

Assignment 1: Automated Instance Management Using AWS Lambda and Boto3

Launch EC2 Instances

1. In the AWS Console, search for EC2 in the search bar and click EC2.

2. Click Launch instances.

Name: NikhilAutoStop

Tag:

Key: Action

Value: Auto-Stop

Name: NikhilAutoStart

Tag:

Key: Action

Value: Auto-Start

AMI : Ubuntu

Instance Type : t2.micro

Key pair (login):

Network settings:

Allow SSH (port 22) from My IP.

Allow HTTP (port 80)

Click Launch instance

The screenshot shows the AWS Management Console interface for launching an EC2 instance. The top navigation bar includes the AWS logo, a search bar, and a [Alt+S] shortcut. The breadcrumb trail indicates the path: EC2 > Instances > Launch an instance. The main heading is 'Launch an instance' with an 'Info' link. Below this, a descriptive paragraph states: 'Amazon EC2 allows you to create virtual machines, or instances, that run on the AWS Cloud. Quickly get started by following the simple steps below.' The 'Name and tags' section is expanded, showing a 'Name' label and a text input field containing 'NikhilAutoStop'. To the right of the input field is a red-bordered button labeled 'Add additional tags'.

aws

Search

[Alt+S]

Canada (Central)

Account ID: 9750-5002-4946

nikhilmathur1957@gmail.com

EC2

Instances

Launch an instance

Launch an instance

Info

Amazon EC2 allows you to create virtual machines, or instances, that run on the AWS Cloud. Quickly get started by following the simple steps below.

Name and tags

Info

Key

Info

Value

Info

Q Name

X

Q NikhilAutoStop

X

Resource types

Info

Select resource types

Remove

Instances

X

Key

Info

Value

Info

Q Action

X

Q Auto-Stop

X

Resource types

Info

Select resource types

Remove

Instances

X

Add new tag

You can add up to 48 more tags.

Summary

Number of instances

Info

1

Software Image (AMI)

Canonical, Ubuntu, 24.04, amd6...[read more](#)

ami-0c0a551d0459e9d39

Virtual server type (instance type)

t2.micro

Firewall (security group)

New security group

Storage (volumes)

1 volume(s) - 8 GiB

Cancel

Launch instance

[Preview code](#)

aws

Search

[Alt+S]

EC2

Instances

Launch an instance

Launch an instance

Info

Amazon EC2 allows you to create virtual machines, or instances, that run on the AWS Cloud. Quickly get started by following the steps below.

Name and tags

Info

Name

NikhilAutoStart

Add additional tags

Launch an instance [Info](#)

Amazon EC2 allows you to create virtual machines, or instances, that run on the AWS Cloud. Quickly get started by following the simple steps below.

▼ **Name and tags** [Info](#)

Key

Info

Value

Info

Resource types

Info

Select resource types

▼

Remove

Instances

X

Key

Info

Value

Info

Resource types

Info

Select resource types

▼

Remove

Instances

X

Add new tag

You can add up to 48 more tags.

Instances (2) Info

Last updated less than a minute ago

Connect

Instance state ▾

Actions ▾

Launch Instances ▾

All states ▾

nikhilauto ✕

Clear filters

< 1 >

⚙️

<input type="checkbox"/>	Name ✎ ▾	Instance ID	Instance state ▾	Instance type ▾	Status check	Alarm status	Availability
<input type="checkbox"/>	NikhilAutoStop	i-03fb7d87b3cfc797c	Running 🔍 🔍	t2.micro	🟢 2/2 checks passed	View alarms +	ca-central-1
<input type="checkbox"/>	NikhilAutoStart	i-0883fe058c0a89130	Running 🔍 🔍	t2.micro	🕒 Initializing	View alarms +	ca-central-1

Lambda Function Creation:

1. Create an IAM Role for Lambda

- AWS Console => IAM => Roles => Create role.
- Trusted Entity type: AWS Services
- Use Case: Lambda
- Click Next

The screenshot shows the 'Select trusted entity' step in the AWS IAM console. The left sidebar indicates the current step is 'Select trusted entity'. The main content area is titled 'Select trusted entity' and contains two sections: 'Trusted entity type' and 'Use case'.

Trusted entity type

- ☒ **AWS service**
Allow AWS services like EC2, Lambda, or others to perform actions in this account.
- ☐ **AWS account**
Allow entities in other AWS accounts belonging to you or a 3rd party to perform actions in this account.
- ☐ **Web identity**
Allows users federated by the specified external web identity provider to assume this role to perform actions in this account.
- ☐ **SAML 2.0 federation**
Allow users federated with SAML 2.0 from a corporate directory to perform actions in this account.
- ☐ **Custom trust policy**
Create a custom trust policy to enable others to perform actions in this account.

Use case
Allow an AWS service like EC2, Lambda, or others to perform actions in this account.

Service or use case
Lambda

Choose a use case for the specified service.

Use case

- ☒ **Lambda**
Allows Lambda functions to call AWS services on your behalf.

Permissions policies: AmazonEC2FullAccess

The screenshot shows the 'Add permissions' step in the AWS IAM console. The left sidebar indicates the current step is 'Add permissions'. The main content area is titled 'Add permissions' and contains a section for 'Permissions policies (1500)'.

Permissions policies (1500)
Choose one or more policies to attach to your new role.

Filter by Type: All types 1 match

Policy name	Type	Description
<input checked="" type="checkbox"/> AmazonEC2FullAccess	AWS managed	Provides full access to Amazon EC2 via th...

► Set permissions boundary - optional

Cancel Previous Next

Role name: NikhilLambdaEC2ControlRole
Click Create role.

The screenshot shows the 'Name, review, and create' step in the AWS IAM console. The 'Role name' field is highlighted with a red box and contains the text 'NikhilLambdaEC2ControlRole'. The 'Description' field contains the text 'Allows Lambda functions to call AWS services on your behalf.' Below the role details, the 'Step 1: Select trusted entities' section shows a 'Trust policy' with the following JSON code:

```
1- {
2-   "Version": "2012-10-17",
3-   "Statement": [
4-     {
5-       "Effect": "Allow",
6-       "Action": [
7-         "sts:AssumeRole"
8-       ],
9-       "Principal": {
10-        "Service": [
11-          "lambda.amazonaws.com"
12-        ]
13-      }
14-    }
15-  ]
16- }
```

The screenshot shows the 'Roles' page in the AWS IAM console. A green banner at the top indicates 'Role NikhilLambdaEC2ControlRole created.' Below this, the 'Roles (594)' list is displayed. The role 'NikhilLambdaEC2ControlRole' is highlighted with a red box. The table has columns for 'Role name', 'Trusted entities', and 'Last activity'.

Role name	Trusted entities	Last activity
NikhilLambdaEC2ControlRole	AWS Service: lambda	-

2. Create the Lambda Function

Go to AWS Console => Lambda.

Click Create function.

Select Author from scratch

Function name: **NikhilEC2TagBasedControl**

Runtime: Python 3.13.

Permissions:

Expand Change default execution role.

Select Use an existing role.

Choose **NikhilLambdaEC2ControlRole** from the dropdown.

Note => I choose the role **prashantb12-role-9p53470y** for permission access to run the code.

Click Create function.

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Lambda > Functions > Create function

Create function [info](#)

Choose one of the following options to create your function.

☒ Author from scratch
Start with a simple Hello World example.

☐ Use a blueprint
Build a Lambda application from sample code and configuration presets for common use cases.

☐ Container image
Select a container image to deploy for your function.

Basic information

Function name

Enter a name that describes the purpose of your function.

NikhilEC2TagBasedControl

Function name must be 1 to 64 characters, must be unique to the Region, and can't include spaces. Valid characters are a-z, A-Z, 0-9, hyphens (-), and underscores (_).

Runtime

[info](#)

Choose the language to use to write your function. Note that the console code editor supports only Node.js, Python, and Ruby.

Python 3.13

Architecture

[info](#)

Choose the instruction set architecture you want for your function code.

☐ arm64

☒ x86_64

Permissions

[info](#)

By default, Lambda will create an execution role with permissions to upload logs to Amazon CloudWatch Logs. You can customize this default role later when adding triggers.

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Lambda > Functions > Create function

x86_64

Permissions [info](#)

By default, Lambda will create an execution role with permissions to upload logs to Amazon CloudWatch Logs. You can customize this default role later when adding triggers.

▼ Change default execution role

Execution role

Choose a role that defines the permissions of your function. To create a custom role, go to the [IAM console](#).

☐ Create a new role with basic Lambda permissions

☒ Use an existing role

☐ Create a new role from AWS policy templates

Existing role

Choose an existing role that you've created to be used with this Lambda function. The role must have permission to upload logs to Amazon CloudWatch Logs.

NikhilLambdaEC2ControlRole

[View the NikhilLambdaEC2ControlRole role](#) on the IAM console.

► Additional configurations

Use additional configurations to set up code signing, function URL, tags, and Amazon VPC access for your function.

[Cancel](#) [Create function](#)

aws

Search

[Alt+S]

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Lambda > Functions > NikhilEC2TagBasedControl

Successfully created the function NikhilEC2TagBasedControl. You can now change its code and configuration. To invoke your function with a test event, choose "Test".

NikhilEC2TagBasedControl

[Throttle](#) [Copy ARN](#) [Actions](#)

▼ Function overview [info](#)

Diagram

Template

NikhilEC2TagBasedControl

Layers (0)

[+ Add trigger](#)

[+ Add destination](#)

Export to Infrastructure Composer

Download

Description

-

Last modified

3 seconds ago

Function ARN

arn:aws:lambda:ca-central-1:975050024946:function:NikhilEC2TagBasedControl

3. Add Python Code to Control EC2

- prints instance IDs with a given tag:
- Code to print instances with Auto-Stop (testing code)

```
Assignment1.py > ...
1
2
3 import boto3
4
5 def lambda_handler(event, context):
6     ec2 = boto3.client('ec2')
7
8     # Find instances with Action=Auto-Stop
9     response = ec2.describe_instances(
10         Filters=[
11             {'Name': 'tag:Action', 'Values': ['Auto-Stop']}
12         ]
13     )
14
15     print(response['Reservations'])
16
17     instances = []
18     for reservation in response['Reservations']:
19         for instance in reservation['Instances']:
20             instances.append(instance['InstanceId'])
21
22     print(f"Found instances with Auto-Stop tag: {instances}")
23     return {"instances": instances}
24
```

■ Full Code

```
Assignment1.py > lambda_handler
1 import boto3
2
3 def lambda_handler(event, context):
4     ec2 = boto3.client('ec2')
5
6     # --- Stop instances with Auto-Stop tag ---
7     stop_response = ec2.describe_instances(
8         Filters=[
9             {'Name': 'tag:Action', 'Values': ['Auto-Stop']},
10            {'Name': 'instance-state-name', 'Values': ['running']} # Only running ones
11        ]
12    )
13
14    stop_ids = []
15    for reservation in stop_response['Reservations']:
16        for instance in reservation['Instances']:
17            stop_ids.append(instance['InstanceId'])
18
19    if stop_ids:
20        ec2.stop_instances(InstanceIds=stop_ids)
21        print(f"Stopping instances: {stop_ids}")
22    else:
23        print("No running instances with Auto-Stop tag found.")
24
25    # --- Start instances with Auto-Start tag ---
26    start_response = ec2.describe_instances(
27        Filters=[
28            {'Name': 'tag:Action', 'Values': ['Auto-Start']},
29            {'Name': 'instance-state-name', 'Values': ['stopped']} # Only stopped ones
30        ]
31    )
32
```

```
Assignment1.py > lambda_handler

30     ]
31 )
32
33 start_ids = []
34 for reservation in start_response['Reservations']:
35     for instance in reservation['Instances']:
36         start_ids.append(instance['InstanceId'])
37
38 if start_ids:
39     ec2.start_instances(InstanceIds=start_ids)
40     print(f"Starting instances: {start_ids}")
41 else:
42     print("No stopped instances with Auto-Start tag found.")
43
44 return {
45     "StoppedInstances": stop_ids,
46     "StartedInstances": start_ids
47 }
48
```

Create the test case

Menu: Lambda > Functions > NikhilEC2TagBasedControl

Code | **Test** | Monitor | Configuration | Aliases | Versions

Executing function: succeeded (logs)

Details

Test event info

To invoke your function without saving an event, modify the event, then choose Test. Lambda uses the modified event to invoke your function, but does not overwrite the original event until you choose Save.

Test event action

☐ Create new event ☒ Edit saved event

Event name

NikhilMathurTestEvent

Event JSON

Format JSON

Click for deploy the code

Menu: Lambda > Functions > NikhilEC2TagBasedControl

EXPLORER

- NIKHILEC2TAGBASEDCONTROL
 - lambda_function.py

DEPLOY (UNDEPLOYED CHANGES)

Δ You have undeployed changes.

Deploy (Ctrl+Shift+U)

Test (Ctrl+Shift+I)

TEST EVENTS [SELECTED: NIKHILMATHURTESTEVENT]

- Create new test event
- Private saved events
 - NikhilMathurTestEvent

ENVIRONMENT VARIABLES

lambda_function.py

```
def lambda_handler(event, context):
    stop_ids = []
    for reservation in stop_response['Reservations']:
        for instance in reservation['Instances']:
            stop_ids.append(instance['InstanceId'])

    if stop_ids:
        ec2.stop_instances(InstanceIds=stop_ids)
        print(f"Stopping instances: {stop_ids}")
    else:
        print("No running instances with Auto-Stop tag found.")

    # --- Start instances with Auto-Start tag ---
    start_response = ec2.describe_instances(
        Filters=[
            {'Name': 'tag:Action', 'Values': ['Auto-Start']},
            {'Name': 'Instance-state-name', 'Values': ['stopped']} # Only stopped ones
        ]
    )

    start_ids = []
    for reservation in start_response['Reservations']:
```

PROBLEMS OUTPUT CODE REFERENCE LOGS TERMINAL

Request ID: 07ad97b2-b68a-4e64-b440-6fef72281b3a

Deploying code

Click on test for Output

Successfully updated the function NikhilEC2TagBasedControl.

DEPLOY

Deploy (Ctrl+Shift+U)

Test (Ctrl+Shift+I)

TEST EVENTS [SELECTED: NIKHILMATHURTESTEVEN...]

Create new test event

Private saved events

NikhilMathurTestEvent

ENVIRONMENT VARIABLES

45

PROBLEMS

OUTPUT

CODE REFERENCE LOG

TERMINAL

Execution Res

Response:

```
{
  "StoppedInstances": [],
  "StartedInstances": [
    "i-0737a00de076a0662",
    "i-0dd7161ab60933034",
    "i-094c8593c8a4e8ea5",
    "i-06146594887d6f02",
    "i-03fb7d87b3cfc797c",
    "i-0f57563aaf0fda17c",
    "i-03e903f6748810bb9",
    "i-033722e1f5f006ae3",
    "i-0f38a58ec7341c52e",
    "i-039ca85a1cac6c5ba"
  ]
}
```

Ln 28, Col 57 Spaces: 4 UTF-8 LF P

Verification

Instances (2) Info

Last updated less than a minute ago

Connect

Instance state

Actions

Launch instances

Find Instance by attribute or tag (case-sensitive)

All states

NikhilAuto

Clear filters

< 1 >

	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IP
<input type="checkbox"/>	NikhilAutoStop	i-03fb7d87b3cfc797c	Stopped	t2.micro	-	View alarms +	ca-central-1b	-
<input type="checkbox"/>	NikhilAutoStart	i-0883fe058c0a89130	Running	t2.micro	2/2 checks passed	View alarms +	ca-central-1b	ec2-16-5