

## ICT & Infra S3 Automation & Orchestration, week 6

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### Introduction

Running multiple EC2 instances can be expensive. By using a Lambda function and Amazon EventBridge you can shut down EC2 instances used for development environment.

This is **group** assignment.

### Assignment 1. Automatically shut down EC2 instances

Difficulty: ★★★★★☆

To save costs, some EC2 instances can be shut down and started up on a schedule. Follow the [tutorial at AWS](#) to implement a Lambda function to control an EC2 instance state every night. Use [cron expressions](#) to specify a schedule. Extend the implementation with the following rules:

- Every EC2 instance must have an additional tag that identifies importance of an instance. A possible tag can be<sup>1</sup>: *Development, Testing, Staging, Production*. Add necessary tag that identifies the purpose of an EC2 instance.
- An EC2 instance with *Development* or *Testing* tag, must be:
  - Shut down daily at 23:00.
  - It must not be started automatically.

I began by creating an EC2 instance and tagging it accordingly

Instance summary for i-0af384df4935be345 (lambdastoptest) Info

Updated less than a minute ago

Instance ID: i-0af384df4935be345 (lambdastoptest)

Public IPv4 address: 3.72.68.100 | open address

Instance state: Running

Private IPv4 addresses: 172.31.44.200

Public IPv4 DNS: ec2-3-72-68-100.eu-central-1.compute.amazonaws.com | open address

IPv6 address: -

Hostname type: IP name: ip-172-31-44-200.eu-central-1.compute.internal

Private IP DNS name (IPv4 only): ip-172-31-44-200.eu-central-1.compute.internal

Instance type: t2.micro

Elastic IP addresses: -

Answer private resource DNS name: IPv4 (A): -

VPC ID: vpc-025b41945b783a001 (vpc)

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

Auto-assigned IP address: 3.72.68.100 [Public IP]

Subnet ID: subnet-098c6f0ed18ccb993

Auto Scaling Group name: -

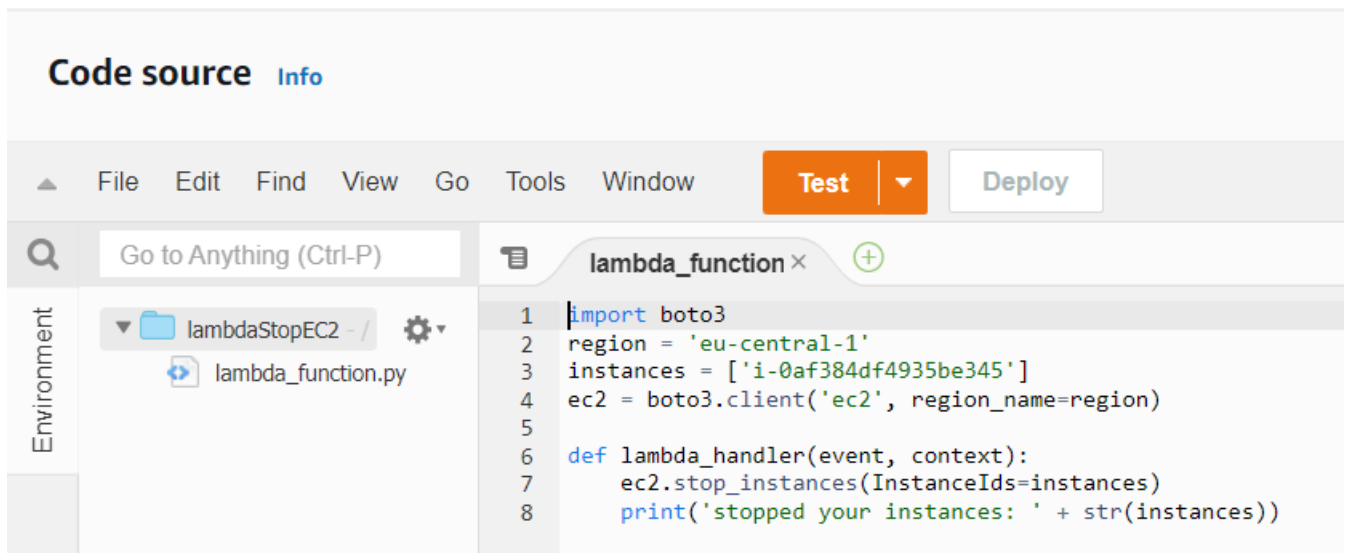
IAM Role: -

Tags

Key	Value
Development...	dev
Name	lambdastoptest

I then created a lambda function that stopped specified EC2 instances

<sup>1</sup> Differences Between Dev, Staging, Preprod...: <https://www.flagship.io/test-environment/>



After that I created a rule in eventbridge that would use the lambda function everyday at a certain time. I specified this time using a CRON expression

## lambdaEC2stop

**Rule details** [Info](#)

Rule name lambdaEC2stop	Status ✔ Enabled	Event bus name default
Description Eventbridge uses lambda command to stop EC2 instances	Rule ARN arn:aws:events:eu-central-1:807013657668:rule/lambdaEC2stop	Event bus ARN arn:aws:events:eu-central-1:807013657668:event-bus/default

[Event schedule](#) | [Targets](#) | [Monitoring](#) | [Tags](#)

**Event schedule** [Info](#)

Cron expression  
0 23 ? \* \* \*

Next 10 trigger date(s)  
Sat, 15 Oct 2022 23:00:00 UTC  
Sun, 16 Oct 2022 23:00:00 UTC  
Mon, 17 Oct 2022 23:00:00 UTC  
Tue, 18 Oct 2022 23:00:00 UTC  
Wed, 19 Oct 2022 23:00:00 UTC  
Thu, 20 Oct 2022 23:00:00 UTC  
Fri, 21 Oct 2022 23:00:00 UTC

UTC ▼

- An EC2 instance with *Staging* tag, must be:
  - Shut down daily at 23:00.
  - It should be started automatically at 9:00 on working days.
  - On a weekend it must not be started automatically.

I started this task the same as the last, by creating an EC2 instance

**Instance summary for i-0b868011a76d9d59d (Staging)** [Info](#)

Updated less than a minute ago

Instance ID

i-0b868011a76d9d59d (Staging)

IPv6 address

–

Hostname type

IP name: ip-172-31-41-26.eu-central-1.compute.internal

Answer private resource DNS name

IPv4 (A)

Auto-assigned IP address

18.184.154.52 [Public IP]

IAM Role

–

Public IPv4 address

18.184.154.52 | [open address](#)

Instance state

Pending

Private IP DNS name (IPv4 only)

ip-172-31-41-26.eu-central-1.compute.internal

Instance type

t2.micro

VPC ID

vpc-025b41945b783a001 (vpc) | [open address](#)

Subnet ID

subnet-098c6f0ed18ccb993 | [open address](#)

Private IPv4 addresses

172.31.41.26

Public IPv4 DNS

ec2-18-184-154-52.eu-central-1.compute.amazonaws.com | [open address](#)

Elastic IP addresses

–

AWS Compute Optimizer finding

Opt-in to AWS Compute Optimizer for recommendations. | [Learn more](#)

Auto Scaling Group name

–

Details | Security | Networking | Storage | Status checks | Monitoring | **Tags**

**Tags**

Manage tags

Q

Key	Value
Staging	stag
Name	Staging

For this task I created another lambda function that started EC2 functions. I altered my previous stop function with the new instance id

**Code source** [Info](#)

File Edit Find View Go Tools Window **Test** Deploy Changes not

Go to Anything (Ctrl-P)

Environment

lambdaStopEC2 - /

lambda\_function.py

```

1 import boto3
2 region = 'eu-central-1'
3 instances = ['i-0b868011a76d9d59d']
4 ec2 = boto3.client('ec2', region_name=region)
5
6 def lambda_handler(event, context):
7     ec2.stop_instances(InstanceIds=instances)
8     print('stopped your instances: ' + str(instances))

```

**Code source** [Info](#)

File Edit Find View Go Tools Window **Test** Deploy

Go to Anything (Ctrl-P)

Environment

lambdaStartEC2 - /

lambda\_function.py

```

1 import boto3
2 region = 'eu-central-1'
3 instances = ['i-0b868011a76d9d59d']
4 ec2 = boto3.client('ec2', region_name=region)
5
6 def lambda_handler(event, context):
7     ec2.start_instances(InstanceIds=instances)
8     print('started your instances: ' + str(instances))

```

I then created a new eventbridge rule for the new lambda function and set the time accordingly. I altered thye previous rule to trigger at a different time

## lambdaEC2start

### Rule details [Info](#)

Rule name  
lambdaEC2start

Description  
Starts EC2 instances at 9am on weekdays

Status  
✔ Enabled

Rule ARN  
arn:aws:events:eu-central-1:807013657668:rule/lambdaEC2start

Event bus name  
default

Event bus ARN  
arn:aws:events:eu-central-1:807013657668:event-bus/default

### Event schedule

### Targets

### Monitoring

### Tags

### Event schedule [Info](#)

Cron expression

0 9 ? \* MON-FRI \*

Next 10 trigger date(s)

UTC

Mon, 17 Oct 2022 09:00:00 UTC  
Tue, 18 Oct 2022 09:00:00 UTC  
Wed, 19 Oct 2022 09:00:00 UTC  
Thu, 20 Oct 2022 09:00:00 UTC  
Fri, 21 Oct 2022 09:00:00 UTC  
Mon, 24 Oct 2022 09:00:00 UTC  
Tue, 25 Oct 2022 09:00:00 UTC  
Wed, 26 Oct 2022 09:00:00 UTC

## lambdaEC2stop

Edit

Disable

Delete

### Rule details [Info](#)

Rule name  
lambdaEC2stop

Description  
Eventbridge uses lambda command to stop EC2 instances

Status  
✔ Enabled

Rule ARN  
arn:aws:events:eu-central-1:807013657668:rule/lambdaEC2stop

Event bus name  
default

Event bus ARN  
arn:aws:events:eu-central-1:807013657668:event-bus/default

Type

### Event schedule

### Targets

### Monitoring

### Tags

### Event schedule [Info](#)

Edit

Cron expression

0 23 ? \* \* \*

Next 10 trigger date(s)

UTC

Sat, 15 Oct 2022 23:00:00 UTC  
Sun, 16 Oct 2022 23:00:00 UTC  
Mon, 17 Oct 2022 23:00:00 UTC  
Tue, 18 Oct 2022 23:00:00 UTC  
Wed, 19 Oct 2022 23:00:00 UTC  
Thu, 20 Oct 2022 23:00:00 UTC  
Fri, 21 Oct 2022 23:00:00 UTC  
Sat, 22 Oct 2022 23:00:00 UTC  
Sun, 23 Oct 2022 23:00:00 UTC

- An EC2 instance with *Production* tag and type of *t2.small* or smaller, must be:
  - Shut down daily at 24:00.
  - It should be started automatically at 8:00 daily.

For this task I did the same steps as the last task, only with different times and tags. I also had to choose a different instance size, one that was smaller than I was used to

Instance summary for i-0c32f88392a38caca (Production)

Info

Refresh

Connect

Instance state

Actions

Instance ID

i-0c32f88392a38caca (Production)

IPv6 address

-

Hostname type

IP name: ip-172-31-36-146.eu-central-1.compute.internal

Answer private resource DNS name

IPv4 (A)

Auto-assigned IP address

3.120.37.82 [Public IP]

IAM Role

-

Public IPv4 address

3.120.37.82 | [open address](#)

Instance state

Running

Private IP DNS name (IPv4 only)

ip-172-31-36-146.eu-central-1.compute.internal

Instance type

t2.nano

VPC ID

vpc-025b41945b783a001 (vpc)

Subnet ID

subnet-098c6f0ed18ccb993

Private IPv4 addresses

172.31.36.146

Public IPv4 DNS

ec2-3-120-37-82.eu-central-1.compute.amazonaws.com | [open address](#)

Elastic IP addresses

-

AWS Compute Optimizer finding

Opt-in to AWS Compute Optimizer for recommendations. | [Learn more](#)

Auto Scaling Group name

-

Details

Security

Networking

Storage

Status checks

Monitoring

Tags

Tags

Manage tags

Q

< 1 >

Code source

Info

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Tools

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Test

Deploy

Go to Anything (Ctrl-P)

Environment

lambdaStopEC2

lambda\_function.py

lambda\_function

```
1 import boto3
2 region = 'eu-central-1'
3 instances = ['i-0c32f88392a38caca']
4 ec2 = boto3.client('ec2', region_name=region)
5
6 def lambda_handler(event, context):
7     ec2.stop_instances(InstanceIds=instances)
8     print('stopped your instances: ' + str(instances))
```

Code source

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Deploy

Go to Anything (Ctrl-P)

Environment

lambdaStartEC2

lambda\_function.py

lambda\_function

```
1 import boto3
2 region = 'eu-central-1'
3 instances = ['i-0c32f88392a38caca']
4 ec2 = boto3.client('ec2', region_name=region)
5
6 def lambda_handler(event, context):
7     ec2.start_instances(InstanceIds=instances)
8     print('started your instances: ' + str(instances))
```

lambdaEC2stop

Edit

Disable

Delete

Rule details [Info](#)

<div>Rule name</div> <div>lambdaEC2stop</div>	<div>Status</div> <div> <div>Enabled</div> </div>	<div>Event bus name</div> <div>default</div>	<div>Type</div>
<div>Description</div> <div>Eventbridge uses lambda command to stop EC2 instances</div>	<div>Rule ARN</div> <div> <div>arn:aws:events:eu-central-1:807013657668:rule/lambdaEC2stop</div> </div>	<div>Event bus ARN</div> <div> <div>arn:aws:events:eu-central-1:807013657668:event-bus/default</div> </div>	

Event schedule [Info](#)

Cron expression

0 00 ? \* \* \*

Next 10 trigger date(s)

UTC

Sun, 16 Oct 2022 00:00:00 UTC

Mon, 17 Oct 2022 00:00:00 UTC

Tue, 18 Oct 2022 00:00:00 UTC

Wed, 19 Oct 2022 00:00:00 UTC

Thu, 20 Oct 2022 00:00:00 UTC

Fri, 21 Oct 2022 00:00:00 UTC

lambdaEC2start

Edit

Disable

Delete

Rule details [Info](#)

<div>Rule name</div> <div>lambdaEC2start</div>	<div>Status</div> <div> <div>Enabled</div> </div>	<div>Event bus name</div> <div>default</div>	<div>Type</div>
<div>Description</div> <div>Starts EC2 instances at 9am on weekdays</div>	<div>Rule ARN</div> <div> <div>arn:aws:events:eu-central-1:807013657668:rule/lambdaEC2start</div> </div>	<div>Event bus ARN</div> <div> <div>arn:aws:events:eu-central-1:807013657668:event-bus/default</div> </div>	

Event schedule [Info](#)

Cron expression

0 9 ? \* \* \*

Next 10 trigger date(s)

UTC

Sun, 16 Oct 2022 09:00:00 UTC

Mon, 17 Oct 2022 09:00:00 UTC

Tue, 18 Oct 2022 09:00:00 UTC

Wed, 19 Oct 2022 09:00:00 UTC

Thu, 20 Oct 2022 09:00:00 UTC

Fri, 21 Oct 2022 09:00:00 UTC

Sat, 22 Oct 2022 09:00:00 UTC

Sun, 23 Oct 2022 09:00:00 UTC

- An EC2 instance with *Production* tag and type of *t2.medium* or bigger, must be:
  - Shut down daily at 24:00.
  - It should be started automatically at 8:00 on working days.
  - On a weekend it must not be started automatically.

For this task I did the same steps as the last task, only with different times and tags. I also had to choose a different instance size, one that was larger than I was used to

Instance summary for i-049d2d1f57d4b5c48 (Production) Info

Updated less than a minute ago

RefreshConnectInstance state ▼Actions ▼

Instance ID i-049d2d1f57d4b5c48 (Production)	Public IPv4 address 3.71.202.234   open address	Private IPv4 addresses 172.31.22.33
IPv6 address -	Instance state Running	Public IPv4 DNS ec2-3-71-202-234.eu-central-1.compute.amazonaws.com   open address
Hostname type IP name: ip-172-31-22-33.eu-central-1.compute.internal	Private IP DNS name (IPv4 only) ip-172-31-22-33.eu-central-1.compute.internal	Elastic IP addresses -
Answer private resource DNS name IPv4 (A)	Instance type t2.medium	AWS Compute Optimizer finding Opt-in to AWS Compute Optimizer for recommendations.   Learn more
Auto-assigned IP address 3.71.202.234 [Public IP]	VPC ID vpc-025b41945b783a001 (vpc)	Auto Scaling Group name -
IAM Role -	Subnet ID subnet-00f18cbdf712f9f8	

DetailsSecurityNetworkingStorageStatus checksMonitoringTags

Tags

Manage tags

Q

KeyValue

NameProduction

Productionprod

Code source Info

FileEditFindViewGoToolsWindowTestDeploy

Go to Anything (Ctrl-P)

Environment

lambda\_function

```
1 import boto3
2 region = 'eu-central-1'
3 instances = ['i-049d2d1f57d4b5c48']
4 ec2 = boto3.client('ec2', region_name=region)
5
6 def lambda_handler(event, context):
7     ec2.stop_instances(InstanceIds=instances)
8     print('stopped your instances: ' + str(instances))
```

Code source Info

FileEditFindViewGoToolsWindowTestDeploy

Go to Anything (Ctrl-P)




Environment

lambda\_function

```
1 import boto3
2 region = 'eu-central-1'
3 instances = ['i-049d2d1f57d4b5c48']
4 ec2 = boto3.client('ec2', region_name=region)
5
6 def lambda_handler(event, context):
7     ec2.start_instances(InstanceIds=instances)
8     print('started your instances: ' + str(instances))
```

# lambdaEC2stop

## Rule details [Info](#)

Rule name lambdaEC2stop	Status  Enabled	Event bus name default
Description Eventbridge uses lambda command to stop EC2 instances	Rule ARN  arn:aws:events:eu-central-1:807013657668:rule/lambdaEC2stop	Event bus ARN  arn:aws:events:eu-central-1:807013657668:event-bus/default

[Event schedule](#) | [Targets](#) | [Monitoring](#) | [Tags](#)

## Event schedule [Info](#)

Cron expression

0 00 ? \* \* \*




Next 10 trigger date(s)

UTC

Sun, 16 Oct 2022 00:00:00 UTC  
Mon, 17 Oct 2022 00:00:00 UTC  
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Sat, 22 Oct 2022 00:00:00 UTC  
Sun, 23 Oct 2022 00:00:00 UTC  
Mon, 24 Oct 2022 00:00:00 UTC  
Tue, 25 Oct 2022 00:00:00 UTC

# lambdaEC2start

## Rule details [Info](#)

Rule name lambdaEC2start	Status  Enabled	Event bus name default
Description Starts EC2 instances at 9am on weekdays	Rule ARN  arn:aws:events:eu-central-1:807013657668:rule/lambdaEC2start	Event bus ARN  arn:aws:events:eu-central-1:807013657668:event-bus/default

[Event schedule](#) | [Targets](#) | [Monitoring](#) | [Tags](#)

## Event schedule [Info](#)

Cron expression

0 8 ? \* MON-FRI \*

Next 10 trigger date(s)

UTC

Mon, 17 Oct 2022 08:00:00 UTC  
Tue, 18 Oct 2022 08:00:00 UTC  
Wed, 19 Oct 2022 08:00:00 UTC  
Thu, 20 Oct 2022 08:00:00 UTC  
Fri, 21 Oct 2022 08:00:00 UTC  
Mon, 24 Oct 2022 08:00:00 UTC  
Tue, 25 Oct 2022 08:00:00 UTC  
Wed, 26 Oct 2022 08:00:00 UTC  
Thu, 27 Oct 2022 08:00:00 UTC  
Fri, 28 Oct 2022 08:00:00 UTC



*Provide screenshots (evidence) for your solution. Always explain your evidence! As a prof, we expect at*

*least:*

- All the CRON expressions used in the solution
- Lambda function(s) code that implements the requirements