 1: Choose an Amazon Machine Image (AMI)

Root device type: ebs Virtualization type: hvm

Amazon Linux 2 AMI (HVM), SSD Volume Type - ami-0350c5670171b5391

Amazon Linux 2 comes with five years support. It provides Linux kernel 4.14 tuned for optimal performance on Amazon EC2, systemd 219, GCC 7.3, Glibc 2.26, Binutils 2.29.1, and the latest software packages through extras.

Root device type: ebs Virtualization type: hvm

64-bit (x86)

Red Hat Enterprise Linux 7.5 (HVM), SSD Volume Type - ami-03291866

Red Hat Enterprise Linux version 7.5 (HVM), EBS General Purpose (SSD) Volume Type

Root device type: ebs Virtualization type: hvm

64-bit (x86)

SUSE Linux Enterprise Server 15 (HVM), SSD Volume Type - ami-0eb9f58db22854f8f

SUSE Linux Enterprise Server 15 (HVM), EBS General Purpose (SSD) Volume Type. Public Cloud, Advanced Systems Management, Web and Scripting, and Legacy modules enabled.

Root device type: ebs Virtualization type: hvm

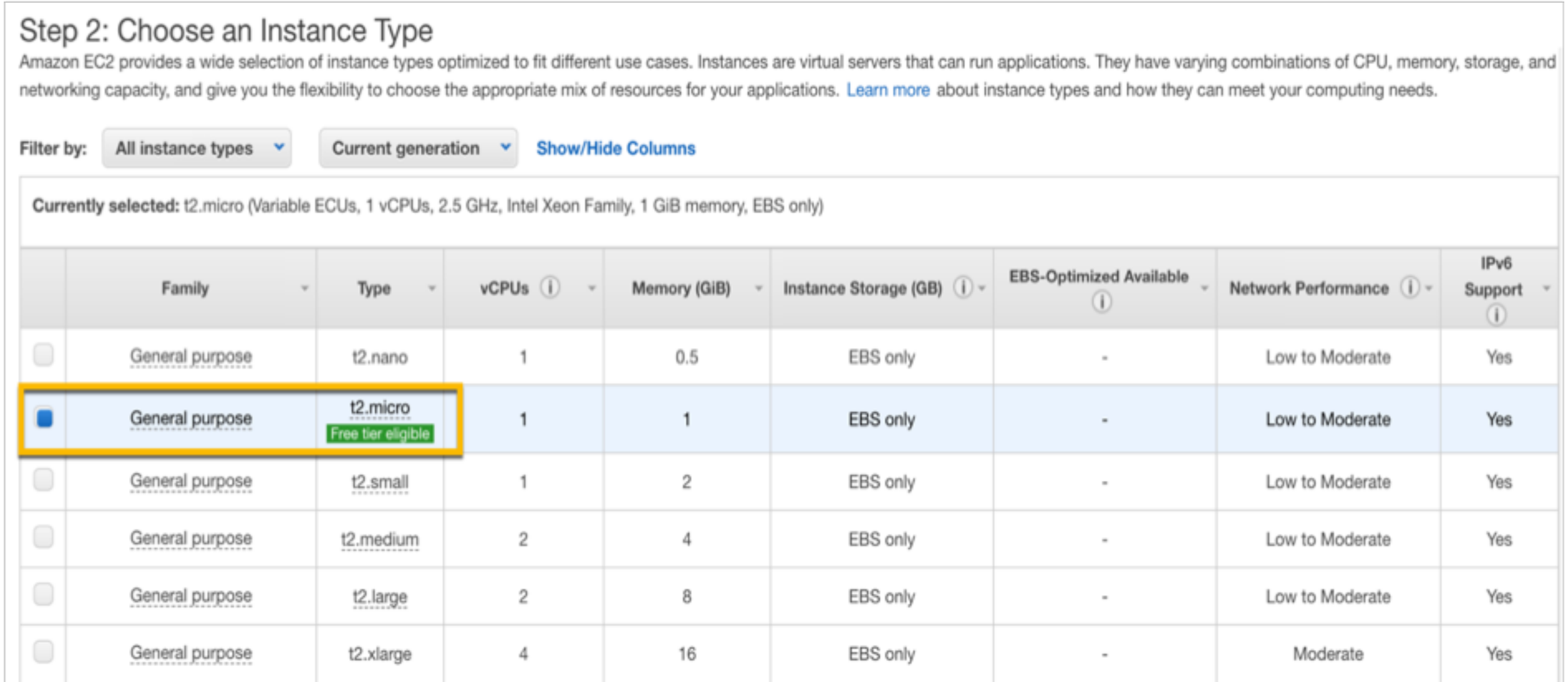
64-bit (x86)

Ubuntu Server 18.04 LTS (HVM), SSD Volume Type - ami-0f65671a86f061fcd

Ubuntu Server 18.04 LTS (HVM),EBS General Purpose (SSD) Volume Type. Support available from Canonical (http://www.ubuntu.com/cloud/services).

64-bit (x86)

Create EC2 (Elastic Compute Cloud)



Step 2: Choose an Instance Type

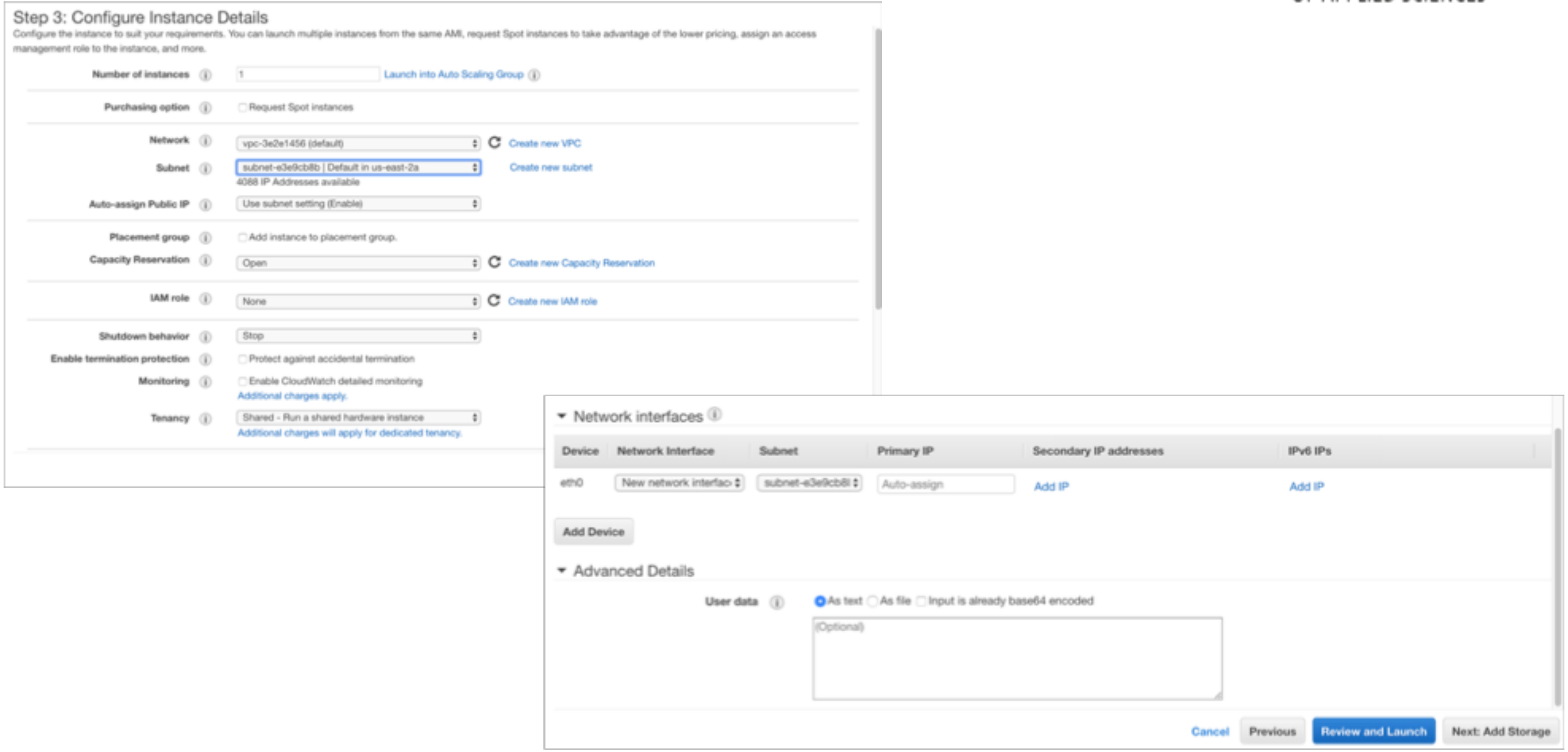
Amazon EC2 provides a wide selection of instance types optimized to fit different use cases. Instances are virtual servers that can run applications. They have varying combinations of CPU, memory, storage, and networking capacity, and give you the flexibility to choose the appropriate mix of resources for your applications. Learn more about instance types and how they can meet your computing needs.

Filter by: All instance types | Current generation | Show/Hide Columns

Currently selected: t2.micro (Variable ECUs, 1 vCPUs, 2.5 GHz, Intel Xeon Family, 1 GiB memory, EBS only)

	Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance	IPv6 Support
□	General purpose	t2.nano	1	0.5	EBS only	-	Low to Moderate	Yes
■	General purpose	t2.micro Free tier eligible	1	1	EBS only	-	Low to Moderate	Yes
□	General purpose	t2.small	1	2	EBS only	-	Low to Moderate	Yes
□	General purpose	t2.medium	2	4	EBS only	-	Low to Moderate	Yes
□	General purpose	t2.large	2	8	EBS only	-	Low to Moderate	Yes
□	General purpose	t2.xlarge	4	16	EBS only	-	Moderate	Yes

Create EC2 (Elastic Compute Cloud)



Step 3: Configure Instance Details

Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot instances to take advantage of the lower pricing, assign an access management role to the instance, and more.

Number of instances: 1 — Launch into Auto Scaling Group

Purchasing option: □ Request Spot instances

Network: vpc-3e2e1456 (default) — Create new VPC

Subnet: subnet-e3e9cb8b | Default in us-east-2a — Create new subnet
4088 IP Addresses available

Auto-assign Public IP: Use subnet setting (Enable)

Placement group: □ Add instance to placement group.

Capacity Reservation: Open — Create new Capacity Reservation

IAM role: None — Create new IAM role

Shutdown behavior: Stop

Enable termination protection: □ Protect against accidental termination

Monitoring: □ Enable CloudWatch detailed monitoring
Additional charges apply.

Tenancy: Shared - Run a shared hardware instance
Additional charges will apply for dedicated tenancy.

Network interfaces

Device	Network Interface	Subnet	Primary IP	Secondary IP addresses	IPv6 IPs
eth0	New network interfac	subnet-e3e9cb8l	Auto-assign	Add IP	Add IP

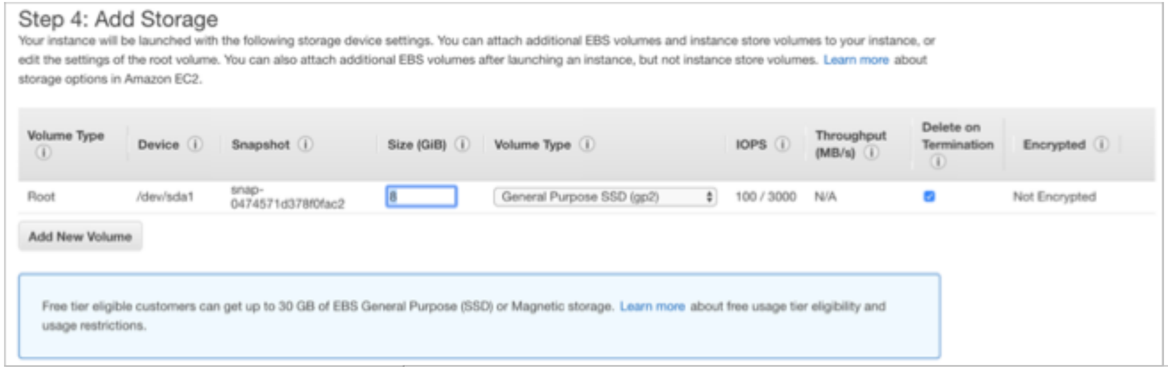
Add Device

Advanced Details

User data: ● As text ○ As file □ Input is already base64 encoded

(Optional)

Create EC2 (Elastic Compute Cloud)



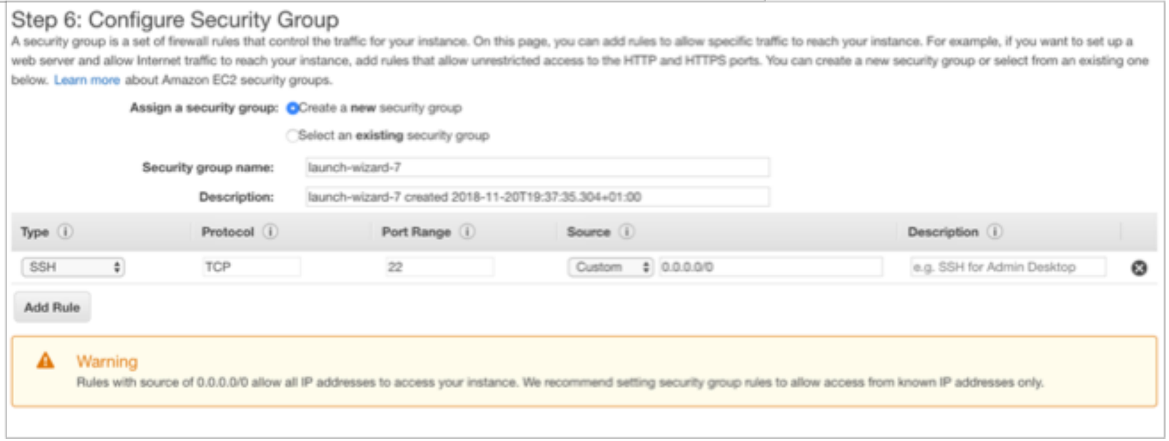
Step 4: Add Storage

Your instance will be launched with the following storage device settings. You can attach additional EBS volumes and instance store volumes to your instance, or edit the settings of the root volume. You can also attach additional EBS volumes after launching an instance, but not instance store volumes. Learn more about storage options in Amazon EC2.

Volume Type	Device	Snapshot	Size (GiB)	Volume Type	IOPS	Throughput (MB/s)	Delete on Termination	Encrypted
Root	/dev/sda1	snap-0474571d378f0fac2	8	General Purpose SSD (gp2)	100 / 3000	N/A	☑	Not Encrypted

Free tier eligible customers can get up to 30 GB of EBS General Purpose (SSD) or Magnetic storage. Learn more about free usage tier eligibility and usage restrictions.

- Step 5: Add Tags
  - No tag added



Step 6: Configure Security Group

A security group is a set of firewall rules that control the traffic for your instance. On this page, you can add rules to allow specific traffic to reach your instance. For example, if you want to set up a web server and allow Internet traffic to reach your instance, add rules that allow unrestricted access to the HTTP and HTTPS ports. You can create a new security group or select from an existing one below. Learn more about Amazon EC2 security groups.

Assign a security group: ● Create a **new** security group
○ Select an **existing** security group

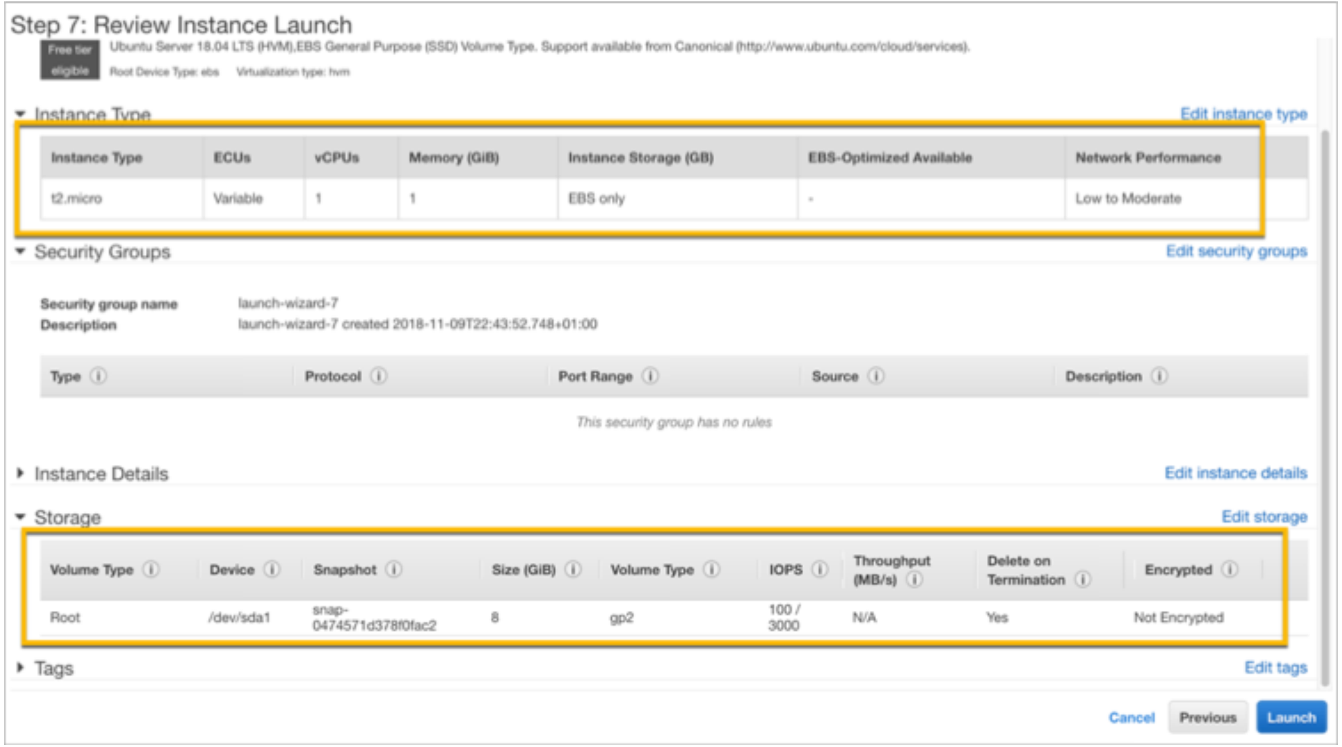
Security group name: launch-wizard-7

Description: launch-wizard-7 created 2018-11-20T19:37:35.304+01:00

Type	Protocol	Port Range	Source	Description
SSH	TCP	22	Custom 0.0.0.0/0	e.g. SSH for Admin Desktop

Warning
Rules with source of 0.0.0.0/0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only.

Create EC2 (Elastic Compute Cloud)



Step 7: Review Instance Launch

Ubuntu Server 18.04 LTS (HVM),EBS General Purpose (SSD) Volume Type. Support available from Canonical (http://www.ubuntu.com/cloud/services).

Root Device Type: ebs   Virtualization type: hvm

Instance Type

Instance Type	ECUs	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
t2.micro	Variable	1	1	EBS only	-	Low to Moderate

Security Groups

Security group name launch-wizard-7

Description launch-wizard-7 created 2018-11-09T22:43:52.748+01:00

Type	Protocol	Port Range	Source	Description

This security group has no rules

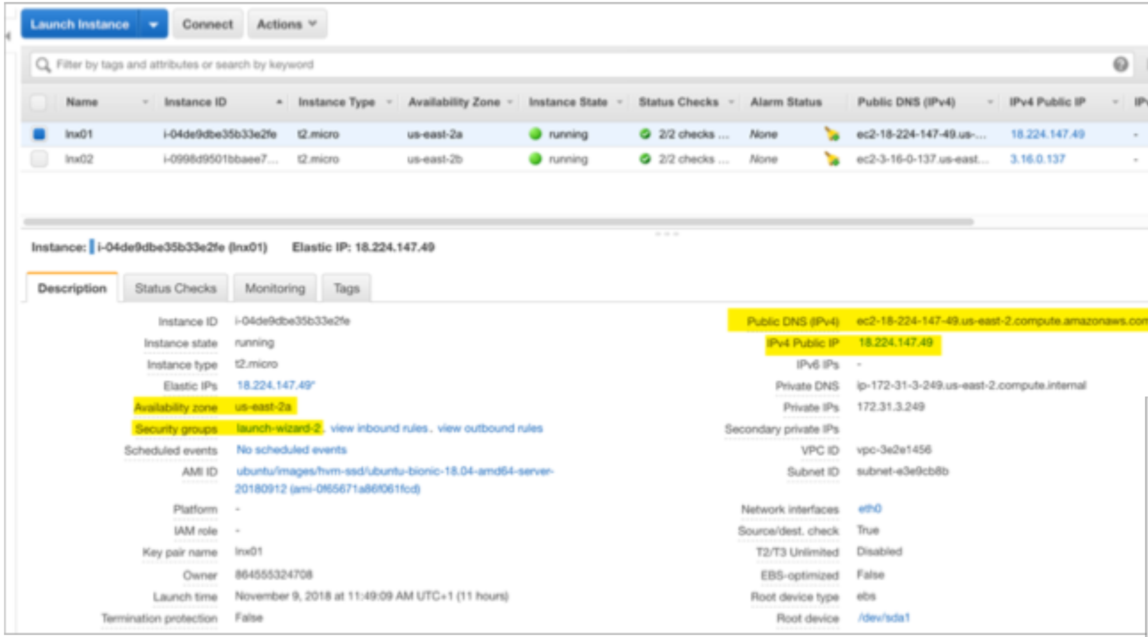
Instance Details

Storage

Volume Type	Device	Snapshot	Size (GiB)	Volume Type	IOPS	Throughput (MB/s)	Delete on Termination	Encrypted
Root	/dev/sda1	snap-0474571d378f0fac2	8	gp2	100 / 3000	N/A	Yes	Not Encrypted

Tags

Create EC2 (Elastic Compute Cloud)

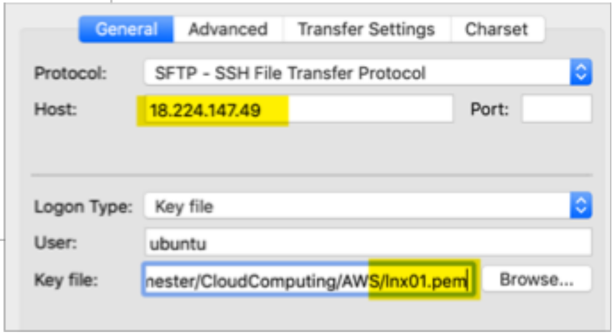


Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS (IPv4)	IPv4 Public IP	IPv6 IPs
lnx01	i-04de9dbe35b33e2fe	t2.micro	us-east-2a	running	2/2 checks ...	None	ec2-18-224-147-49.us-...	18.224.147.49	-
lnx02	i-0998d9501bbaee7...	t2.micro	us-east-2b	running	2/2 checks ...	None	ec2-3-16-0-137.us-east...	3.16.0.137	-

Instance: i-04de9dbe35b33e2fe (lnx01)   Elastic IP: 18.224.147.49

Instance ID	i-04de9dbe35b33e2fe
Instance state	running
Instance type	t2.micro
Elastic IPs	18.224.147.49*
Availability zone	us-east-2a
Security groups	launch-wizard-2. view inbound rules. view outbound rules
Scheduled events	No scheduled events
AMI ID	ubuntu/images/hvm-ssd/ubuntu-bionic-18.04-amd64-server-20180912 (ami-0f65671a86f061fcd)
Platform	-
IAM role	-
Key pair name	lnx01
Owner	864555324708
Launch time	November 9, 2018 at 11:49:09 AM UTC+1 (11 hours)
Termination protection	False

Public DNS (IPv4)	ec2-18-224-147-49.us-east-2.compute.amazonaws.com
IPv4 Public IP	18.224.147.49
IPv6 IPs	-
Private DNS	ip-172-31-3-249.us-east-2.compute.internal
Private IPs	172.31.3.249
Secondary private IPs	
VPC ID	vpc-3e2e1456
Subnet ID	subnet-e3e9cb8b
Network interfaces	eth0
Source/dest. check	True
T2/T3 Unlimited	Disabled
EBS-optimized	False
Root device type	ebs
Root device	/dev/sda1



Protocol: SFTP - SSH File Transfer Protocol

Host: 18.224.147.49   Port:

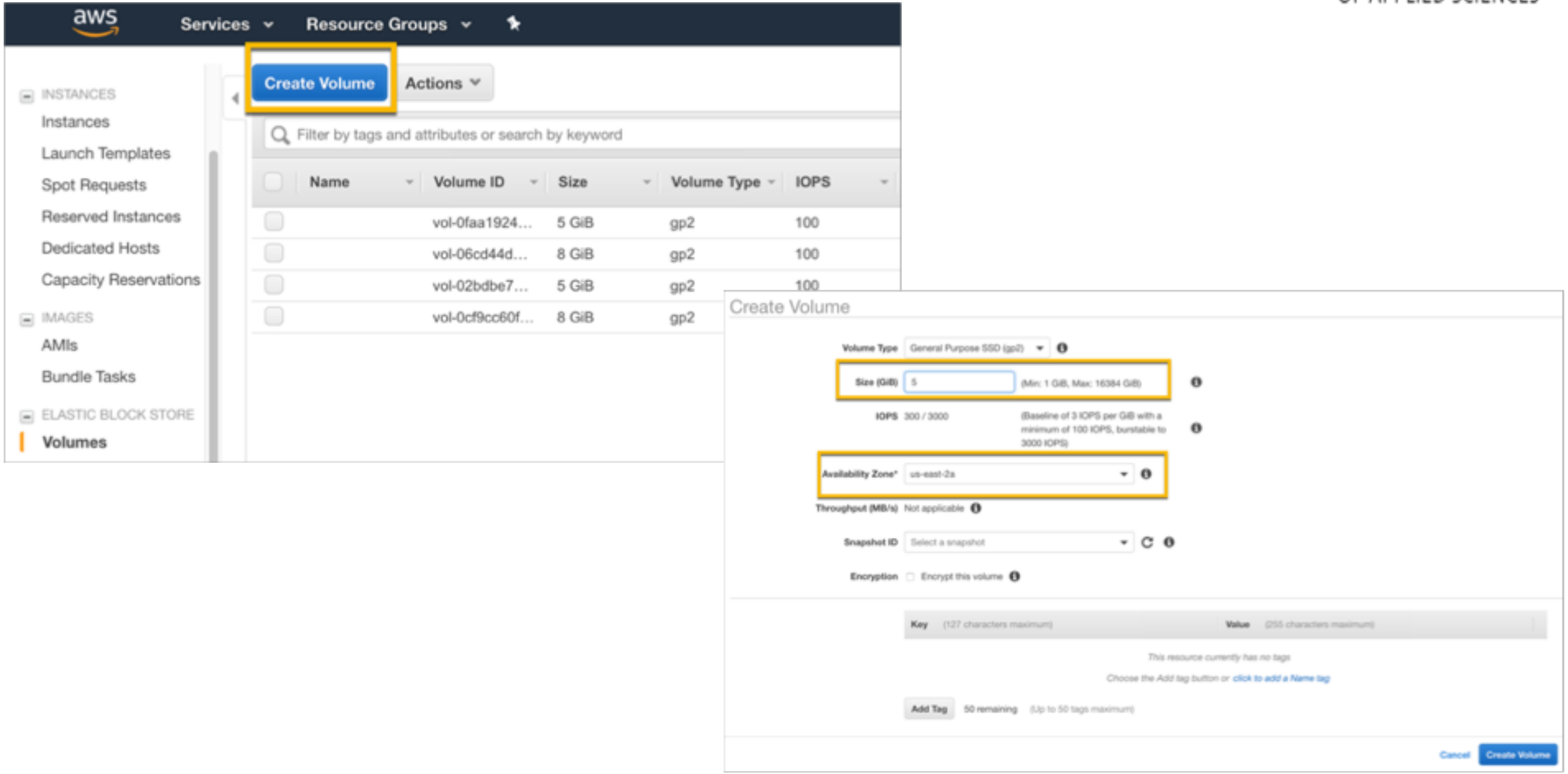
Logon Type: Key file

User: ubuntu

Key file: nester/CloudComputing/AWS/lnx01.pem

- Connect using ssh and certificate:
- `ssh -i 'lnx01.pem' ubuntu@18.224.147.49`

Create EBS (Elastic Block Storage)



□	Name	Volume ID	Size	Volume Type	IOPS
□		vol-0faa1924…	5 GiB	gp2	100
□		vol-06cd44d…	8 GiB	gp2	100
□		vol-02bdbe7…	5 GiB	gp2	100
□		vol-0cf9cc60f…	8 GiB	gp2	

Create Volume

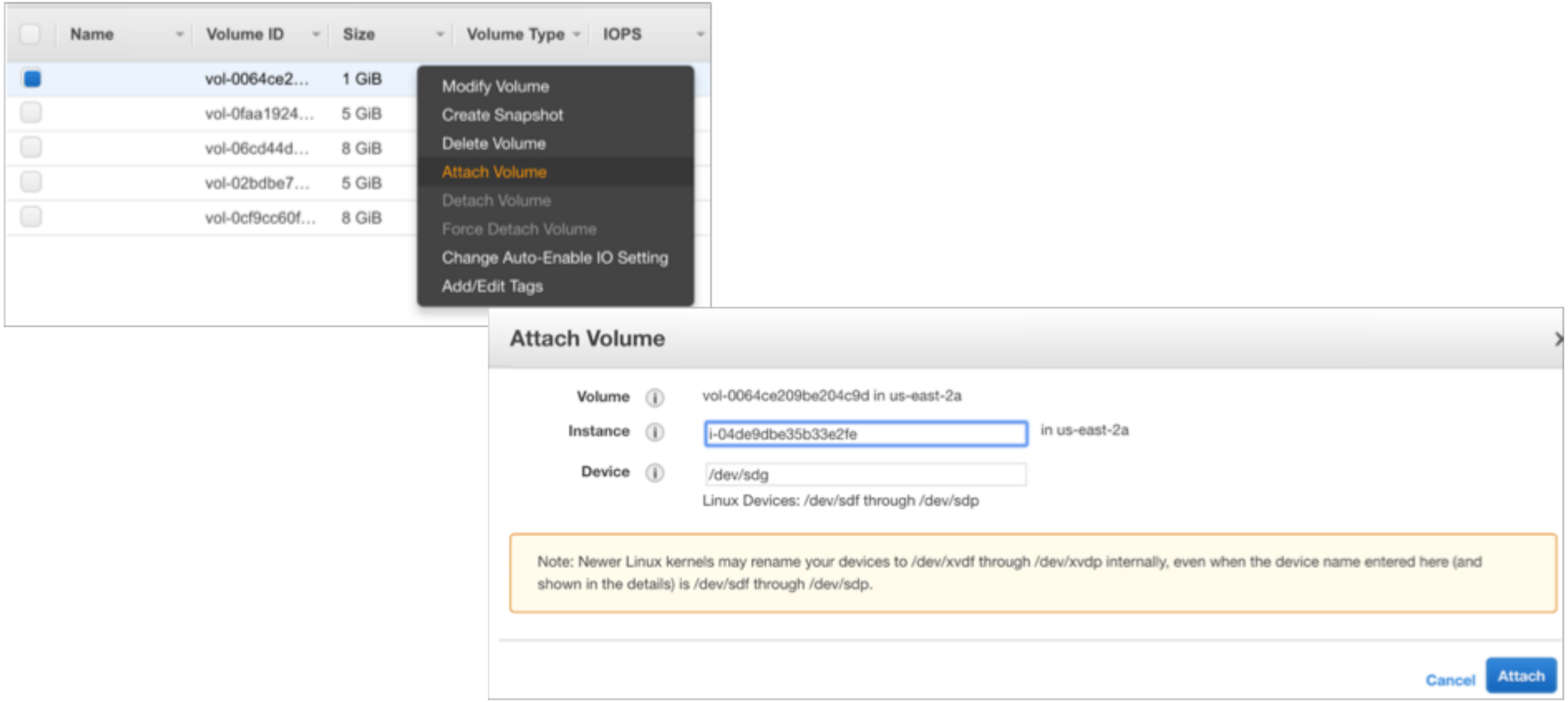
Volume Type	General Purpose SSD (gp2)	
Size (GiB)	5	(Min: 1 GiB, Max: 16384 GiB)
IOPS	300 / 3000	(Baseline of 3 IOPS per GiB with a minimum of 100 IOPS, burstable to 3000 IOPS)
Availability Zone*	us-east-2a	
Throughput (MB/s)	Not applicable	
Snapshot ID	Select a snapshot	
Encryption	□ Encrypt this volume	

Key (127 characters maximum)	Value (255 characters maximum)

This resource currently has no tags

Choose the Add tag button or click to add a Name tag

Create EBS (Elastic Block Storage)



☐	Name	Volume ID	Size	Volume Type	IOPS
☑		vol-0064ce2…	1 GiB		
☐		vol-0faa1924…	5 GiB		
☐		vol-06cd44d…	8 GiB		
☐		vol-02bdbe7…	5 GiB		
☐		vol-0cf9cc60f…	8 GiB		

Attach Volume

Volume: vol-0064ce209be204c9d in us-east-2a

Instance: i-04de9dbe35b33e2fe in us-east-2a

Device: /dev/sdg

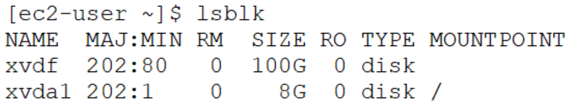
Linux Devices: /dev/sdf through /dev/sdp

Note: Newer Linux kernels may rename your devices to /dev/xvdf through /dev/xvdp internally, even when the device name entered here (and shown in the details) is /dev/sdf through /dev/sdp.

Create EBS (Elastic Block Storage)

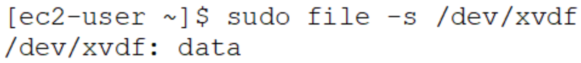
Making an Amazon EBS Volume Available for Use on Linux

- Use the **lsblk** command to view your available disk devices and their mount points (if applicable) to help you determine the correct device name to use.



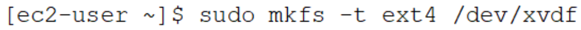
```
[ec2-user ~]$ lsblk
NAME   MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
xvdf   202:80   0  100G  0 disk
xvda1  202:1    0    8G  0 disk /
```

- Use the sudo file -s device command to list special information, such as file system type.



```
[ec2-user ~]$ sudo file -s /dev/xvdf
/dev/xvdf: data
```

- Create an ext4 file system on the volume

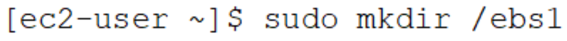


```
[ec2-user ~]$ sudo mkfs -t ext4 /dev/xvdf
```

Create EBS (Elastic Block Storage)

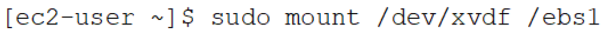
Making an Amazon EBS Volume Available for Use on Linux

- Create mount point



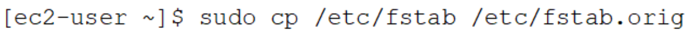
```
[ec2-user ~]$ sudo mkdir /ebs1
```

- Use the following command to mount the volume at the created location



```
[ec2-user ~]$ sudo mount /dev/xvdf /ebs1
```

- Create a backup for your /etc/fstab file that you can use if you accidentally destroy or delete this file while editing it

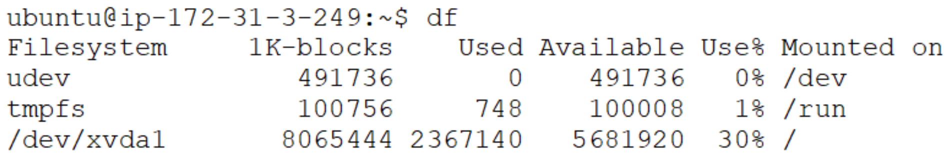


```
[ec2-user ~]$ sudo cp /etc/fstab /etc/fstab.orig
```

Create EBS (Elastic Block Storage)

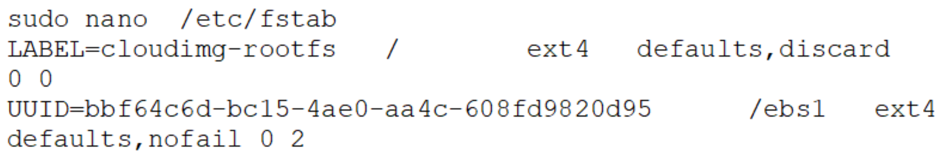
Making an Amazon EBS Volume Available for Use on Linux

- Get UUDI (Universally Unique Identifier)



```
ubuntu@ip-172-31-3-249:~$ df
Filesystem      1K-blocks    Used Available Use% Mounted on
udev               491736       0    491736   0% /dev
tmpfs              100756     748    100008   1% /run
/dev/xvda1        8065444 2367140   5681920  30% /
```

- Add a new line to the end of the file for the volume using the following format

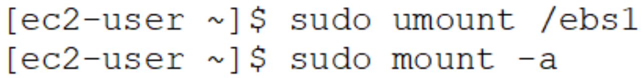


```
sudo nano  /etc/fstab
LABEL=cloudimg-rootfs   /        ext4   defaults,discard
0 0
UUID=bbf64c6d-bc15-4ae0-aa4c-608fd9820d95      /ebs1   ext4
defaults,nofail 0 2
```

Create EBS (Elastic Block Storage)

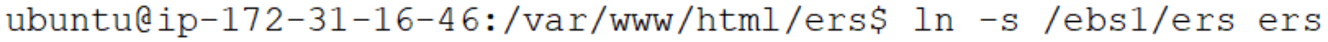
Making an Amazon EBS Volume Available for Use on Linux

- Check if the entry works



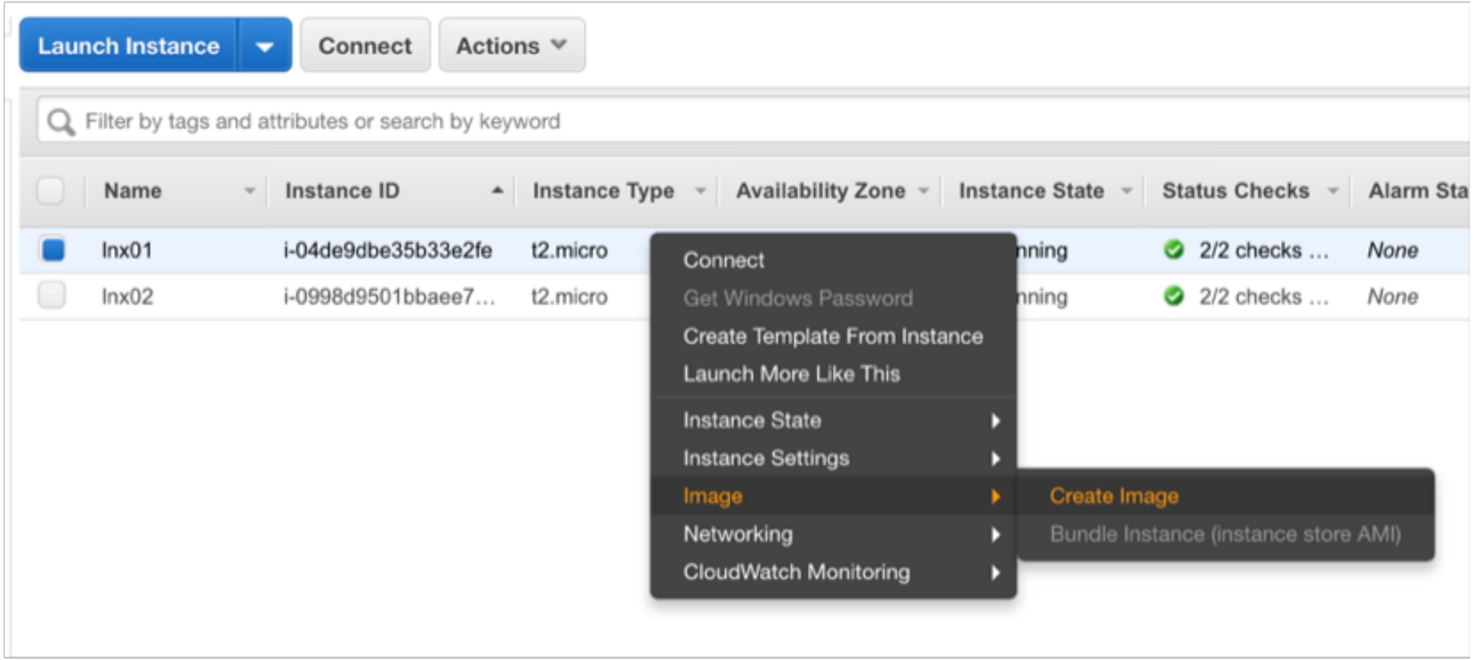
```
[ec2-user ~]$ sudo umount /ebs1
[ec2-user ~]$ sudo mount -a
```

- Create symbolic link to ebs1



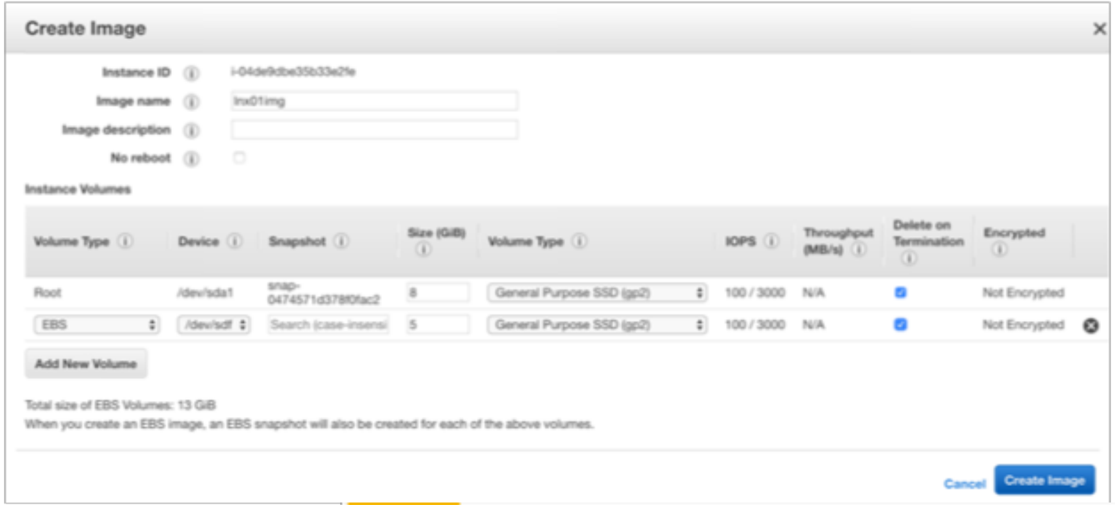
```
ubuntu@ip-172-31-16-46:/var/www/html/ers$ ln -s /ebs1/ers ers
```

Cloning the EC2 & EBS



□	Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Sta
☑	Inx01	i-04de9dbe35b33e2fe	t2.micro		nning	✓ 2/2 checks ...	*None*
□	Inx02	i-0998d9501bbaee7...	t2.micro		nning	✓ 2/2 checks ...	*None*

Cloning the EC2 & EBS



Instance ID: i-04de9dbe35b33e2fe

Image name: lnx01img

Image description:

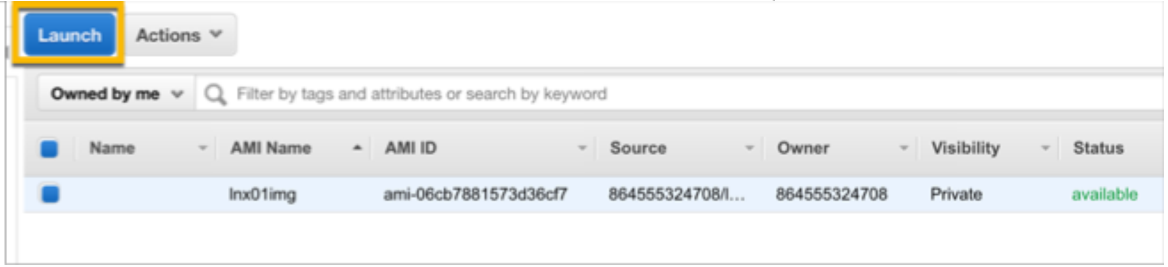
No reboot: □

Instance Volumes

Volume Type	Device	Snapshot	Size (GiB)	Volume Type	IOPS	Throughput (MB/s)	Delete on Termination	Encrypted	
Root	/dev/sda1	snap-0474571d378f0fac2	8	General Purpose SSD (gp2)	100 / 3000	N/A	☑	Not Encrypted	
EBS	/dev/sdf	Search (case-insensi	5	General Purpose SSD (gp2)	100 / 3000	N/A	☑	Not Encrypted	⊗

Total size of EBS Volumes: 13 GiB

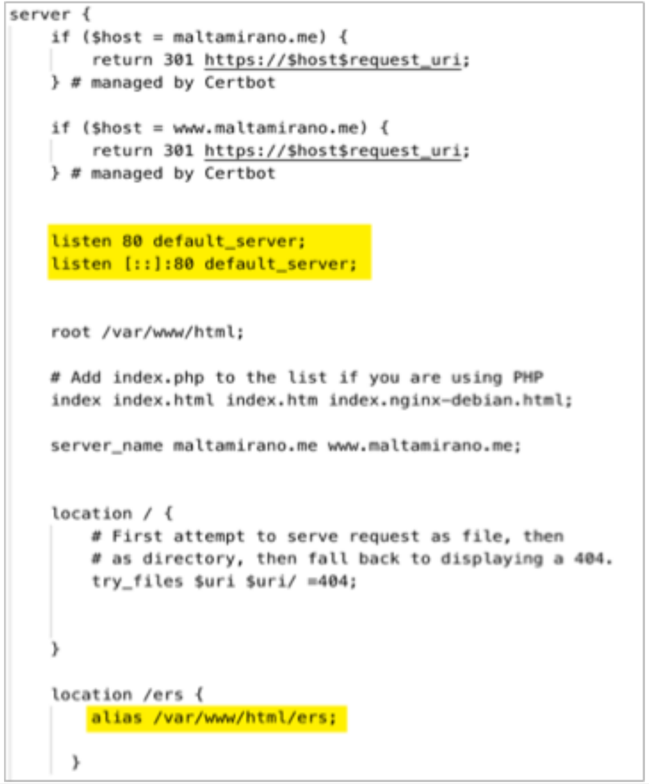
When you create an EBS image, an EBS snapshot will also be created for each of the above volumes.



☐	Name	AMI Name	AMI ID	Source	Owner	Visibility	Status
☐		lnx01img	ami-06cb7881573d36cf7	864555324708/l...	864555324708	Private	available

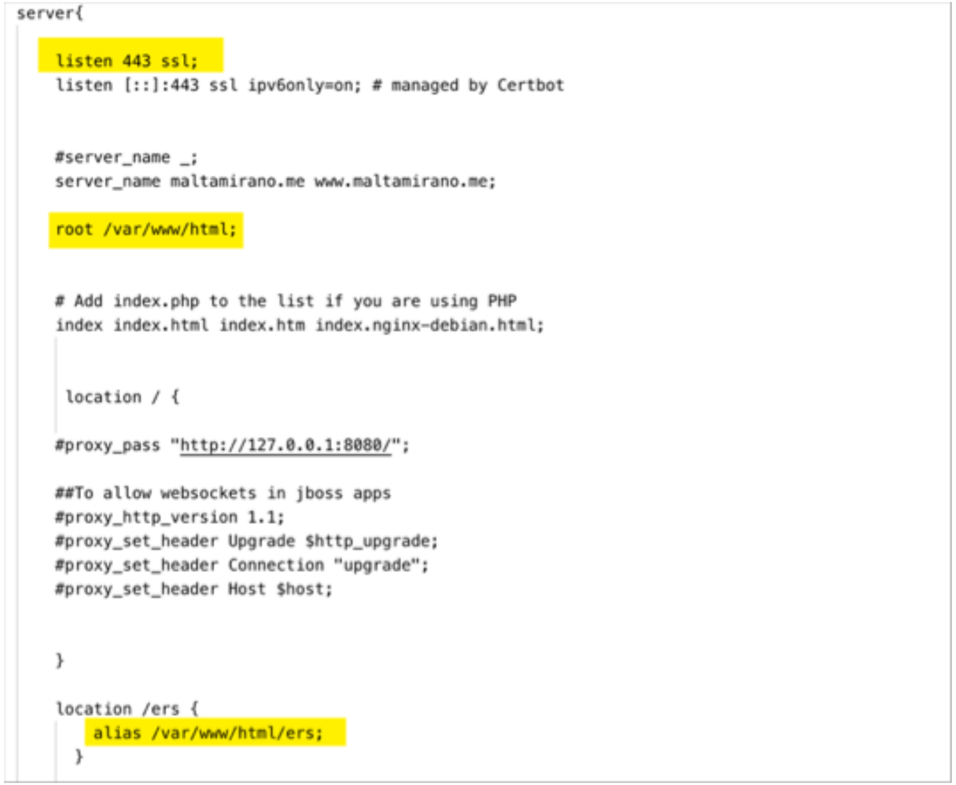
Install and Configure NGINX

- Install Nginx:
  - `sudo apt-get install nginx`
- Configure:
  - `sudo nano /etc/nginx/sites-available/default`



```
server {
    if ($host = maltamirano.me) {
        return 301 https://$host$request_uri;
    } # managed by Certbot

    if ($host = www.maltamirano.me) {
        return 301 https://$host$request_uri;
    } # managed by Certbot


    listen 80 default_server;
    listen [::]:80 default_server;


    root /var/www/html;

    # Add index.php to the list if you are using PHP
    index index.html index.htm index.nginx-debian.html;

    server_name maltamirano.me www.maltamirano.me;


    location / {
        # First attempt to serve request as file, then
        # as directory, then fall back to displaying a 404.
        try_files $uri $uri/ =404;


    }

    location /ers {
        alias /var/www/html/ers;

      }
```

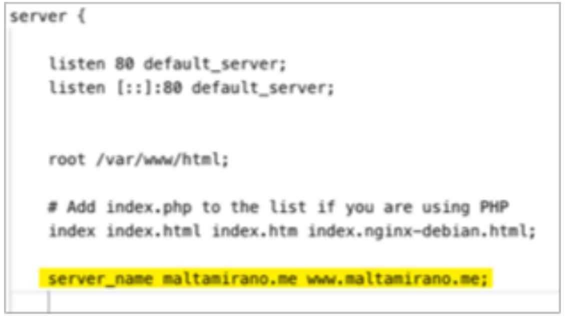
Install and Configure NGINX



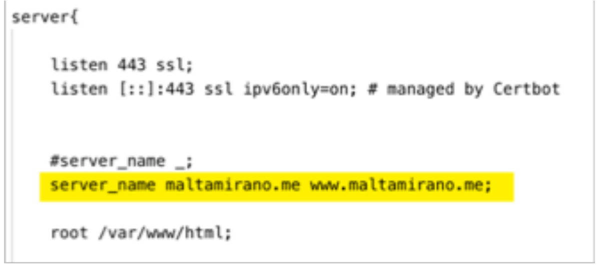
```
server{

    listen 443 ssl;
    listen [::]:443 ssl ipv6only=on; # managed by Certbot


    #server_name _;
    server_name maltamirano.me www.maltamirano.me;

    root /var/www/html;


    # Add index.php to the list if you are using PHP
    index index.html index.htm index.nginx-debian.html;


     location / {

    #proxy_pass "http://127.0.0.1:8080/";

    ##To allow websockets in jboss apps
    #proxy_http_version 1.1;
    #proxy_set_header Upgrade $http_upgrade;
    #proxy_set_header Connection "upgrade";
    #proxy_set_header Host $host;


    }

    location /ers {
        alias /var/www/html/ers;
      }
```

Set Up Let’s Encrypt with NGINX Server

- Install Nginx:
  - `sudo apt-get install python-certbot-nginx`
- Configure:
  - `sudo nano /etc/nginx/sites-available/default`



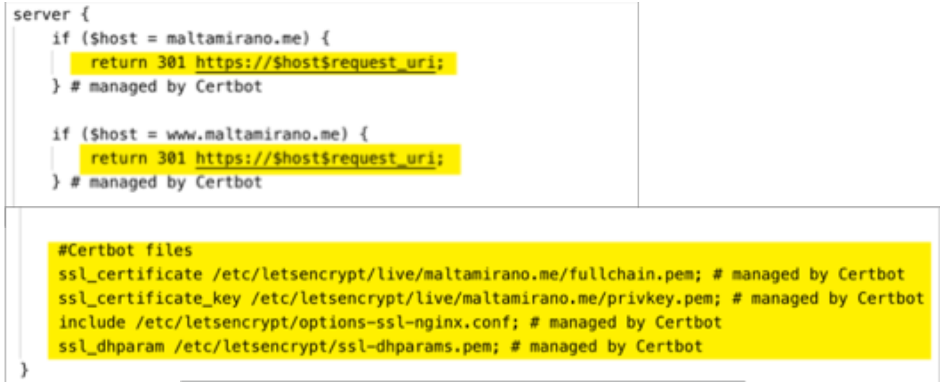
```
server {

    listen 80 default_server;
    listen [::]:80 default_server;


    root /var/www/html;

    # Add index.php to the list if you are using PHP
    index index.html index.htm index.nginx-debian.html;

    server_name maltamirano.me www.maltamirano.me;
```



```
server{

    listen 443 ssl;
    listen [::]:443 ssl ipv6only=on; # managed by Certbot


    #server_name _;
    server_name maltamirano.me www.maltamirano.me;

    root /var/www/html;
```

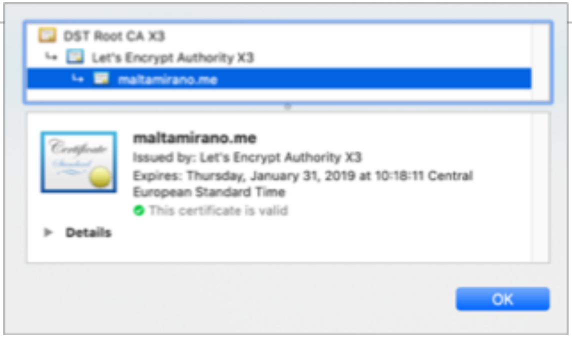
Set Up Let's Encrypt with NGINX Server

- Obtaining an SSL Certificate
  - `sudo certbot --nginx -d example.com -d www.example.com`
- This will change the Nginx configuration
- Verify the certificate



```
server {
    if ($host = maltamirano.me) {
        return 301 https://$host$request_uri;
    } # managed by Certbot

    if ($host = www.maltamirano.me) {
        return 301 https://$host$request_uri;
    } # managed by Certbot
```

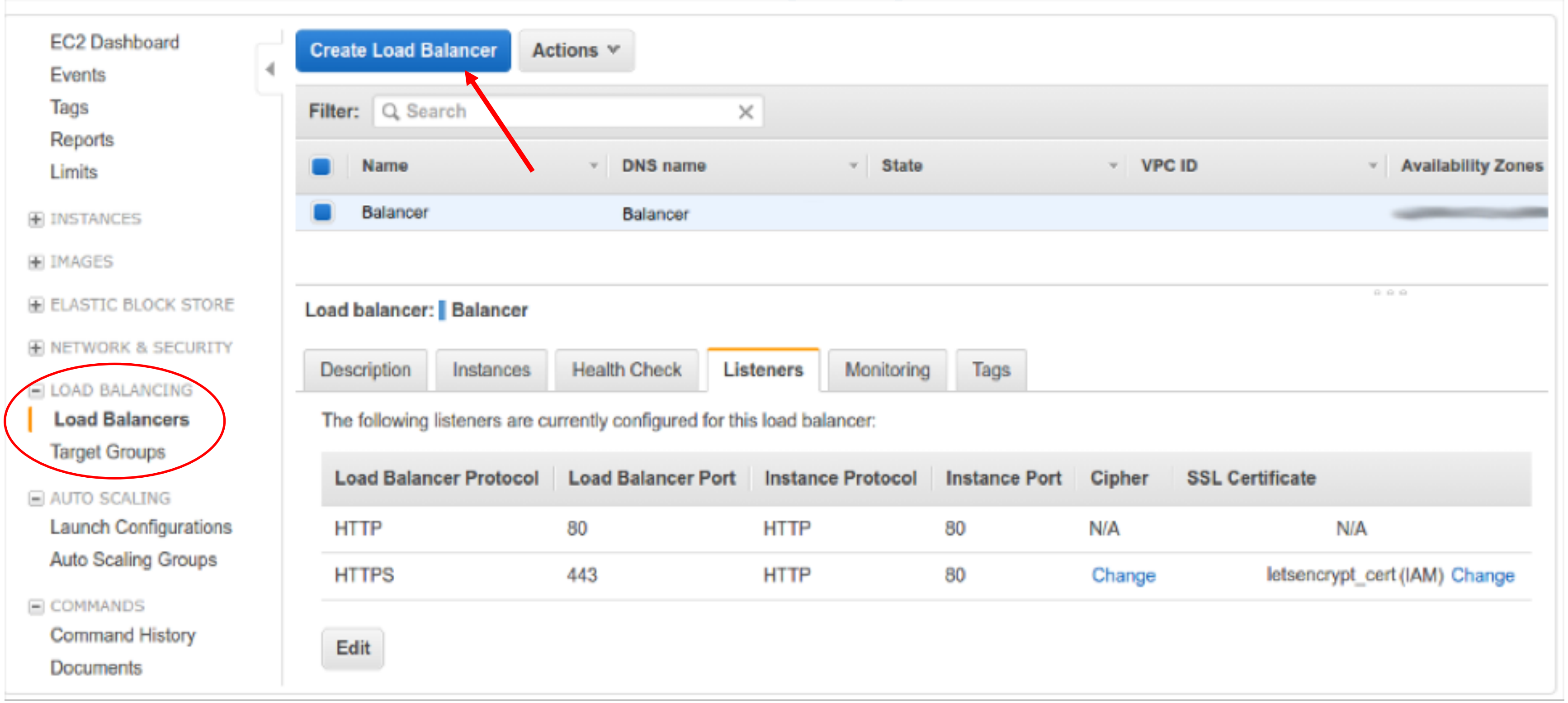
```
    #Certbot files
    ssl_certificate /etc/letsencrypt/live/maltamirano.me/fullchain.pem; # managed by Certbot
    ssl_certificate_key /etc/letsencrypt/live/maltamirano.me/privkey.pem; # managed by Certbot
    include /etc/letsencrypt/options-ssl-nginx.conf; # managed by Certbot
    ssl_dhparam /etc/letsencrypt/ssl-dhparams.pem; # managed by Certbot
}
```



DST Root CA X3
↳ Let's Encrypt Authority X3
↳ maltamirano.me

maltamirano.me
Issued by: Let's Encrypt Authority X3
Expires: Thursday, January 31, 2019 at 10:18:11 Central European Standard Time
This certificate is valid

Create Elastic Load Balancer (ELB)



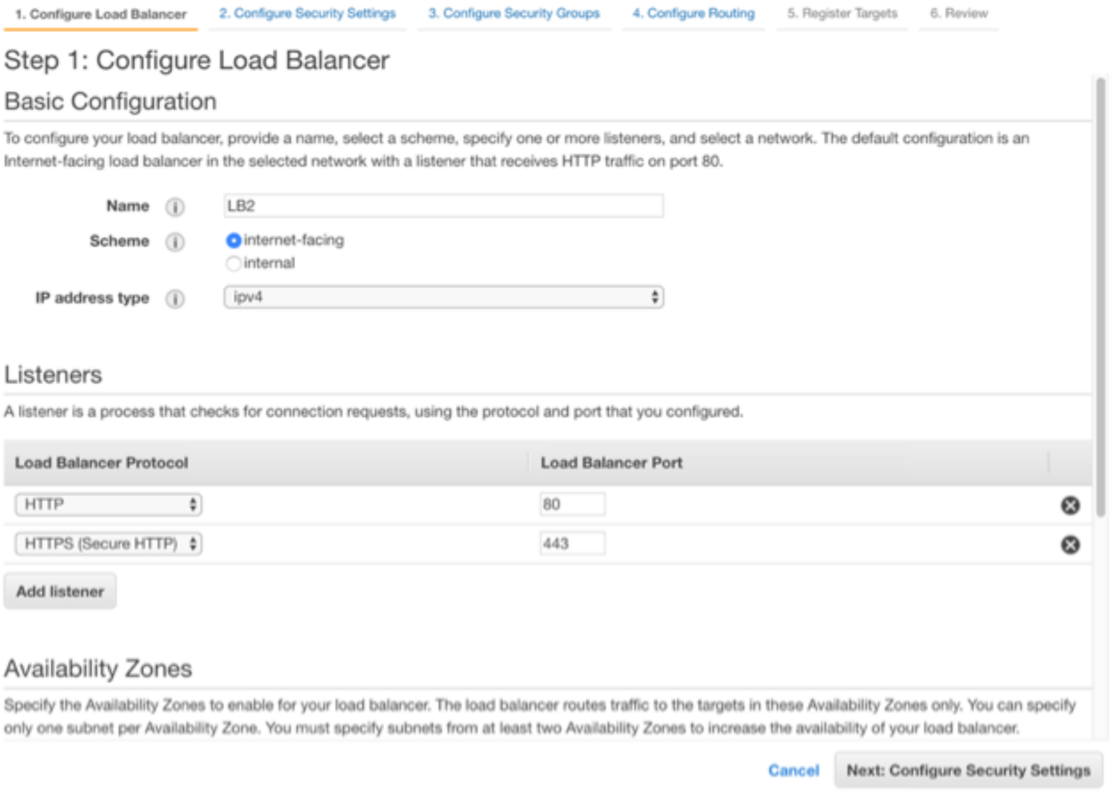
	Name	DNS name	State	VPC ID	Availability Zones
■	Balancer	Balancer			

Load balancer: Balancer

The following listeners are currently configured for this load balancer:

Load Balancer Protocol	Load Balancer Port	Instance Protocol	Instance Port	Cipher	SSL Certificate
HTTP	80	HTTP	80	N/A	N/A
HTTPS	443	HTTP	80	Change	letsencrypt_cert (IAM) Change

Create Elastic Load Balancer (ELB)



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: LB2

Scheme: ● internet-facing ○ internal

IP address type: ipv4

Listeners

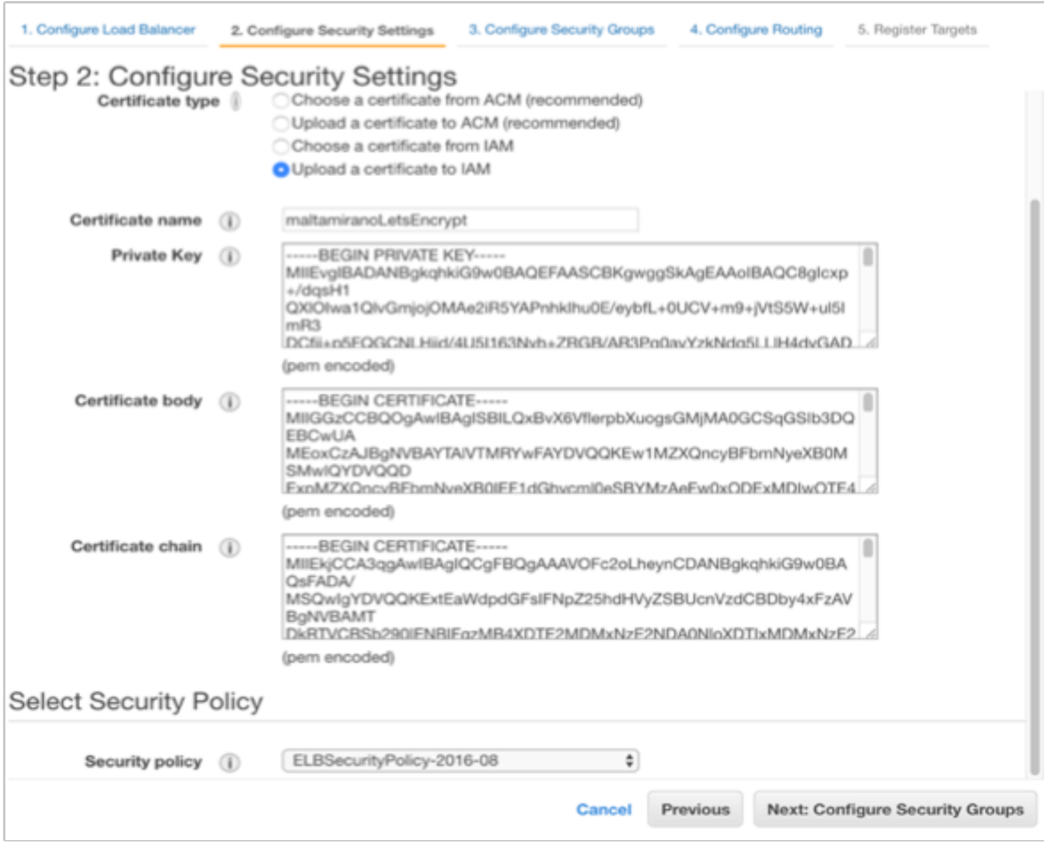
A listener is a process that checks for connection requests, using the protocol and port that you configured.

Load Balancer Protocol	Load Balancer Port
HTTP	80
HTTPS (Secure HTTP)	443

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.

Create Elastic Load Balancer (ELB)



1. Configure Load Balancer | 2. Configure Security Settings | 3. Configure Security Groups | 4. Configure Routing | 5. Register Targets

Step 2: Configure Security Settings

Certificate type
- ○ Choose a certificate from ACM (recommended)
- ○ Upload a certificate to ACM (recommended)
- ○ Choose a certificate from IAM
- ● Upload a certificate to IAM

Certificate name: maltamiranoLetsEncrypt

Private Key

```
-----BEGIN PRIVATE KEY-----
MIIEvgIBADANBgkqhkiG9w0BAQEFAASCBKgwggSkAgEAAoIBAQC8glcxp
+/dqsH1
QXlOlwa1QlvGmjojOMAe2iR5YAPnhklhu0E/eybfL+0UCV+m9+jVtS5W+ul5I
mR3
DCfii+p5FQGCNLHiid/4U5l163Nvb+ZRGB/AR3Pq0avYzkNdq5LUH4dvGAD
```

(pem encoded)

Certificate body

```
-----BEGIN CERTIFICATE-----
MIIGGzCCBQOgAwIBAgISBILQxBvX6VflerpbXuogsGMjMA0GCSqGSIb3DQ
EBCwUA
MEoxCzAJBgNVBAYTAlVTMRYwFAYDVQQKEw1MZXQncyBFbmNyeXB0M
SMwIQYDVQQD
ExpMZXQncyBFbmNyeXB0IEF1dGhvcml0eSBYMzAeFw0xODExMDIwOTE4
```

(pem encoded)

Certificate chain

```
-----BEGIN CERTIFICATE-----
MIIEkjCCA3qgAwIBAgIQCgFBQgAAAVOFc2oLheynCDANBgkqhkiG9w0BA
QsFADA/
MSQwIgYDVQQKExtEaWdpdGFsIFNpZ25hdHVyZSBUcnVzdCBDby4xFzAV
BgNVBAMT
DkRTVCBSb290IENBIFgzMB4XDTE2MDMxNzE2NDA0NloXDTIxMDMxNzE2
```

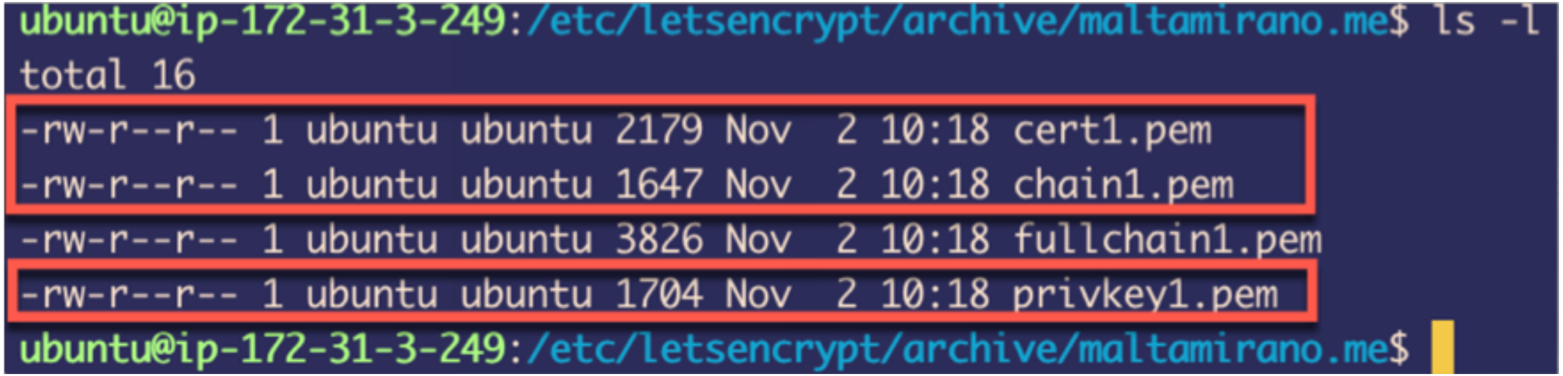
(pem encoded)

Select Security Policy

Security policy: ELBSecurityPolicy-2016-08

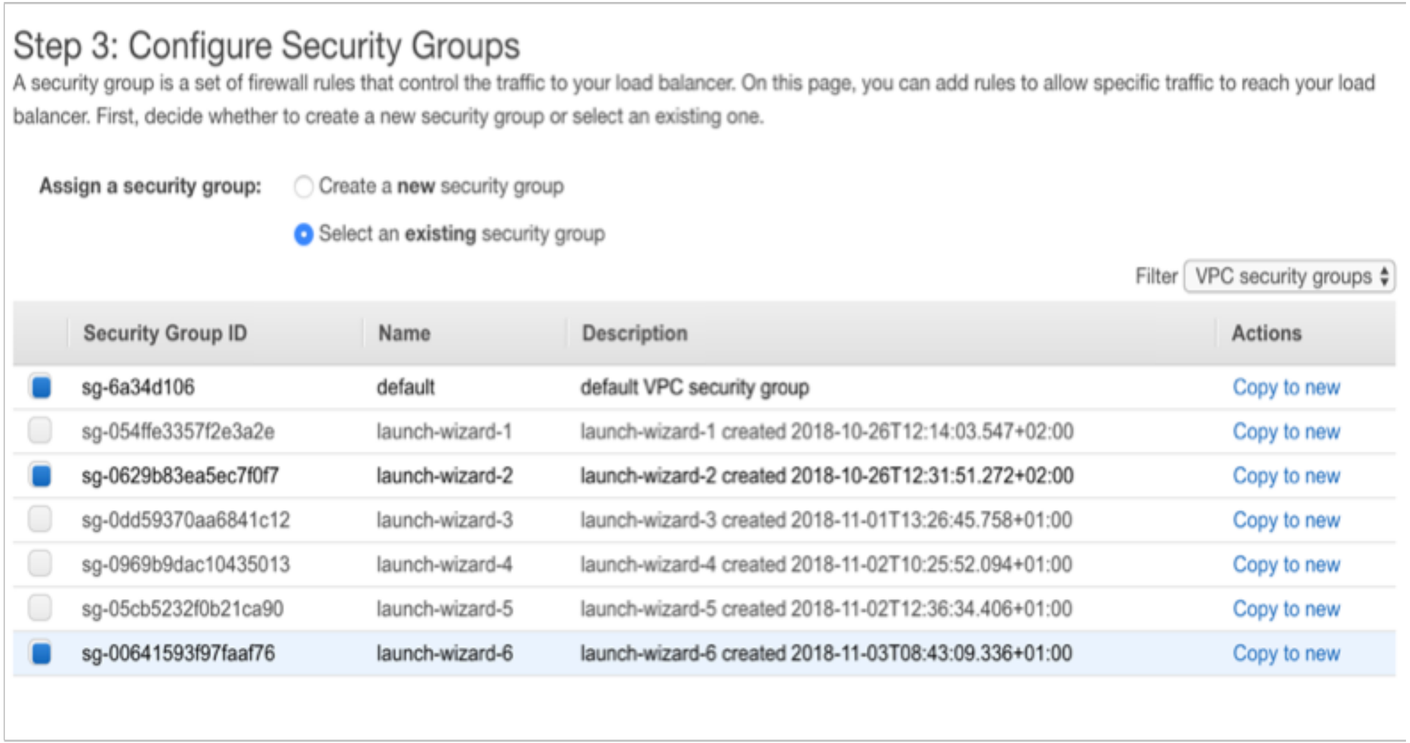
Create Elastic Load Balancer (ELB)

- To enable **HTTPS** in the Load Balancer we need to **import the certificates** created before using **Certbot**.
- Copy and paste the text in the next files into the Step2: Configure Security Settings



```
ubuntu@ip-172-31-3-249:/etc/letsencrypt/archive/maltamirano.me$ ls -l
total 16
-rw-r--r-- 1 ubuntu ubuntu 2179 Nov  2 10:18 cert1.pem
-rw-r--r-- 1 ubuntu ubuntu 1647 Nov  2 10:18 chain1.pem
-rw-r--r-- 1 ubuntu ubuntu 3826 Nov  2 10:18 fullchain1.pem
-rw-r--r-- 1 ubuntu ubuntu 1704 Nov  2 10:18 privkey1.pem
ubuntu@ip-172-31-3-249:/etc/letsencrypt/archive/maltamirano.me$
```

Create Elastic Load Balancer (ELB)



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.

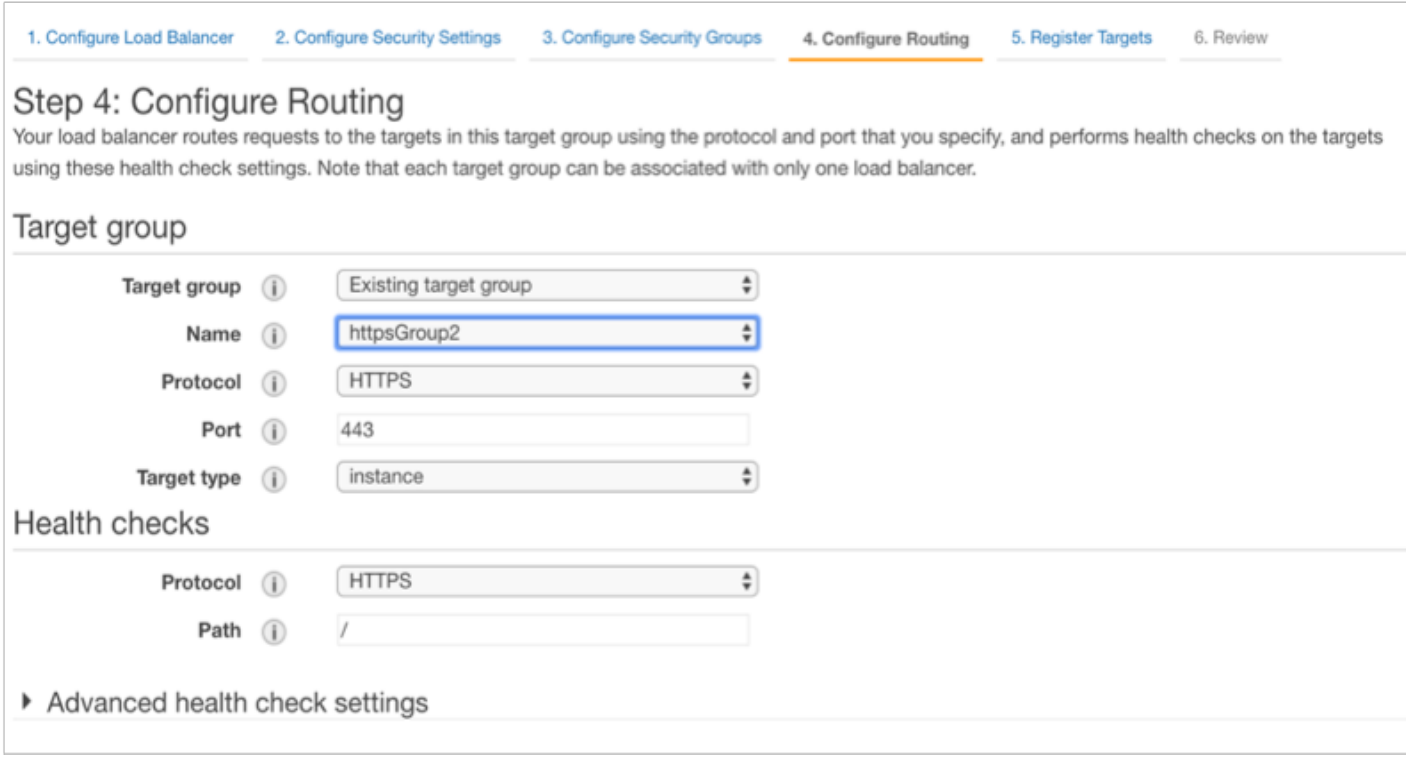
Assign a security group: ○ Create a **new** security group

● Select an **existing** security group

Filter VPC security groups

	Security Group ID	Name	Description	Actions
☑	sg-6a34d106	default	default VPC security group	Copy to new
□	sg-054ffe3357f2e3a2e	launch-wizard-1	launch-wizard-1 created 2018-10-26T12:14:03.547+02:00	Copy to new
☑	sg-0629b83ea5ec7f0f7	launch-wizard-2	launch-wizard-2 created 2018-10-26T12:31:51.272+02:00	Copy to new
□	sg-0dd59370aa6841c12	launch-wizard-3	launch-wizard-3 created 2018-11-01T13:26:45.758+01:00	Copy to new
□	sg-0969b9dac10435013	launch-wizard-4	launch-wizard-4 created 2018-11-02T10:25:52.094+01:00	Copy to new
□	sg-05cb5232f0b21ca90	launch-wizard-5	launch-wizard-5 created 2018-11-02T12:36:34.406+01:00	Copy to new
☑	sg-00641593f97faaf76	launch-wizard-6	launch-wizard-6 created 2018-11-03T08:43:09.336+01:00	Copy to new

Create Elastic Load Balancer (ELB)



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, and performs health checks on the targets using these health check settings. Note that each target group can be associated with only one load balancer.

Target group

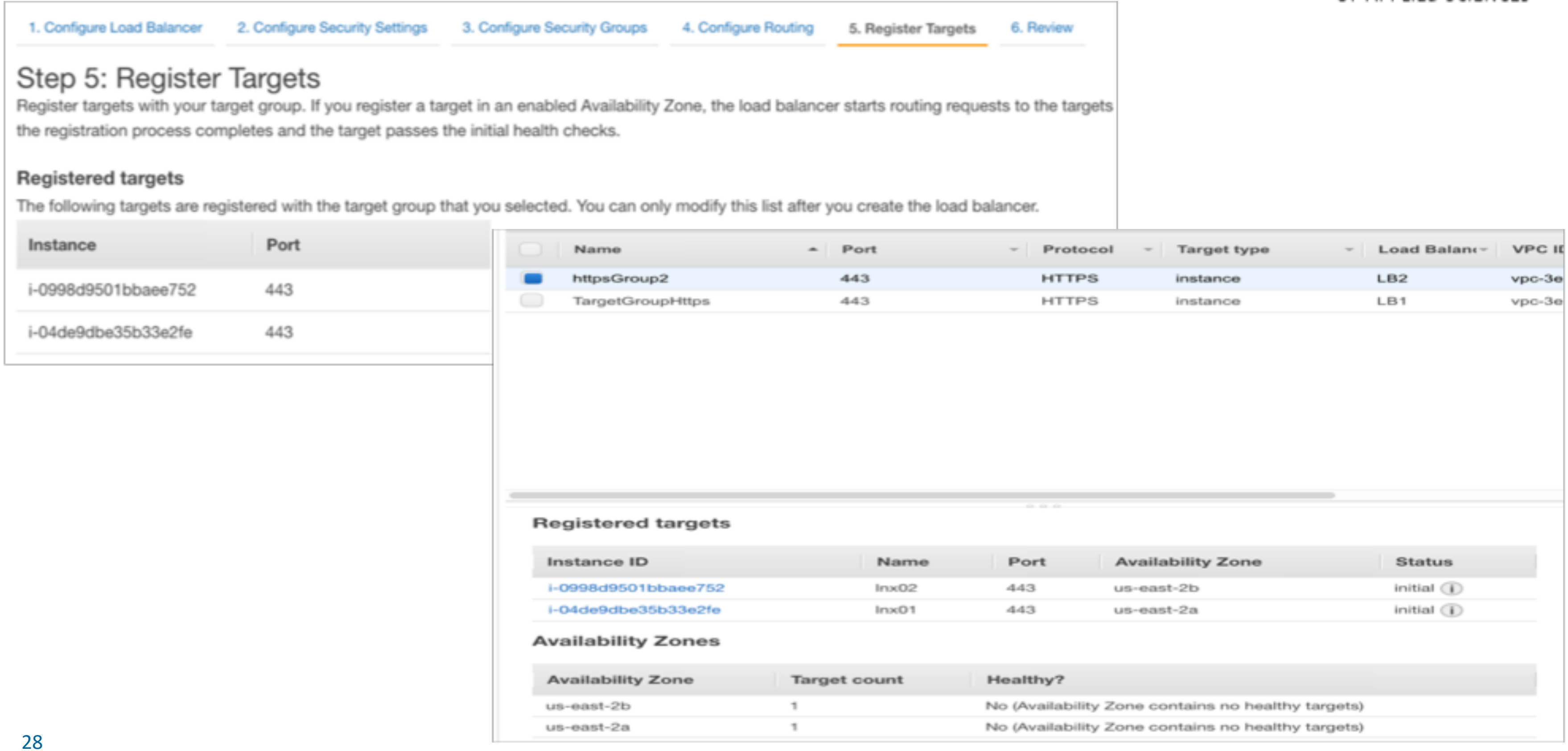
Target group	Existing target group
Name	httpsGroup2
Protocol	HTTPS
Port	443
Target type	instance

Health checks

Protocol	HTTPS
Path	/

▸ Advanced health check settings

Create Elastic Load Balancer (ELB)



1. Configure Load Balancer
2. Configure Security Settings
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Step 5: Register Targets

Register targets with your target group. If you register a target in an enabled Availability Zone, the load balancer starts routing requests to the targets the registration process completes and the target passes the initial health checks.

Registered targets

The following targets are registered with the target group that you selected. You can only modify this list after you create the load balancer.

Instance	Port
i-0998d9501bbaee752	443
i-04de9dbe35b33e2fe	443

☐	Name	Port	Protocol	Target type	Load Balan	VPC I
■	httpsGroup2	443	HTTPS	instance	LB2	vpc-3e
☐	TargetGroupHttps	443	HTTPS	instance	LB1	vpc-3e

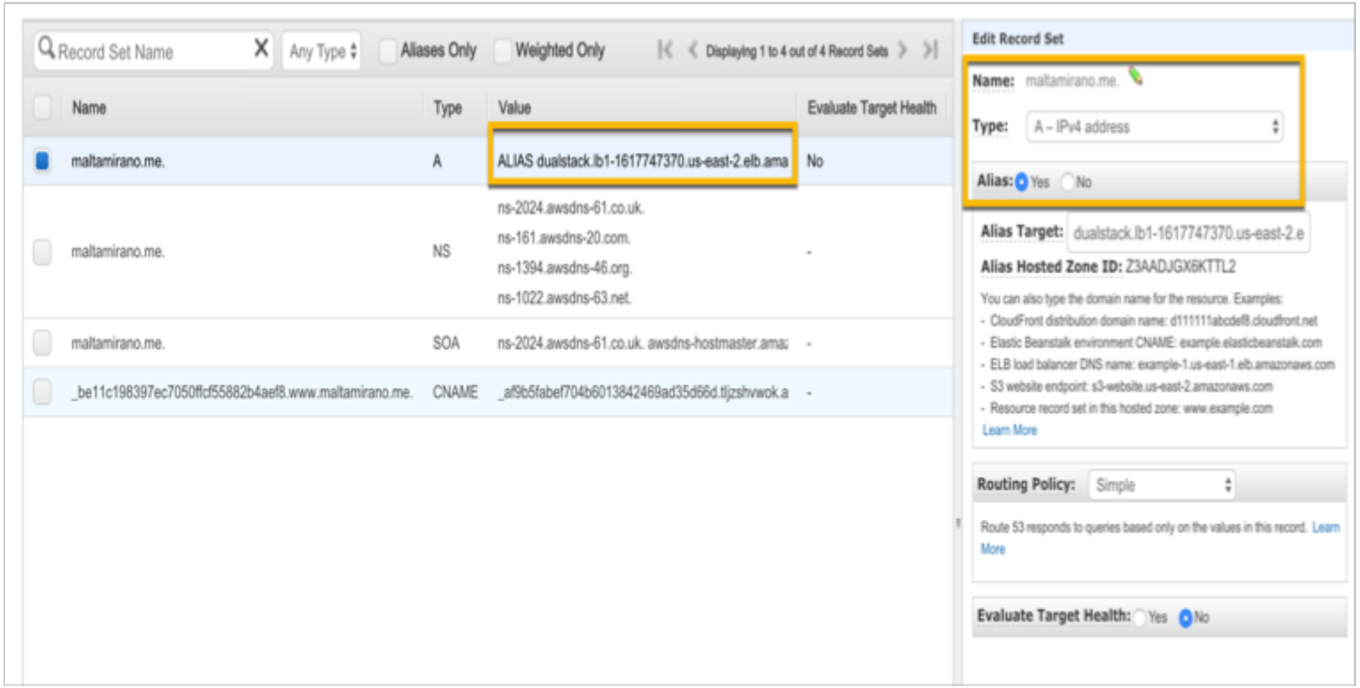
Registered targets

Instance ID	Name	Port	Availability Zone	Status
i-0998d9501bbaee752	lnx02	443	us-east-2b	initial ⓘ
i-04de9dbe35b33e2fe	lnx01	443	us-east-2a	initial ⓘ

Availability Zones

Availability Zone	Target count	Healthy?
us-east-2b	1	No (Availability Zone contains no healthy targets)
us-east-2a	1	No (Availability Zone contains no healthy targets)

Configure Domain Name with ELB



	Name	Type	Value	Evaluate Target Health
■	maltamirano.me.	A	ALIAS dualstack.lb1-1617747370.us-east-2.elb.ama	No
□	maltamirano.me.	NS	ns-2024.awsdns-61.co.uk. ns-161.awsdns-20.com. ns-1394.awsdns-46.org. ns-1022.awsdns-63.net.	-
□	maltamirano.me.	SOA	ns-2024.awsdns-61.co.uk. awsdns-hostmaster.ama:	-
□	_be11c198397ec7050ffcf55882b4aef8.www.maltamirano.me.	CNAME	_af9b5fabef704b6013842469ad35d66d.tljzshvwok.a	-

Edit Record Set

Name: maltamirano.me.

Type: A – IPv4 address

Alias: ● Yes ○ No

Alias Target: dualstack.lb1-1617747370.us-east-2.e

Alias Hosted Zone ID: Z3AADJGX6KTTL2

You can also type the domain name for the resource. Examples:

- CloudFront distribution domain name: d111111abcdef8.cloudfront.net
- Elastic Beanstalk environment CNAME: example.elasticbeanstalk.com
- ELB load balancer DNS name: example-1.us-east-1.elb.amazonaws.com
- S3 website endpoint: s3-website.us-east-2.amazonaws.com
- Resource record set in this hosted zone: www.example.com

Learn More

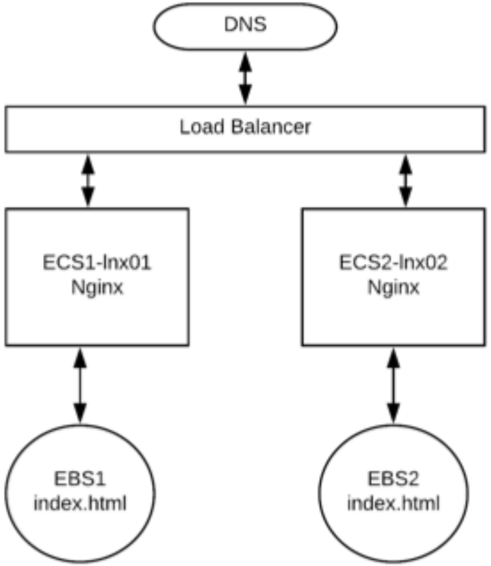
Routing Policy: Simple

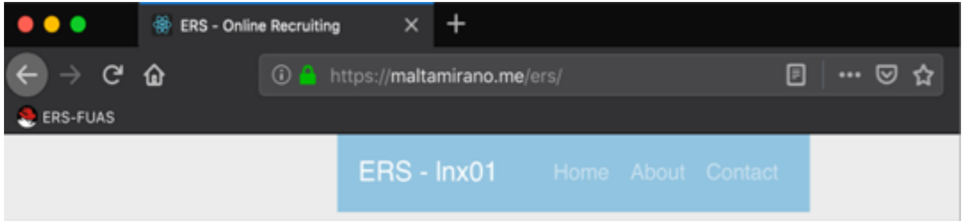
Route 53 responds to queries based only on the values in this record. Learn More

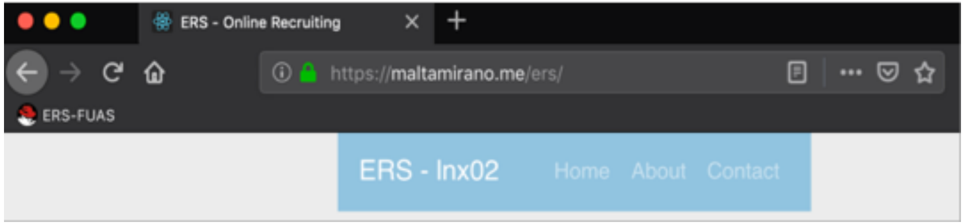
Evaluate Target Health: ○ Yes ● No

Monitoring of the Web-Server Cluster

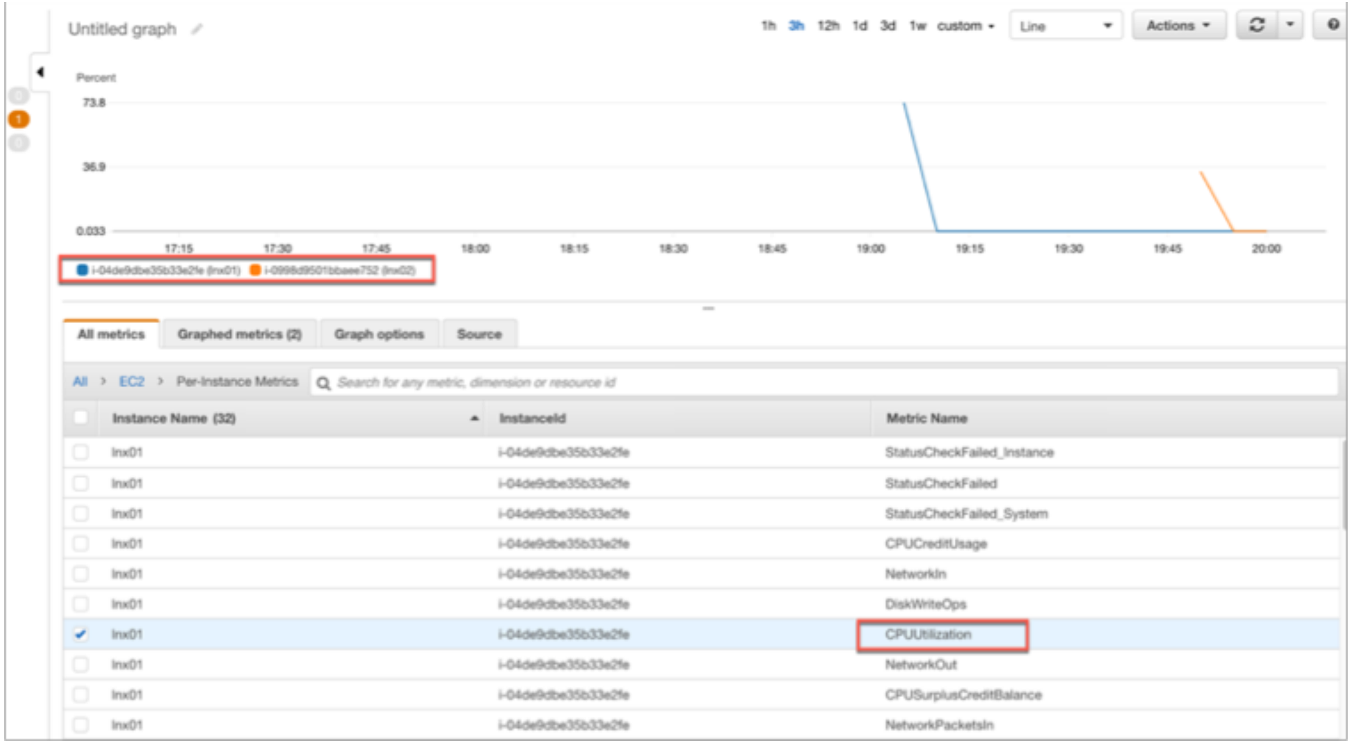
Architecture







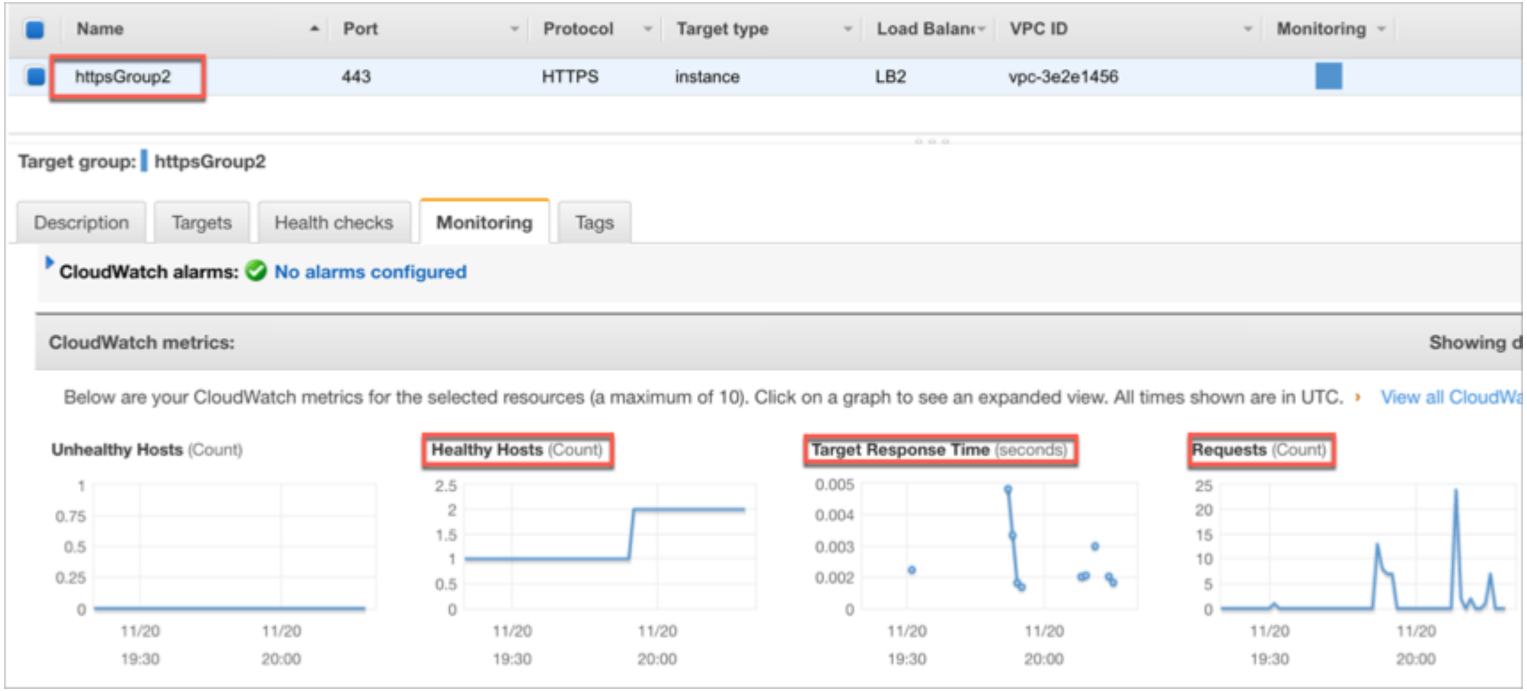
Monitoring of the Web-Server Cluster



🟦 i-04de9dbe35b33e2fe (lnx01) 🟧 i-0998d9501bbaee752 (lnx02)

☐	Instance Name (32)	InstanceId	Metric Name
☐	lnx01	i-04de9dbe35b33e2fe	StatusCheckFailed_Instance
☐	lnx01	i-04de9dbe35b33e2fe	StatusCheckFailed
☐	lnx01	i-04de9dbe35b33e2fe	StatusCheckFailed_System
☐	lnx01	i-04de9dbe35b33e2fe	CPUCreditUsage
☐	lnx01	i-04de9dbe35b33e2fe	NetworkIn
☐	lnx01	i-04de9dbe35b33e2fe	DiskWriteOps
☑	lnx01	i-04de9dbe35b33e2fe	CPUUtilization
☐	lnx01	i-04de9dbe35b33e2fe	NetworkOut
☐	lnx01	i-04de9dbe35b33e2fe	CPUSurplusCreditBalance
☐	lnx01	i-04de9dbe35b33e2fe	NetworkPacketsIn

Monitoring of the Web-Server Cluster



	Name	Port	Protocol	Target type	Load Balanc	VPC ID	Monitoring
■	httpsGroup2	443	HTTPS	instance	LB2	vpc-3e2e1456	■

Target group: httpsGroup2

CloudWatch alarms: ✓ No alarms configured

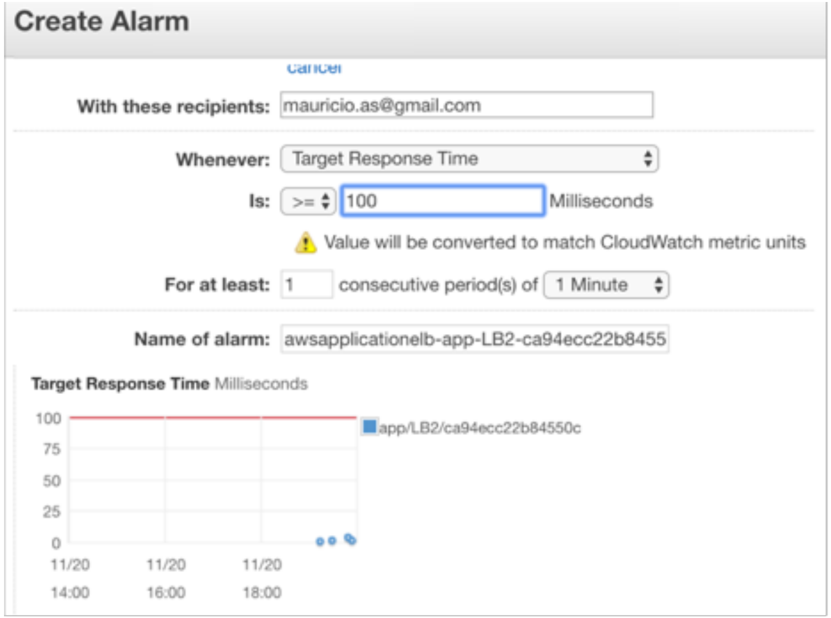
CloudWatch metrics:

Showing d

Below are your CloudWatch metrics for the selected resources (a maximum of 10). Click on a graph to see an expanded view. All times shown are in UTC. › View all CloudWa

Monitoring of the Web-Server Cluster

Alarms



Create Alarm

cancel

With these recipients: mauricio.as@gmail.com

Whenever: Target Response Time

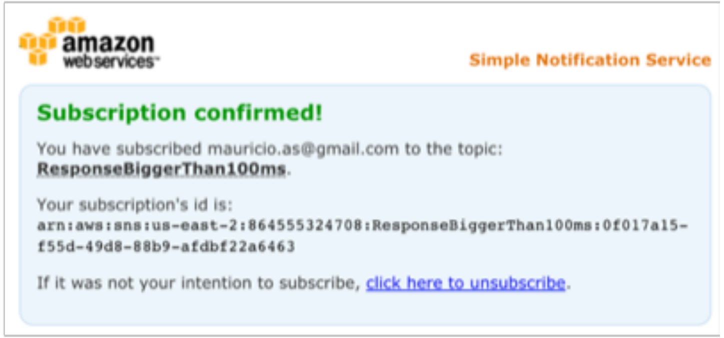
Is: >= 100 Milliseconds

⚠ Value will be converted to match CloudWatch metric units

For at least: 1 consecutive period(s) of 1 Minute

Name of alarm: awsapplicationelb-app-LB2-ca94ecc22b8455

Target Response Time Milliseconds



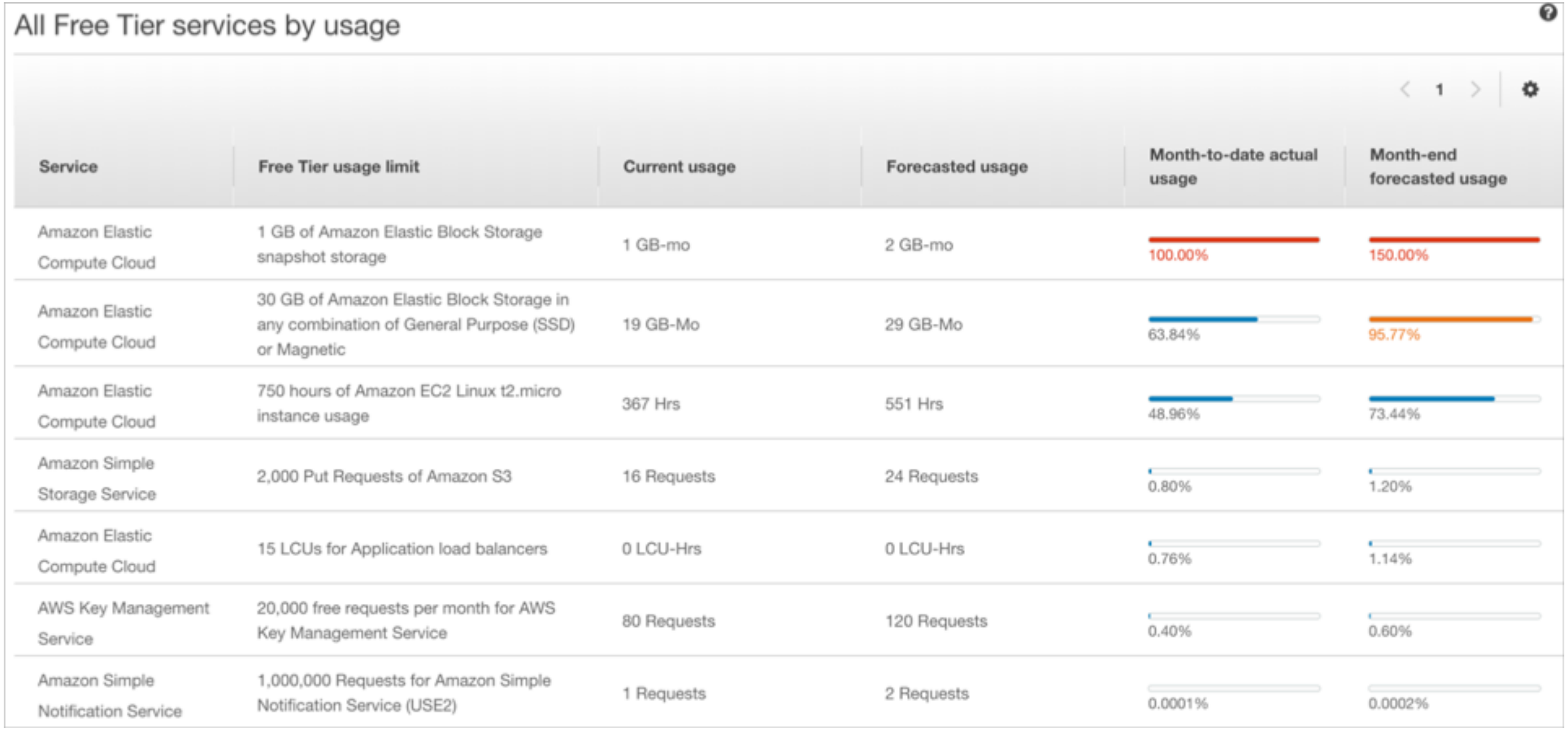
Subscription confirmed!

You have subscribed mauricio.as@gmail.com to the topic: **ResponseBiggerThan100ms**.

Your subscription's id is:
arn:aws:sns:us-east-2:864555324708:ResponseBiggerThan100ms:0f017a15-f55d-49d8-88b9-afdbf22a6463

If it was not your intention to subscribe, click here to unsubscribe.

AWS Free limits

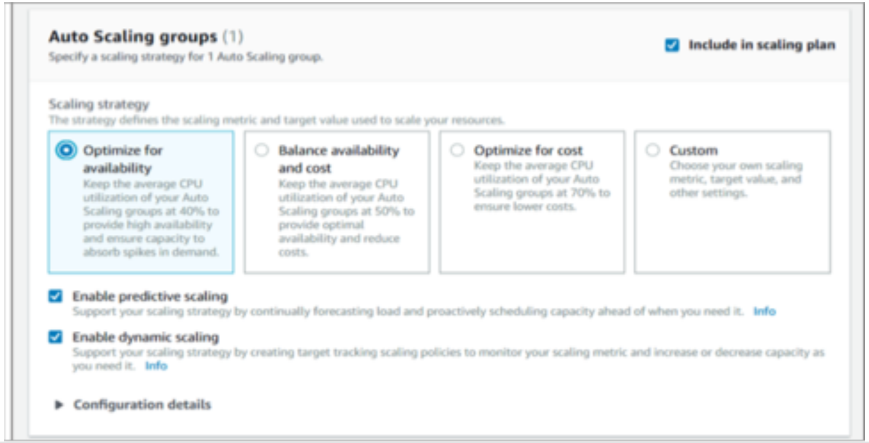


All Free Tier services by usage

Service	Free Tier usage limit	Current usage	Forecasted usage	Month-to-date actual usage	Month-end forecasted usage
Amazon Elastic Compute Cloud	1 GB of Amazon Elastic Block Storage snapshot storage	1 GB-mo	2 GB-mo	100.00%	150.00%
Amazon Elastic Compute Cloud	30 GB of Amazon Elastic Block Storage in any combination of General Purpose (SSD) or Magnetic	19 GB-Mo	29 GB-Mo	63.84%	95.77%
Amazon Elastic Compute Cloud	750 hours of Amazon EC2 Linux t2.micro instance usage	367 Hrs	551 Hrs	48.96%	73.44%
Amazon Simple Storage Service	2,000 Put Requests of Amazon S3	16 Requests	24 Requests	0.80%	1.20%
Amazon Elastic Compute Cloud	15 LCUs for Application load balancers	0 LCU-Hrs	0 LCU-Hrs	0.76%	1.14%
AWS Key Management Service	20,000 free requests per month for AWS Key Management Service	80 Requests	120 Requests	0.40%	0.60%
Amazon Simple Notification Service	1,000,000 Requests for Amazon Simple Notification Service (USE2)	1 Requests	2 Requests	0.0001%	0.0002%

AWS auto-scaling in EC2

- **Reactive Scaling**, users manually thresholds to the CPU usage in order to trigger new EC2 instances.
- **Proactive Scaling,** users manually schedule when new instances will be triggered.
- **Predictive Scaling,** new instances will be trigger automatically when needed, based on machine learning to predict the CPU usage of the instances.



Auto Scaling groups (1)

Specify a scaling strategy for 1 Auto Scaling group.

☑ **Include in scaling plan**

Scaling strategy

The strategy defines the scaling metric and target value used to scale your resources.

● **Optimize for availability** Keep the average CPU utilization of your Auto Scaling groups at 40% to provide high availability and ensure capacity to absorb spikes in demand.

○ **Balance availability and cost** Keep the average CPU utilization of your Auto Scaling groups at 50% to provide optimal availability and reduce costs.

○ **Optimize for cost** Keep the average CPU utilization of your Auto Scaling groups at 70% to ensure lower costs.

○ **Custom** Choose your own scaling metric, target value, and other settings.

☑ **Enable predictive scaling**
Support your scaling strategy by continually forecasting load and proactively scheduling capacity ahead of when you need it. Info

☑ **Enable dynamic scaling**
Support your scaling strategy by creating target tracking scaling policies to monitor your scaling metric and increase or decrease capacity as you need it. Info

▶ **Configuration details**

Thanks!