

## Contents

Prerequisites .....	2
Lab 6B: Multi-tier Web App with Autoscaling.....	2
Create VPC, Subnet, IGW, NAT, Routing Table, Keys, Sec Groups (Labs4c1) VPC Peering (Labs4c2), Instances on App Layer (Labs5c1), ALB, NLB and their target groups (Labs6c1).....	2
Lab 6B using Web Management Console .....	3
Create Launch Configuration, Autoscaling Group and internal configurations .....	3
Lab 6B using Command Line (Windows).....	8
Create Launch Configuration, Autoscaling Group, Simple Scaling Policy with Cloudwatch as trigger .....	8
Forcing Policy Status .....	9
Clean Resources .....	13

## Prerequisites

Labs1c1 have to be done and the context for Administrative user have to activated on Command Line Session.

Labs6c1 have to be done, because you learn how to: Deploy Network Infrastructure, Securize instances, deploy applications using Docker, create a functional ALB and NLB. The only exception is that you have to delete the instances A and B of previous lab.

## Lab 6B: Multi-tier Web App with Autoscaling

Create VPC, Subnet, IGW, NAT, Routing Table, Keys, Sec Groups (Labs4c1) VPC Peering (Labs4c2), Instances on App Layer (Labs5c1), ALB, NLB and their target groups (Labs6c1).

Review with the browser from Lab s6c1 as initial status. Delete Instances A and B to force that work Autoscaling Group

The screenshot shows the MTWA application interface, which is a multi-tier web application. It consists of two identical panels, each representing a different tier of the application. The top panel shows the 'Client Information' section, which includes the client's IP address (10.0.0.17), port (38830), and X-Forwarded-For (181.61.208.101). Below this, the 'Web Server Information' section shows the EC2 instance ID (ip-10-0-0-79-us-west-1), container name (web1), and IP address (172.17.0.2). The 'App Server Information' section shows the EC2 instance ID (ip-172-16-1-231-us-west-1), container name (app1), and IP address (172.17.0.2). The bottom panel shows the 'Client Information' section, which includes the client's IP address (10.0.0.17), port (38830), and X-Forwarded-For (181.61.208.101). Below this, the 'Web Server Information' section shows the EC2 instance ID (ip-10-0-0-79-us-west-1), container name (web1), and IP address (172.17.0.2). The 'App Server Information' section shows the EC2 instance ID (ip-172-16-1-231-us-west-1), container name (app1), and IP address (172.17.0.2).

Client Information	Web Server Information	App Server Information
IPv4: 10.0.0.17 Port: 38830 X-Forwarded-For: 181.61.208.101 Cookies: None	EC2 instance: ip-10-0-0-79-us-west-1 hostname: web1 IPv4: 172.17.0.2 Protocol: HTTP Port: 80 Local System: 2020-07-05 14:09:53 Time:	EC2 instance: ip-172-16-1-231-us-west-1 hostname: app1 IPv4: 172.17.0.2 Protocol: HTTP Port: 8080 Local System: 2020-07-05 14:09:53 Time:

## Lab 6B using Web Management Console

### Create Launch Configuration, Autoscaling Group and internal configurations

EC2 Dashboard

Events

Tags

Reports

Limits

INSTANCES

Instances

Instance Types

Launch Templates

Spot Requests

Savings Plans

Reserved Instances

Dedicated Hosts

Capacity Reservations

IMAGES

AMIs

Bundle Tasks

ELASTIC BLOCK STORE

Volumes

Snapshots

Lifecycle Manager

NETWORK & SECURITY

Security Groups

Elastic IPs

Placement Groups

Key Pairs

Network Interfaces

LOAD BALANCING

Load Balancers

Target Groups

AUTO SCALING

**Launch Configurations**

Auto Scaling Groups

Save up to 90% on Compute

Optimize compute costs by creating your Auto Scaling group with a launch template to combine EC2 On-Demand, Spot, and RIs. [Learn more.](#)

Create launch configuration

Create Auto Scaling group

Copy to launch template

Actions

Filter launch configurations...

No Launch Configurations

No launch configurations found

Select a launch configuration above

1. Choose AMI

2. Choose Instance Type

3. Configure details

4. Add Storage

5. Configure Security Group

6. Review

Create Launch Configuration

Name

Purchasing option ☐ Request Spot Instances

IAM role

Monitoring ☐ Enable CloudWatch detailed monitoring

Advanced Details

Kernel ID

RAM Disk ID

User data ☒ As text ☐ As file ☐ Input is already base64 encoded

```
#!/bin/bash\nsudo yum install -y httpd\nsudo systemctl enable httpd\nsudo systemctl start httpd\nsudo yum install -y awscli\naws configure\naws s3 cp s3://aws-logs-1-aml-us-east-1.amazonaws.com/elastic\naws s3 cp s3://aws-logs-1-aml-us-east-1.amazonaws.com/elastic\naws s3 cp s3://aws-logs-1-aml-us-east-1.amazonaws.com/elastic
```

IP Address Type ☒ Only assign a public IP address to instances launched in the default VPC and subnet. (default)  
☐ Assign a public IP address to every instance.  
☐ Do not assign a public IP address to any instances.  
Note: this option only affects instances launched into an Amazon VPC

Later, if you want to use a different launch configuration, you can create a new one and apply it to any Auto Scaling group. Existing launch configurations cannot be edited.

Cancel

Previous

Skip Storage

**Next: Add Storage**

Launch configuration creation status

✔ Successfully created launch configuration: LaunchCFG\_For\_Web

[View creation log](#)

▼ View

[View your launch configurations](#)

[View your Auto Scaling groups](#)

▶ Here are some helpful resources to get you started

Create an Auto Scaling group using this launch configuration

Closes

This is a shortcut to create a Auto Scaling Group from a Launch configuration:

1. Configure Auto Scaling group details2. Configure scaling policies3. Configure Notifications4. Configure Tags5. Review

Create Auto Scaling Group

Cancel and Exit

No default VPC found

Select another VPC, or [contact AWS Support](#) if you want to create a new default VPC.

Don't show me this again

Group name

ASG\_For\_Web

Launch Configuration

LaunchCFG\_For\_Web

Group size

Start with 1 instances

Network

vpc-09d5f695d0497a16 (10.0.0.0/16)

Create new VPC

Subnet

subnet-da139312946709fa610.0.0.0/24 (us-east-1a, x)

subnet-0b681b745a6c320e510.0.1.0/24 (us-east-1c, x)

Create new subnet

No public IP addresses will be assigned

None of the instances in this Auto Scaling group will be assigned a public IP address because you have not chosen to launch in your default VPC and subnet.

You can ensure a public IP address is assigned to instances launched with this configuration by selecting only default subnets of your default VPC.

[Learn more about IP addressing in an Amazon VPC.](#)

Advanced Details

Load Balancing

☒ Receive traffic from one or more load balancers

[Learn about Elastic Load Balancing](#)

Classic Load Balancers

Target Groups

TG-Port-80 x

Cancel

Next: Configure scaling policies

1. Configure Auto Scaling group details2. Configure scaling policies3. Configure Notifications4. Configure Tags5. Review

Create Auto Scaling Group

Cancel and Exit

Subnet

subnet-da139312946709fa610.0.0.0/24 (us-east-1a, x)

subnet-0b681b745a6c320e510.0.1.0/24 (us-east-1c, x)

Create new subnet

No public IP addresses will be assigned

None of the instances in this Auto Scaling group will be assigned a public IP address because you have not chosen to launch in your default VPC and subnet.

You can ensure a public IP address is assigned to instances launched with this configuration by selecting only default subnets of your default VPC.

[Learn more about IP addressing in an Amazon VPC.](#)

Advanced Details

Load Balancing

☒ Receive traffic from one or more load balancers

[Learn about Elastic Load Balancing](#)

Classic Load Balancers

Target Groups

TG-Port-80 x

Health Check Type

ELB EC2

Health Check Grace Period

259 seconds

Monitoring

Amazon EC2 Detailed Monitoring metrics, which are provided at 1 minute frequency, are not enabled for the launch configuration LaunchCFG\_For\_Web. Instances launched from it will use Basic Monitoring metrics, provided at 5 minute frequency.

[Learn more](#)

Instance Protection

Service-Linked Role

AWSAutoScalingRoleForElasticLoadBalancing

[View Role in IAM](#)

Cancel

Next: Configure scaling policies

1. Configure Auto Scaling group details2. Configure scaling policies3. Configure Notifications4. Configure Tags5. Review

Create Auto Scaling Group

You can optionally add scaling policies if you want to adjust the size (number of instances) of your group automatically. A scaling policy is a set of instructions for making such adjustments in response to an Amazon CloudWatch alarm that you assign to it. In each policy, you can choose to add or remove a specific number of instances or a percentage of the existing group size. When the alarm triggers, it will execute the policy and adjust the size of your group accordingly. [Learn more about scaling policies.](#)

Keep this group at its initial size

Use scaling policies to adjust the capacity of this group

Scale between 1 and 2 instances. These will be the minimum and maximum size of your group.

Scale Group Size

Name

Scale Group Size

Metric type

Average CPU Utilization

Target value

Instances need

300 seconds to warm up after scaling

Disable scale-in

☐

Scale the Auto Scaling group using step or simple scaling policies

Cancel

Previous

Review

Next: Configure Notifications

1. Configure Auto Scaling group details 2. Configure scaling policies 3. Configure Notifications 4. Configure Tags 5. Review

### Create Auto Scaling Group

Keep this group at its initial size  
 Use scaling policies to adjust the capacity of this group

Scale between 1 and 2 instances. These will be the minimum and maximum size of your group.

#### Increase Group Size

Name: lab5b-scale-out-policy

Execute policy when: No alarm selected [Add new alarm](#)

Take the action: Add 1 capacity units

Instances need: 300 seconds to warm up after each step

Create a simple scaling policy

#### Decrease Group Size

Name: lab5b-scale-in-policy

Execute policy when: No alarm selected [Add new alarm](#)

Take the action: Remove 1 capacity units

Create a simple scaling policy

Scale the Auto Scaling group using a target tracking scaling policy

Cancel Previous **Review** Next: Configure Notifications

### Create Alarm

You can use CloudWatch alarms to be notified automatically whenever metric data reaches a level you define.  
 To edit an alarm, first choose whom to notify and then define when the notification should be sent.

☐ Send a notification to: No SNS topics found...

Whenever: Average of CPU Utilization

Is: >= 70 Percent

For at least: 2 consecutive period(s) of 1 Minute

Name of alarm: Step-Scaling-AlarmHigh-AddCapacity

CPU Utilization Percent

ASG\_For\_Web

Cancel **Create Alarm**

### Create Alarm

You can use CloudWatch alarms to be notified automatically whenever metric data reaches a level you define.  
 To edit an alarm, first choose whom to notify and then define when the notification should be sent.

☐ Send a notification to: No SNS topics found...

Whenever: Average of CPU Utilization

Is: <= 40 Percent

For at least: 2 consecutive period(s) of 1 Minute

Name of alarm: Step-Scaling-AlarmLow-RemoveCapacity

CPU Utilization Percent

ASG\_For\_Web

Cancel **Create Alarm**

1. Configure Auto Scaling group details
2. Configure scaling policies
3. Configure Notifications
4. Configure Tags
5. Review

### Create Auto Scaling Group

☐ Keep this group at its initial size  
☒ Use scaling policies to adjust the capacity of this group

Scale between  and  instances. These will be the minimum and maximum size of your group.

#### Increase Group Size

Name:

Execute policy when: [Step-Scaling-AlarmHigh-AddCapacity](#) [Edit](#) [Remove](#)  
 breaches the alarm threshold: CPUUtilization >= 70 for 2 consecutive periods of 60 seconds for the metric dimensions AutoScalingGroupName = ASG\_For\_Web

Take the action:   capacity units when  <= CPUUtilization < -infinity

[Add step](#) <sup>(1)</sup>

Instances need:  seconds to warm up after each step

[Create a simple scaling policy](#) <sup>(1)</sup>

#### Decrease Group Size

Name:

Execute policy when: [Step-Scaling-AlarmLow-RemoveCapacity](#) [Edit](#) [Remove](#)  
 breaches the alarm threshold: CPUUtilization <= 40 for 2 consecutive periods of 60 seconds for the metric dimensions AutoScalingGroupName = ASG\_For\_Web

Take the action:   capacity units when  >= CPUUtilization > -infinity

[Add step](#) <sup>(1)</sup>

[Cancel](#)
[Previous](#)
[Review](#)
[Next: Configure Notifications](#)

1. Configure Auto Scaling group details
2. Configure scaling policies
3. Configure Notifications
4. Configure Tags
5. Review

### Create Auto Scaling Group

Please review your Auto Scaling group details. You can go back to edit changes for each section. Click **Create Auto Scaling group** to complete the creation of an Auto Scaling group.

#### Auto Scaling Group Details

Group name	ASG_For_Web
Group size	1
Minimum Group Size	1
Maximum Group Size	2
Subnet(s)	subnet-0a439312946700fa6, subnet-0b6616745a6c320d5
Load Balancers	
Target Groups	TG-Port-80
Health Check Type	ELB
Health Check Grace Period	300
Detailed Monitoring	No
Instance Protection	None
Service-Linked Role	AWSManagedForAutoScaling

[Edit details](#)

#### Scaling Policies

LabBb-scale-out-policy With alarm = Step-Scaling-AlarmHigh-AddCapacity, Add 1 capacity units and 300 seconds for instances to warm up

LabBb-scale-in-policy With alarm = Step-Scaling-AlarmLow-RemoveCapacity, Remove 1 capacity units

[Edit scaling policies](#)

#### Notifications

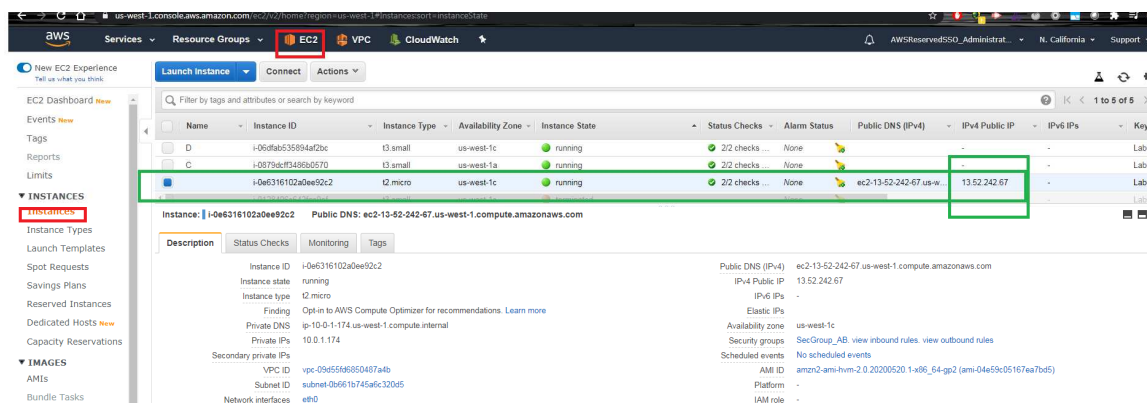
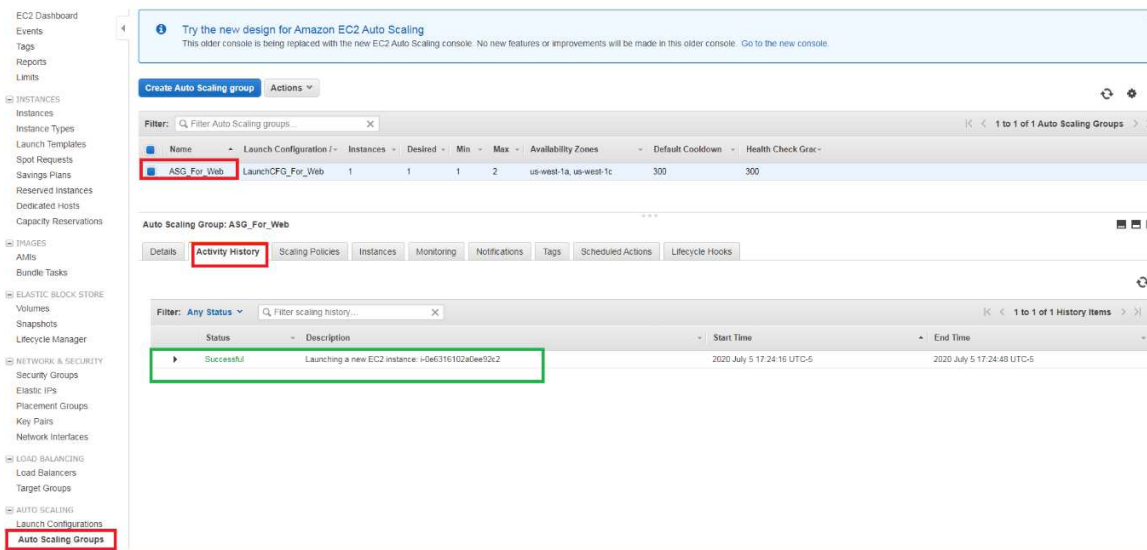
[Edit notifications](#)

#### Tags

[Edit tags](#)

[Cancel](#)
[Previous](#)
[Create Auto Scaling group](#)

Finally, you can check that a new instance is created:



Go to “Forcing Policy Status” section

## Lab 6B using Command Line (Windows)

Create Launch Configuration, Autoscaling Group, Simple Scaling Policy with Cloudwatch as trigger

rem Se tiene que crear un Launch Template

rem Se crea una configuracion para la capa Web

```
aws autoscaling create-launch-configuration --launch-configuration-name LaunchCFG_For_Web --image-id %AMI% --instance-type %instance_type% --security-groups %SecGroup_AB_Id% --key-name Lab6a --user-data file://bootstrapAB.txt >tmpFile
```

rem Se tiene que crear un AutoScaling Group para un LB

```
aws autoscaling create-auto-scaling-group --auto-scaling-group-name ASG_For_Web --launch-configuration-name LaunchCFG_For_Web --vpc-zone-identifier %pbsn1_Id%,%pbsn2_Id% --target-group-arns %TG80_ARN% --max-size 5 --min-size 1 --desired-capacity 1
```



rem Se crea un escalamiento simple en crecimiento y decreciendo. <https://docs.aws.amazon.com/autoscaling/ec2/userguide/as-scaling-simple-step.html#simple-scaling-policies-aws-cli>

```
aws autoscaling put-scaling-policy --policy-name Lab6b-scale-out-policy --
auto-scaling-group-name ASG_For_Web --scaling-adjustment 50 --adjustment-
type PercentChangeInCapacity |jq ".PolicyARN" >tmpFile
set /p ASG_Scaleout_Policy= <tmpFile
aws autoscaling put-scaling-policy --policy-name Lab6b-scale-in-policy --
auto-scaling-group-name ASG_For_Web --scaling-adjustment -1 --adjustment-
type ChangeInCapacity --cooldown 180 |jq ".PolicyARN" >tmpFile
set /p ASG_Scalein_Policy= <tmpFile
aws cloudwatch put-metric-alarm --alarm-name Step-Scaling-AlarmHigh-
AddCapacity --metric-name CPUUtilization --namespace AWS/EC2 --
statistic Average --period 120 --evaluation-periods 1 --threshold 70 --
comparison-operator GreaterThanOrEqualToThreshold --
dimensions "Name=AutoScalingGroupName,Value=ASG_For_Web" --alarm-
actions %ASG_Scaleout_Policy%
aws cloudwatch put-metric-alarm --alarm-name Step-Scaling-AlarmLow-
RemoveCapacity --metric-name CPUUtilization --namespace AWS/EC2 --
statistic Average --period 120 --evaluation-periods 1 --threshold 40 --
comparison-operator LessThanOrEqualToThreshold --
dimensions "Name=AutoScalingGroupName,Value=ASG_For_Web" --alarm-
actions %ASG_Scalein_Policy%
```

```
C:\Code\bsg-saa-c02\AWS_SAA\Code\s6c1\CLI>aws autoscaling create-launch-configuration --launch-configuration-name LaunchCFG_For_Web --image-id %AMI% --instance-
type %instance_type% --security-groups %SecGroup_AB_Id% --key-name Lab6a --user-data file://bootstrapAB.txt >tmpFile
C:\Code\bsg-saa-c02\AWS_SAA\Code\s6c1\CLI>aws autoscaling create-auto-scaling-group --auto-scaling-group-name ASG_For_Web --launch-configuration-name LaunchCFG_
For_Web --vpc-zone-identifier %vpczn1_Id%,%vpczn2_Id% --target-group-arns %TG80_Arn% --max-size 5 --min-size 1 --desired-capacity 1
C:\Code\bsg-saa-c02\AWS_SAA\Code\s6c1\CLI>aws autoscaling put-scaling-policy --policy-name ASG_For_Web-policy --auto-scaling-group-name ASG_For_Web --scaling-ad
justment 30 --adjustment-type PercentChangeInCapacity --min-adjustment-magnitude 2
{
  "PolicyARN": "arn:aws:autoscaling:us-west-1:455469987488:scalingPolicy:9df4ce76-f8dd-435a-9768-215b404d49a9:autoScalingGroupName/ASG_For_Web:policyName/ASG_
For_Web-policy",
  "Alarms": []
}
C:\Code\bsg-saa-c02\AWS_SAA\Code\s6c1\CLI>aws autoscaling put-scaling-policy --policy-name ASG_For_Web_ScaleIn-policy --auto-scaling-group-name ASG_For_Web --sc
aling-adjustment -1 --adjustment-type ChangeInCapacity --cooldown 180
{
  "PolicyARN": "arn:aws:autoscaling:us-west-1:455469987488:scalingPolicy:1d8a89ea-9239-4c5b-bcc9-da58f02c0190:autoScalingGroupName/ASG_For_Web:policyName/ASG_
For_Web_ScaleIn-policy",
  "Alarms": []
}
```

Go to “Forcing Policy Status” section

## Forcing Policy Status

Given the new IP, goes to Putty and run the following commands:

<div> <div>Launch Instance</div> <div>Connect</div> <div>Actions</div> </div>									
<div> <div>Instance State: Pending</div> <div>Instance State: Running</div> <div>Instance State: Stopping</div> <div>Add filter</div> </div>									
	Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS (IPv4)	IPv4 Public IP
<input checked="" type="checkbox"/>		i-02e487e6ab16774f1	t3.small	us-west-1a	running	2/2 checks ...	None	ec2-13-57-242-30.us-w...	13.57.242.30
<input type="checkbox"/>	D	i-06dfab535894af2bc	t3.small	us-west-1c	running	2/2 checks ...	None	-	-
<input type="checkbox"/>	C	i-0879dcff3486b0570	t3.small	us-west-1a	running	2/2 checks ...	None	-	-

Instance: i-02e487e6ab16774f1

Public DNS: ec2-13-57-242-30.us-west-1.compute.amazonaws.com

Description

Status Checks

Monitoring

Tags

Instance ID

Instance state

Instance type

Finding

Public DNS (IPv4)

IPv4 Public IP

IPv6 IPs

Elastic IPs

ec2-13-57-242-30.us-west-1.compute.amazonaws.com

13.57.242.30

-

-

Opt-in to AWS Compute Optimizer for recommendations. Learn more

```

putty -i "Lab6a.ppk" ec2-user@13.57.242.30
putty -i "Lab6a.ppk" ec2-user@13.57.242.30
sudo amazon-linux-extras install epel -y
sudo yum install stress -y
rem Definir la cantidad de CPUs a cargar, esto depende del tipo de instancia
a realizar la prueba. t3.small tiene 2 cpus
stress --cpu 2 --timeout 360

```

```

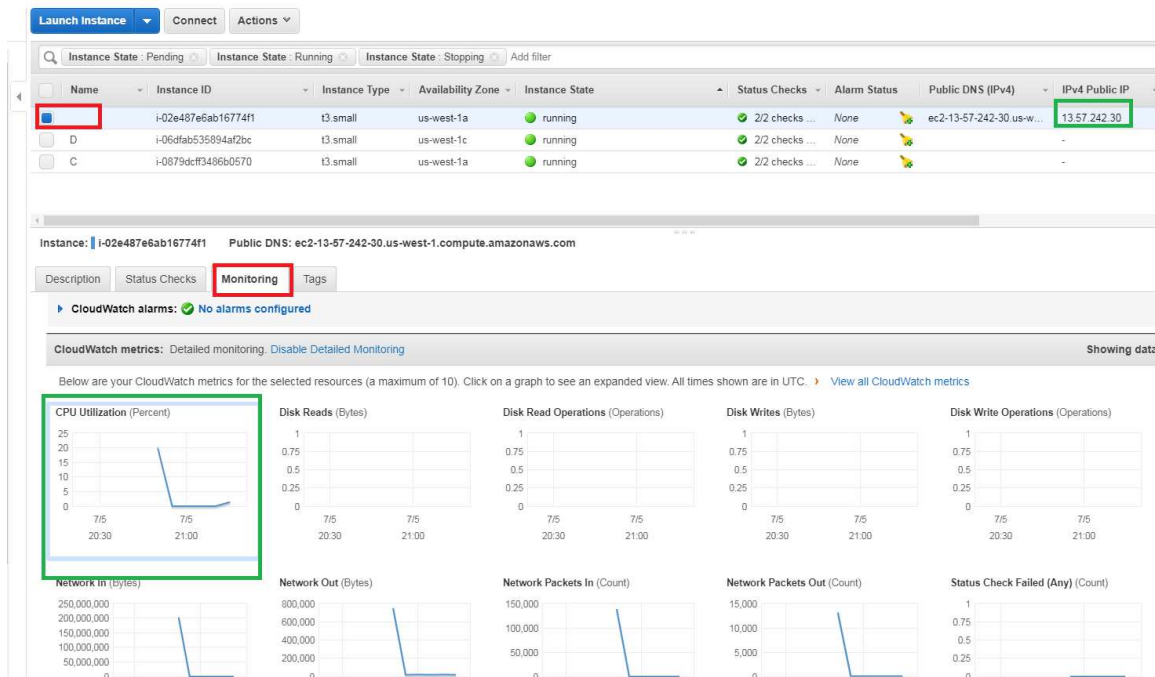
ec2-user@ip-10-0-0-5:~
Using username "ec2-user".
Authenticating with public key "imported-openssh-key"
Last login: Sun Jul  5 21:56:48 2020 from ec2-13-52-6-112.us-west-
onaws.com

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

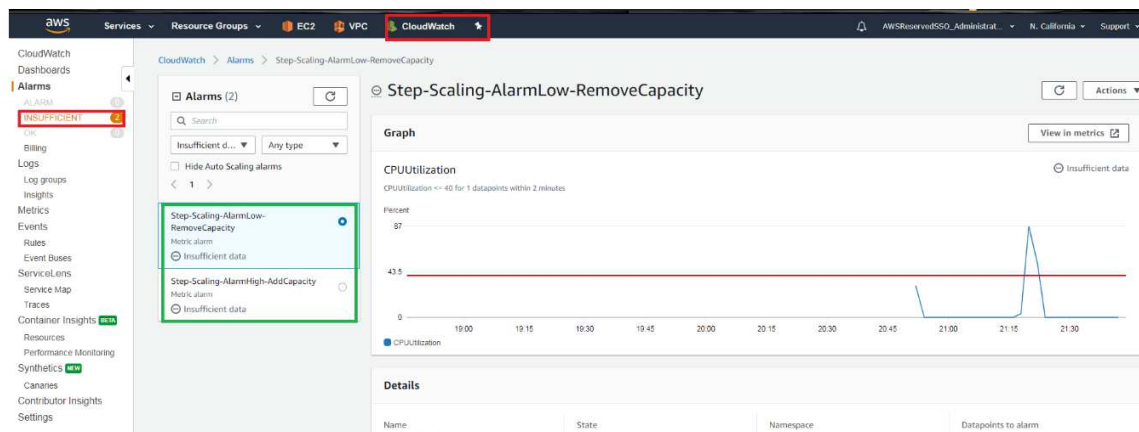
https://aws.amazon.com/amazon-linux-2/
No packages needed for security; 2 packages available
Run "sudo yum update" to apply all updates.
[ec2-user@ip-10-0-0-5 ~]$ stress --cpu 2 --timeout 300
stress: info: [20887] dispatching hogs: 2 cpu, 0 io, 0 vm, 0 hdd

```

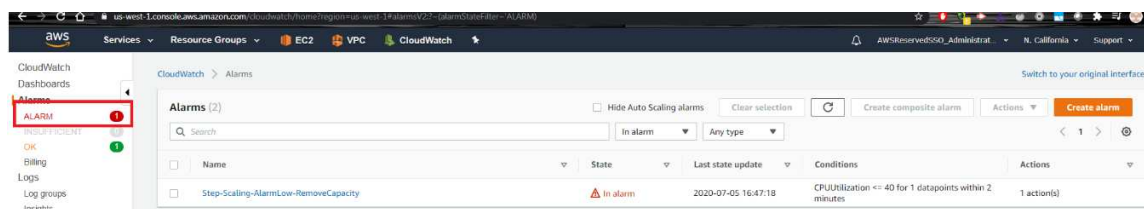
You can check its status on Monitoring on the same instance page.

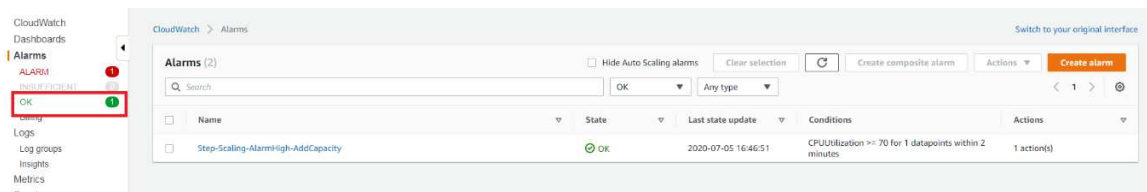


And you check the status of the alarms on Cloudwatch. At starting, there are “insufficient data” status upto have a complete period.

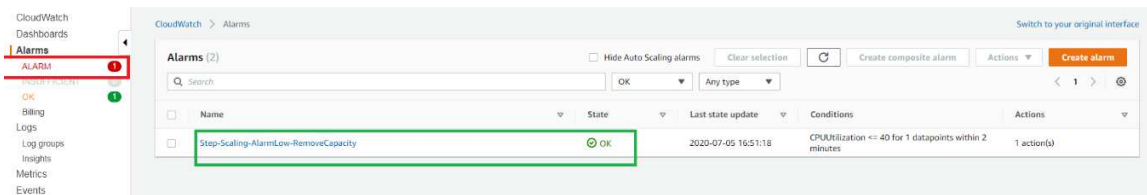
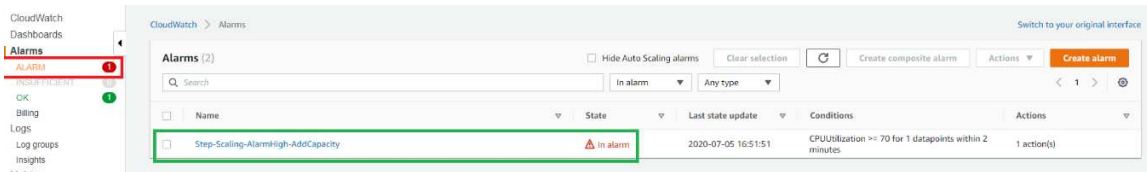


Later,

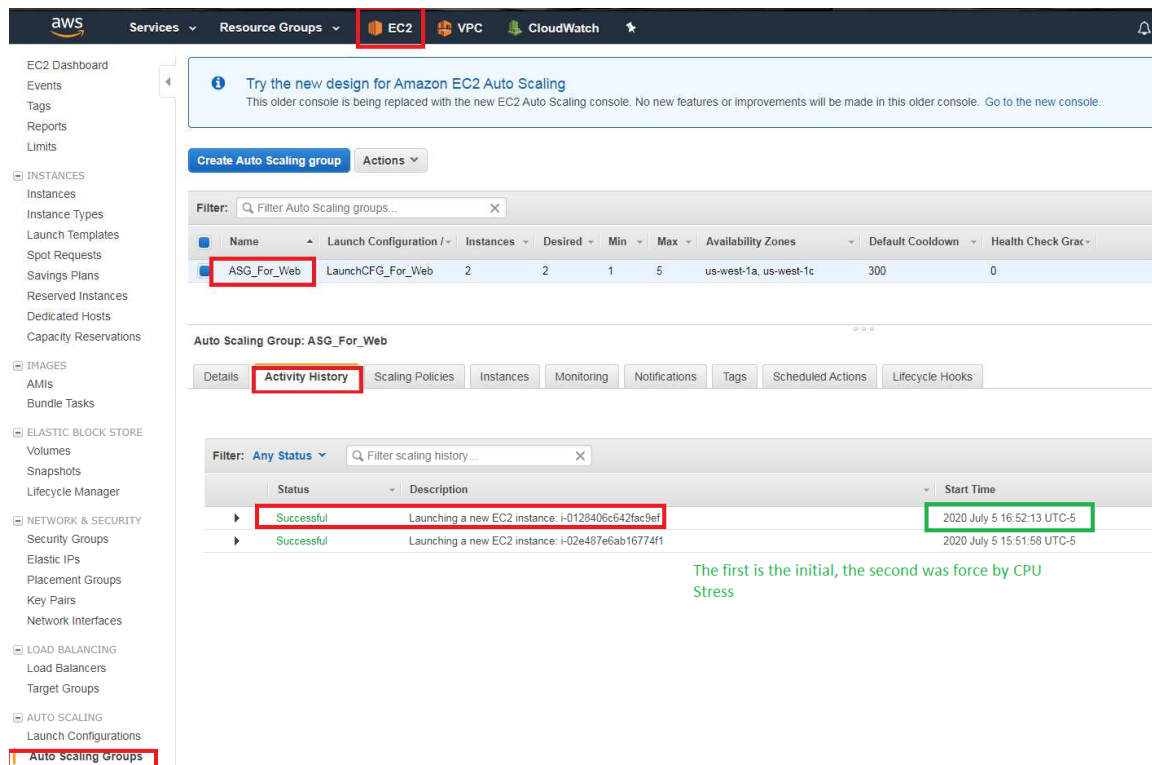




When it detects the CPU stress, the alarms change its statues.



And you can see the activity of Autoscaling group history,



Even on the instance page, you see the new instance

The screenshot shows the AWS Management Console with the EC2 Dashboard. The 'Instances' section is selected, and a table lists several EC2 instances. The instance 'i-02e487e6ab16774f1' is highlighted with a green box, showing its state as 'running'. Below the table, the 'Monitoring' tab is active, displaying CloudWatch metrics for CPU Utilization, Disk Reads, and Disk Writes.

On the other way, to scale-in you have to wait until it happened, and the default policy is to delete the older.

The screenshot shows the AWS Management Console with the EC2 Dashboard. The 'Instances' section is selected, and a table lists several EC2 instances. The instance 'i-02e487e6ab16774f1' is highlighted with a green box, showing its state as 'terminated'.

The screenshot shows the AWS Management Console with the Auto Scaling Groups page. The 'ASG\_For\_Web' group is selected, and the 'Activity History' tab is active. The table shows the history of scaling activities, including the termination of the instance 'i-02e487e6ab16774f1' and the launch of a new EC2 instance.

Clean Resources

VPC: Peering Connections

EC2: Instances  
EC2: Load LoadBalancers  
EC2: TargetGroups  
VPC: NAT gateway  
VPC: EIP  
EC2: Keypair  
EC2: Security Group  
VPC: VPC