St. Francis Institute of Technology, Mumbai-400 103
Department of Information Technology

A.Y. 2023-2024
Class: TE-ITA/B, Semester: V

Subject: **Advanced DevOps Lab**

Experiment – 2: AWS Cloud9 IDE.

1. **Aim:** To understand the benefits of Cloud Infrastructure and Setup AWS Cloud9 IDE, Launch AWS Cloud9 IDE, write and run simple python program in IDE.
2. **Objectives:** After study of this experiment, the student will be able to
   - Understand basics of cloud9 IDE
   - Difference between desktop IDE and Web IDE
   - Steps to set up cloud9 IDE and acquiring EC2 instance also cloudFormation stack.
   - How to write program in different languages, edit program, and run program.
   - To execute commands on terminal window.
3. **Lab objective mapped : ITL504.2:** To understand the fundamentals of Cloud Computing and be fully proficient with Cloud based DevOps solution deployment options to meet your business requirements
4. **Prerequisite:** Fundamentals of IDE framework, working with desktop IDE
5. **Requirements:** Computer, Windows operating system, Internet Connection, web browser, AWS cloud account..
6. **Pre-Experiment Exercise:**

Brief Theory:

AWS Cloud9 is a cloud-based integrated development environment (IDE) that lets you write, run, and debug your code with just a browser. It includes a code editor, debugger, and terminal. Cloud9 comes prepackaged with essential tools for popular programming languages, including JavaScript, Python, PHP, and more, so you don't need to install files or configure your development machine to start new projects. Since your Cloud9 IDE is cloud-based, you can work on your projects from your office, home, or anywhere using an internet-connected machine. Cloud9 also provides a seamless experience for developing serverless applications enabling you to easily define resources, debug, and switch between local and remote execution of serverless applications. With Cloud9, you can quickly share your development environment with your team, enabling you to pair program and track each other's inputs in real time.

CODE WITH JUST A BROWSER

AWS Cloud9 gives you the flexibility to run your development environment on a managed Amazon EC2 instance or any existing Linux server that supports SSH. This means that you can write, run, and debug applications with just a browser, without needing to install or maintain a local IDE. The Cloud9 code editor and integrated debugger include helpful, time-saving features such as code hinting code completion, and step-through debugging. The Cloud9 terminal provides a browser- based shell experience enabling you to install additional software, do a git push, or enter commands.

CODE TOGETHER IN REAL TIME

AWS Cloud9 makes collaborating on code easy. You can share your development environment with your team in just a few clicks and pair program together. While collaborating, your team members can see each other type in real time, and instantly chat with one another from within the IDE.

BUILD SERVERLESS APPLICATIONS WITH EASE

AWS Cloud9 makes it easy to write, run, and debug serverless applications. It preconfigures the development environment with all the SDKs, libraries, and plug-ins needed for serverless development. Cloud9 also provides an environment for locally testing and debugging AWS Lambda functions. This allows you to iterate on your code directly, saving you time and improving the quality of your code.

DIRECT TERMINAL ACCESS TO AWS

AWS Cloud9 comes with a terminal that includes sudo privileges to the managed Amazon EC2 instance that is hosting your development environment and a pre-authenticated AWS Command Line Interface. This makes it easy for you to quickly run commands and directly access AWS services

START NEW PROJECTS QUICKLY

AWS Cloud9 makes it easy for you to start new projects. Cloud9's development environment comes prepackaged with tooling for over 40 programming languages, including Node.js, JavaScript, Python, PHP, Ruby, Go, and C++. This enables you to start writing code for popular application stacks within minutes by eliminating the need to install or configure files, SDKs, and plug-ins for your development machine. Because Cloud9 is cloud-based, you can easily maintain multiple development environments to isolate your project's resources.

Pricing example (monthly estimates for AWS Cloud9 EC2 environments)

If you use the default settings running an IDE for 4 hours per day for 20 days in a month with a 30-minute auto-hibernation setting your monthly charges for 90 hours of usage would be:

Type of charge	Amount	Comments
Compute fees*	$1.05	t2.micro Linux instance at $0.0116/hour x 90 total hours used per month = $1.05
Storage fees	$1.00	$0.10 per GB-month of provisioned storage x 10-GB storage volume = $1.00
Total monthly fees	$2.05	

7. **Laboratory Exercise** (attach Screen Shot for each step given below)
1. Login to AWS account.
2. Check EC2 and cloudFormation dashboard. Make sure no instances and stack running for your account.
3. Navigate to Cloud 9 IDE service from Developer tools section
4. Click on Create Environment
5. Provide name for the Environment (WebAppIDE) and click on next.
6. Keep all the Default settings as it is
7. Review the Environment name and Settings and click on Create Environment
8. Go to EC2 dashboard to ensure new instance running.
9. Go to CloudFormation to ensure new stack created. check resources and templates tabs.
10. Launch IDE
11. run some commands on terminal.
12. write simple python program in an IDE
13. save changes to py file , run the code and check the result in terminal.
14. Click on settings option. Change some of the settings.

8. **Post-Experiments Exercise**
   - **A. Extended Theory:**
     a. Check current git version supported by IDE(attach SS here)
     b. Give command to create empty python file using IDE terminal(attach SS here)
   - **B. Questions:**

1. What is the need of IDE? (Write in Hand)
2. Which programming languages are supported by cloud9? (Soft copy)
   https://docs.aws.amazon.com/cloud9/latest/user-guide/language-support.html
3. Compare Desktop IDE (Offline IDE) with AWS Cloud9 online IDE? (Write in Hand)

C. Conclusion:(Write in Hand)

1. Write what was performed in the experiment
2. Mention few applications of what was studied.
3. Write the significance of the studied topic

D. References:

1. https://docs.aws.amazon.com/cloud9/latest/user-guide/aws-cloud9-ug.pdf
2. https://aws.amazon.com/cloud9/faqs/
3. https://cloudacademy.com/course/working-aws-cloud9/working-aws-cloud9/

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8. Post-Experiments Exercise

A. Extended Theory:

a. Check current git version supported by IDE(attach SS here)

```
ec2-user:~/environment $ aws --version
aws-cli/1.19.112 Python/2.7.18 Linux/4.14.320-242.534.amzn2.x86_64 botocore/1.20.112
ec2-user:~/environment $ git --version
git version 2.40.1
ec2-user:~/environment $ java -version
openjdk version "11.0.20" 2023-07-18 LTS
OpenJDK Runtime Environment Corretto-11.0.20.8.1 (build 11.0.20+8-LTS)
OpenJDK 64-Bit Server VM Corretto-11.0.20.8.1 (build 11.0.20+8-LTS, mixed mode)
ec2-user:~/environment $ python --version
Python 3.7.16
ec2-user:~/environment $ pwd
/home/ec2-user/environment
ec2-user:~/environment $ ls
README.md
ec2-user:~/environment $
```

b. Give command to create empty python file using IDE terminal(attach SS here)

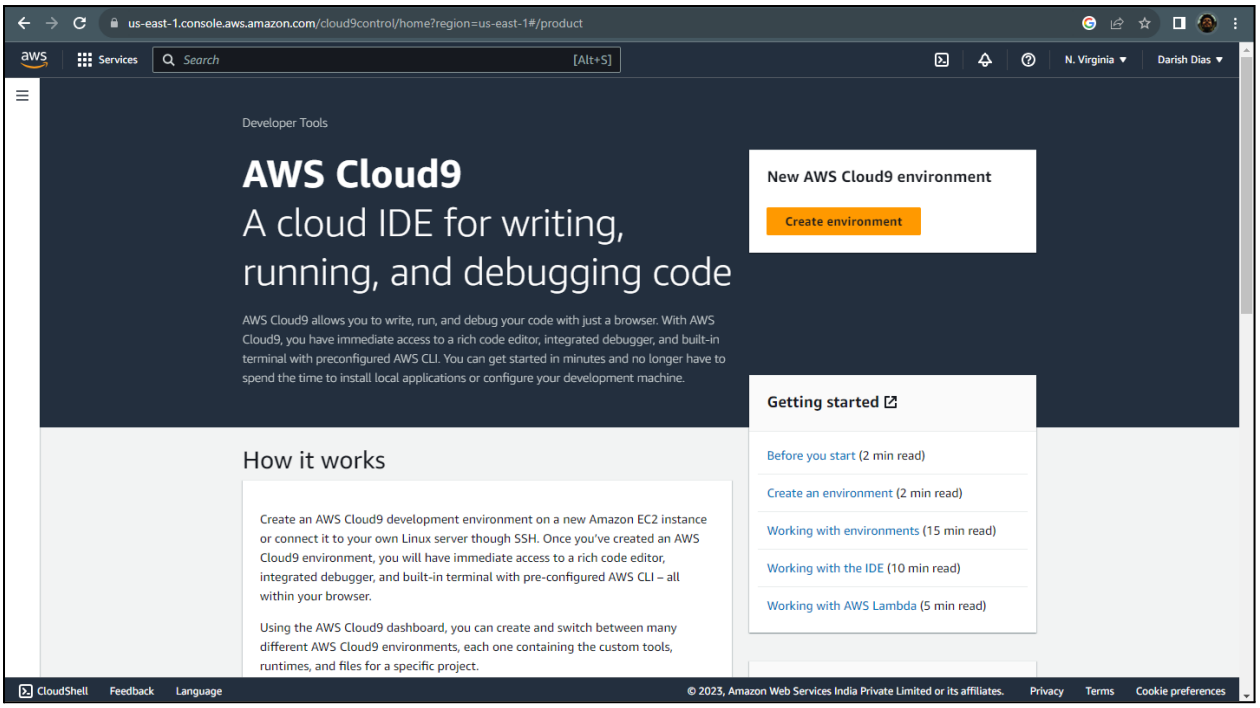
```
$ touch darish.py
```

B. Questions:

2. Which programming languages are supported by cloud9? (Soft copy)

AWS Cloud9 supports over 40 programming languages, including:

1. JavaScript
2. Python
3. Ruby
4. Java
5. PHP
6. C++
7. C#
8. Go
9. D
10. TypeScript
11. HTML
12. CSS
13. Swift
14. Kotlin
15. Rust
16. Scala
17. Perl
18. Shell scripting (Bash)
19. R
20. Haskell
21. Matlab
22. Erlang


us-east-1.console.aws.amazon.com/cloud9control/home?region=us-east-1#/product
Services
Search
[Alt+S]
N. Virginia
Darish Dias
Developer Tools
AWS Cloud9
A cloud IDE for writing, running, and debugging code
AWS Cloud9 allows you to write, run, and debug your code with just a browser. With AWS Cloud9, you have immediate access to a rich code editor, integrated debugger, and built-in terminal with preconfigured AWS CLI. You can get started in minutes and no longer have to spend the time to install local applications or configure your development machine.
New AWS Cloud9 environment
Create environment
Getting started
Before you start (2 min read)
Create an environment (2 min read)
Working with environments (15 min read)
Working with the IDE (10 min read)
Working with AWS Lambda (5 min read)
How it works
Create an AWS Cloud9 development environment on a new Amazon EC2 instance or connect it to your own Linux server though SSH. Once you've created an AWS Cloud9 environment, you will have immediate access to a rich code editor, integrated debugger, and built-in terminal with pre-configured AWS CLI – all within your browser.
Using the AWS Cloud9 dashboard, you can create and switch between many different AWS Cloud9 environments, each one containing the custom tools, runtimes, and files for a specific project.
CloudShell
Feedback
Language
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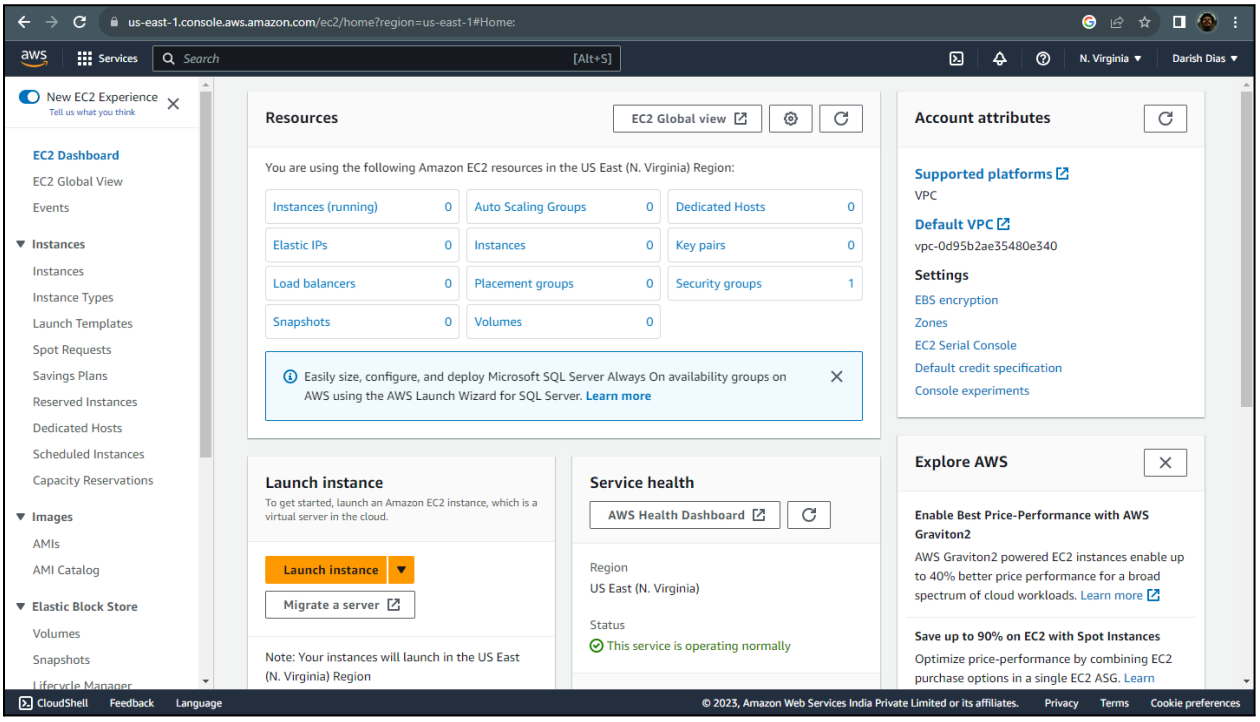
us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#Home:
Services
Search
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N. Virginia
Darish Dias
New EC2 Experience
Tell us what you think
EC2 Dashboard
EC2 Global View
Events
Instances
Instances
Instance Types
Launch Templates
Spot Requests
Savings Plans
Reserved Instances
Dedicated Hosts
Scheduled Instances
Capacity Reservations
Images
AMIs
AMI Catalog
Elastic Block Store
Volumes
Snapshots
Lifecycle Manager
Resources
EC2 Global view
You are using the following Amazon EC2 resources in the US East (N. Virginia) Region:
Instances (running) 0
Auto Scaling Groups 0
Dedicated Hosts 0
Elastic IPs 0
Instances 0
Key pairs 0
Load balancers 0
Placement groups 0
Security groups 1
Snapshots 0
Volumes 0
Easily size, configure, and deploy Microsoft SQL Server Always On availability groups on AWS using the AWS Launch Wizard for SQL Server. Learn more
Account attributes
Supported platforms
VPC
Default VPC
vpc-0d95b2ae35480e340
Settings
EBS encryption
Zones
EC2 Serial Console
Default credit specification
Console experiments
Launch instance
To get started, launch an Amazon EC2 instance, which is a virtual server in the cloud.
Launch instance
Migrate a server
Note: Your instances will launch in the US East (N. Virginia) Region
Service health
AWS Health Dashboard
Region
US East (N. Virginia)
Status
This service is operating normally
Explore AWS
Enable Best Price-Performance with AWS Graviton2
AWS Graviton2 powered EC2 instances enable up to 40% better price performance for a broad spectrum of cloud workloads. Learn more
Save up to 90% on EC2 with Spot Instances
Optimize price-performance by combining EC2 purchase options in a single EC2 ASG. Learn
CloudShell
Feedback
Language
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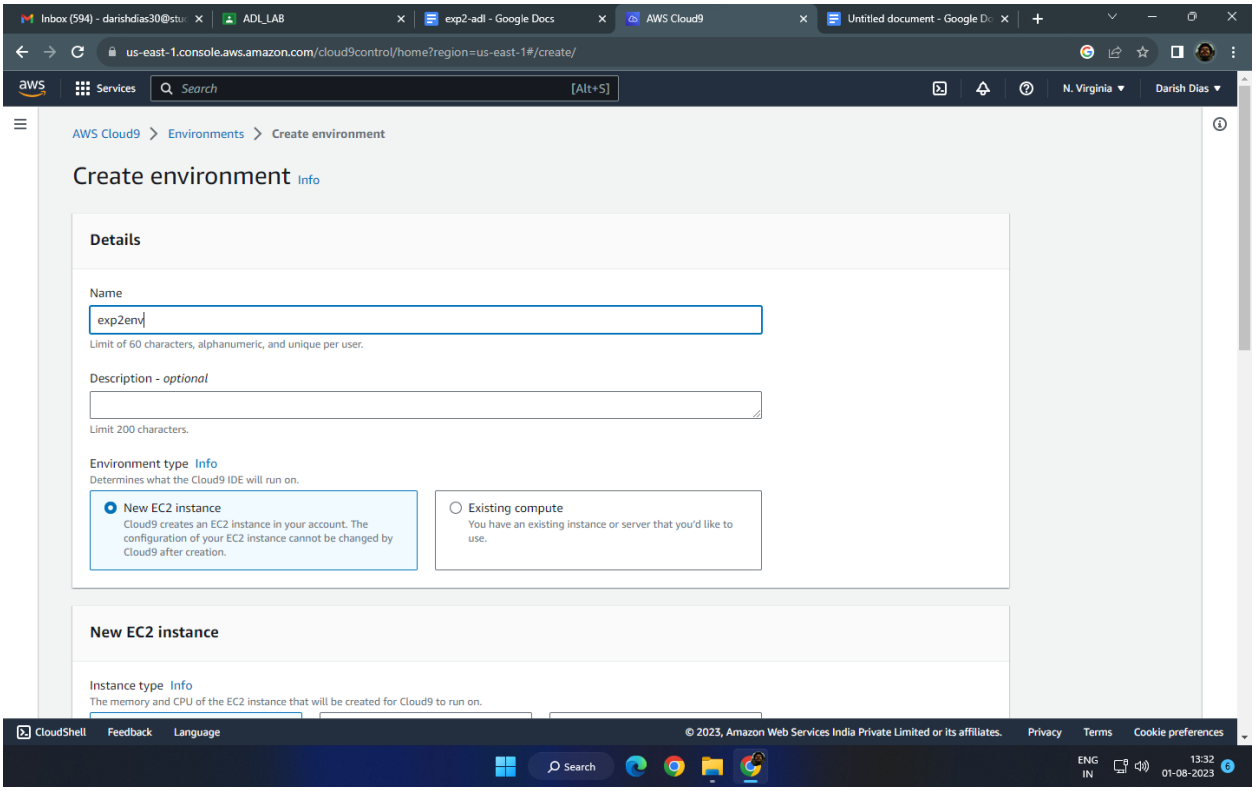
Inbox (594) - darishdias30@stu
ADL_LAB
exp2-adl - Google Docs
AWS Cloud9
Untitled document - Google Do
us-east-1.console.aws.amazon.com/cloud9control/home?region=us-east-1#/create/
Services
Search
[Alt+S]
N. Virginia
Darish Dias
AWS Cloud9 > Environments > Create environment
Create environment Info
Details
Name
exp2env
Limit of 60 characters, alphanumeric, and unique per user.
Description - optional
Limit 200 characters.
Environment type Info
Determines what the Cloud9 IDE will run on.
New EC2 instance
Cloud9 creates an EC2 instance in your account. The configuration of your EC2 instance cannot be changed by Cloud9 after creation.
Existing compute
You have an existing instance or server that you'd like to use.
New EC2 instance
Instance type Info
The memory and CPU of the EC2 instance that will be created for Cloud9 to run on.
CloudShell
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Language
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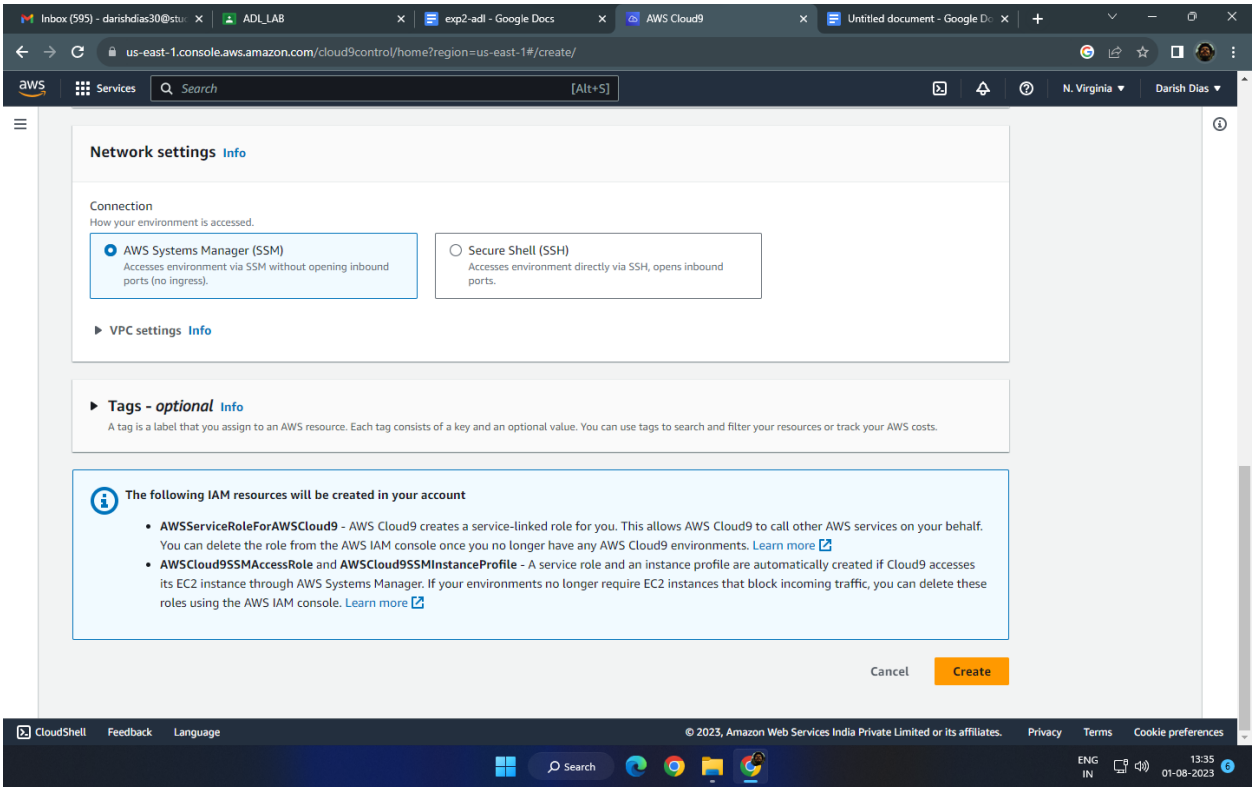
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us-east-1.console.aws.amazon.com/cloud9control/home?region=us-east-1#/create/
Services
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Network settings Info
Connection
How your environment is accessed.
AWS Systems Manager (SSM)
Accesses environment via SSM without opening inbound ports (no ingress).
Secure Shell (SSH)
Accesses environment directly via SSH, opens inbound ports.
VPC settings Info
Tags - optional Info
A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.
The following IAM resources will be created in your account
AWSServiceRoleForAWSCloud9 - AWS Cloud9 creates a service-linked role for you. This allows AWS Cloud9 to call other AWS services on your behalf. You can delete the role from the AWS IAM console once you no longer have any AWS Cloud9 environments. Learn more
AWSCloud9SSMAccessRole and AWSCloud9SSMInstanceProfile - A service role and an instance profile are automatically created if Cloud9 accesses its EC2 instance through AWS Systems Manager. If your environments no longer require EC2 instances that block incoming traffic, you can delete these roles using the AWS IAM console. Learn more
Cancel
Create
CloudShell
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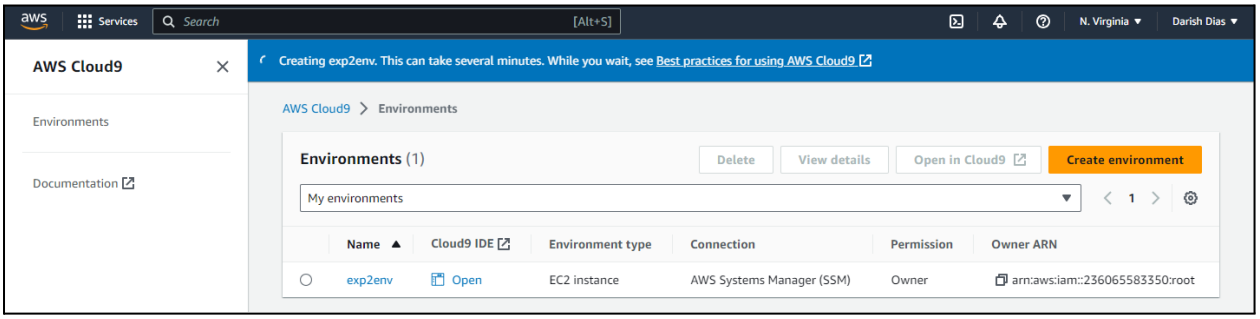
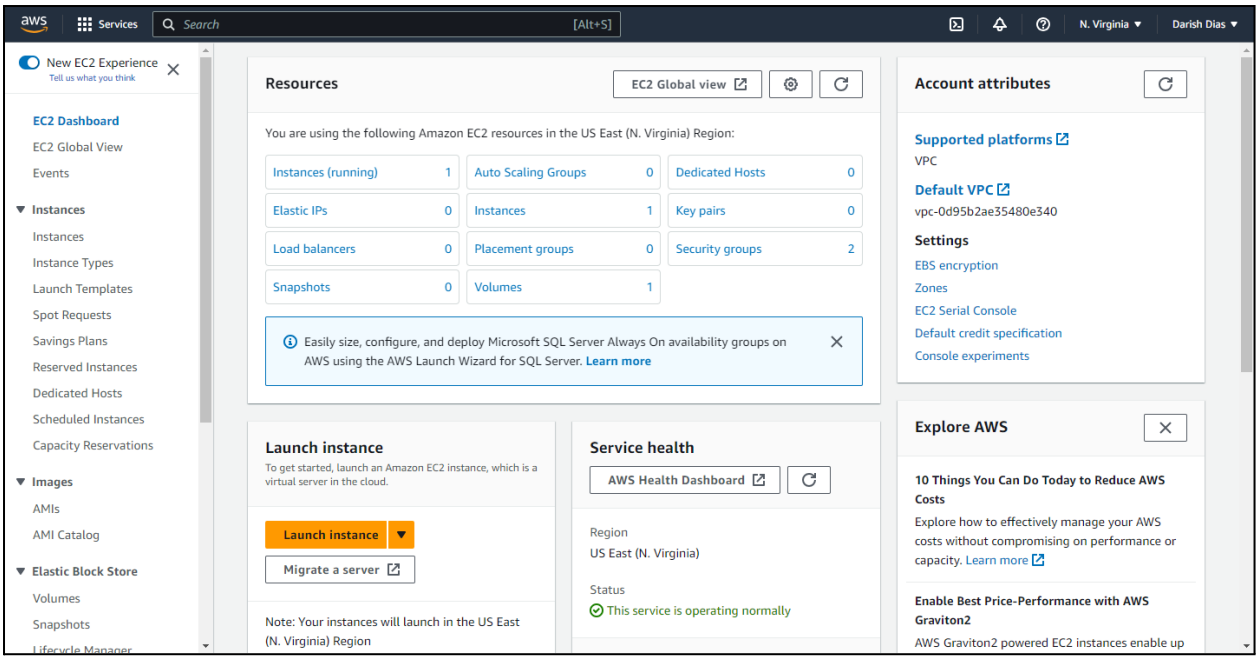
01-08-2023


Services
Search
[Alt+S]
N. Virginia
Darish Dias
AWS Cloud9
Environments
Documentation
Creating exp2env. This can take several minutes. While you wait, see Best practices for using AWS Cloud9
AWS Cloud9 > Environments
Environments (1)
Delete
View details
Open in Cloud9
Create environment
My environments
Name
Cloud9 IDE
Environment type
Connection
Permission
Owner ARN
exp2env
Open
EC2 instance
AWS Systems Manager (SSM)
Owner
arn:aws:iam::236065583350:root


aws
Services
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Placement groups 0
Security groups 2
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Volumes 1
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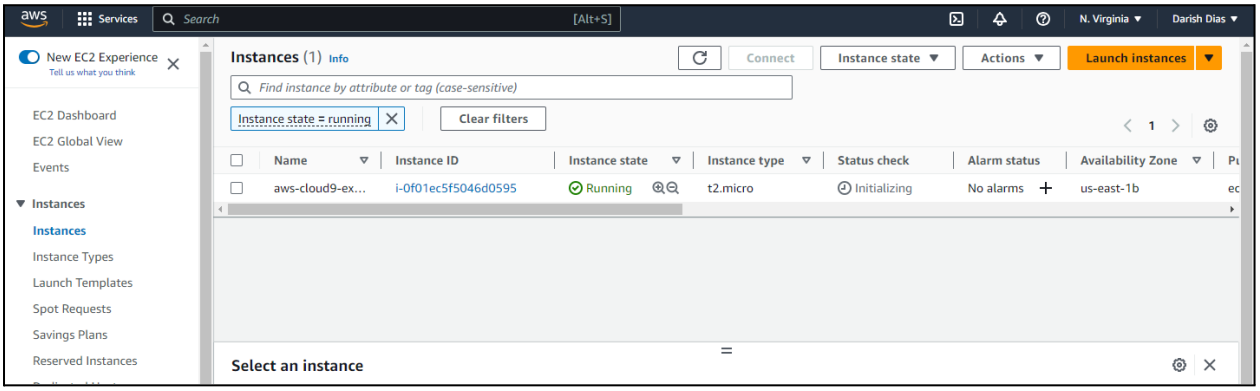
AWS Health Dashboard
Region
US East (N. Virginia)
Status
This service is operating normally
Account attributes
Supported platforms
VPC
Default VPC
vpc-0d95b2ae35480e340
Settings
EBS encryption
Zones
EC2 Serial Console
Default credit specification
Console experiments
Explore AWS
10 Things You Can Do Today to Reduce AWS Costs
Explore how to effectively manage your AWS costs without compromising on performance or capacity. Learn more
Enable Best Price-Performance with AWS Graviton2
AWS Graviton2 powered EC2 instances enable up


aws
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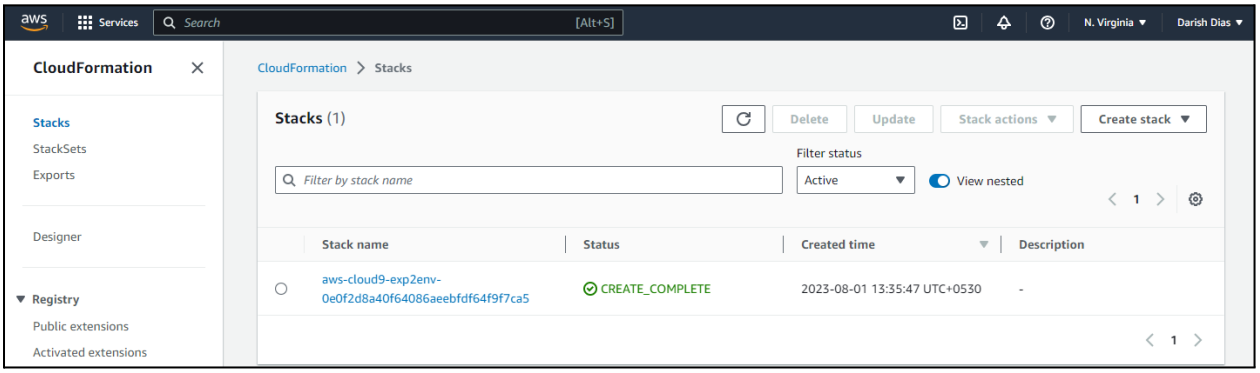
N. Virginia
Darish Dias
New EC2 Experience
Tell us what you think
EC2 Dashboard
EC2 Global View
Events
Instances
Instances
Instance Types
Launch Templates
Spot Requests
Savings Plans
Reserved Instances
Instances (1) Info
Connect
Instance state
Actions
Launch instances
Find instance by attribute or tag (case-sensitive)
Instance state = running
Clear filters
Name
Instance ID
Instance state
Instance type
Status check
Alarm status
Availability Zone
aws-cloud9-ex...
i-0f01ec5f5046d0595
Running
t2.micro
Initializing
No alarms
us-east-1b
Select an instance


aws
Services
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N. Virginia
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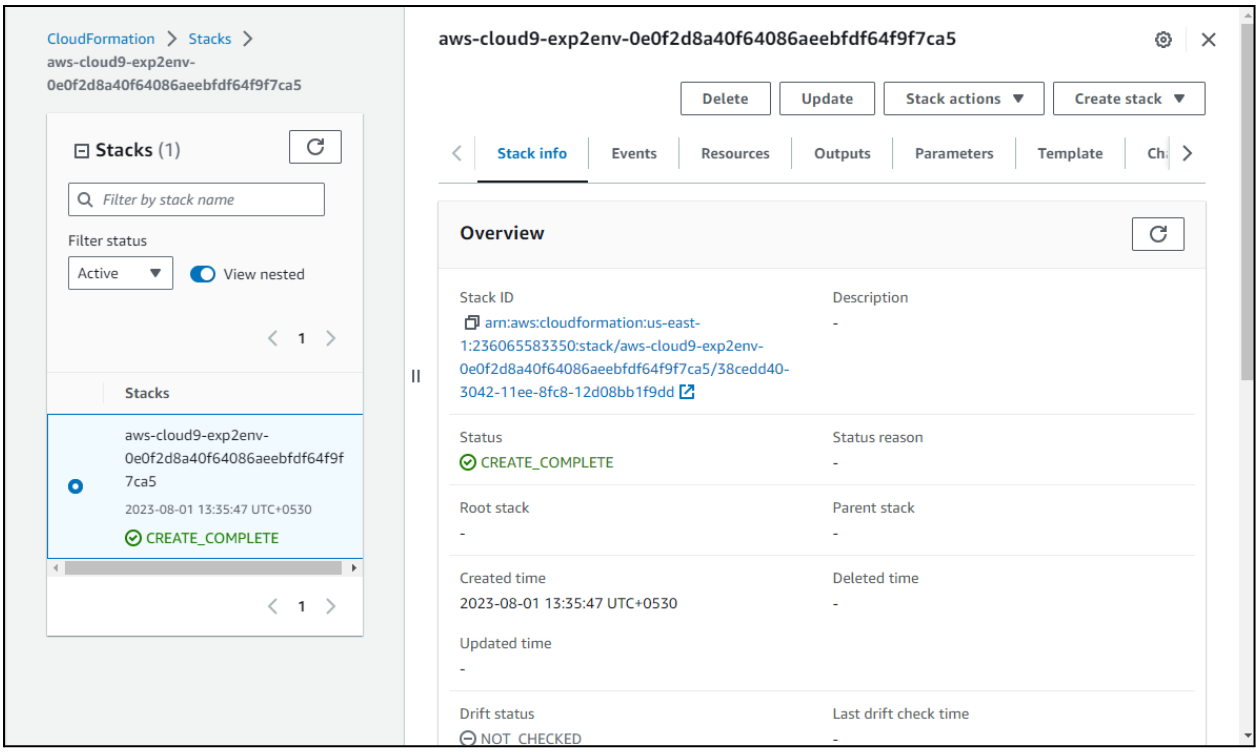
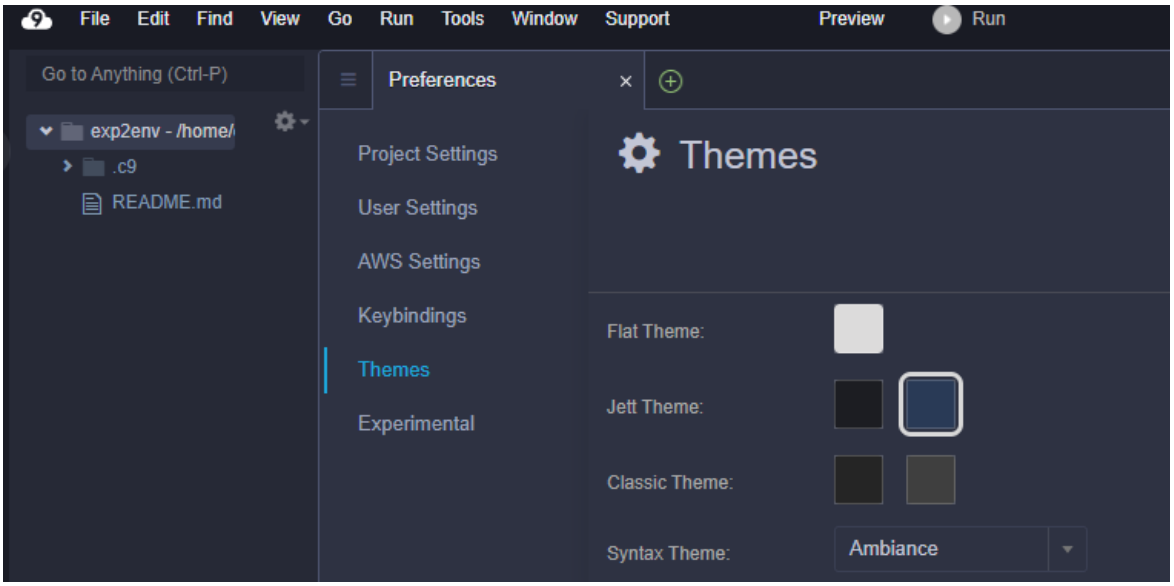
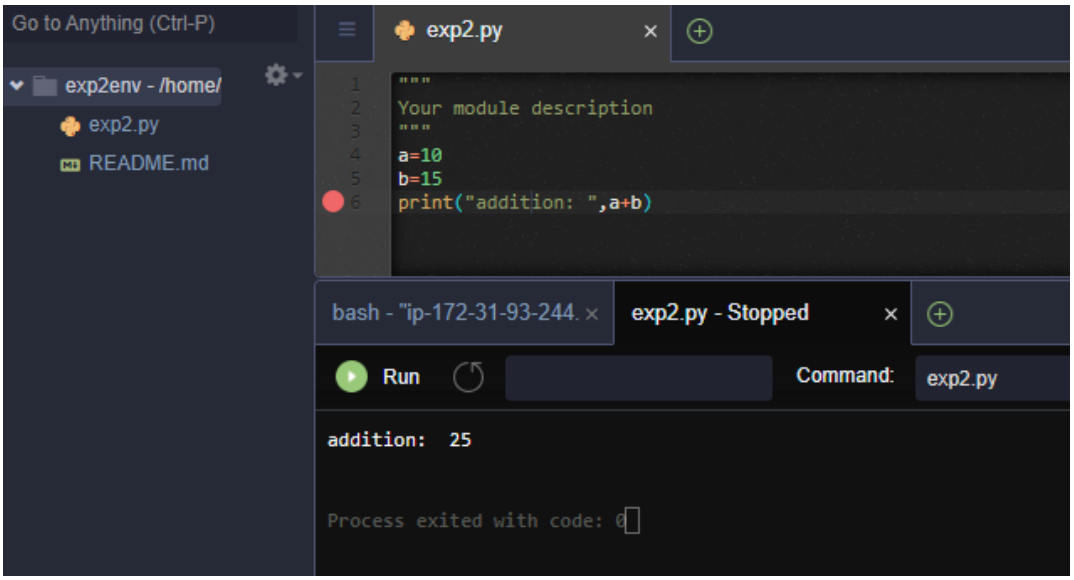
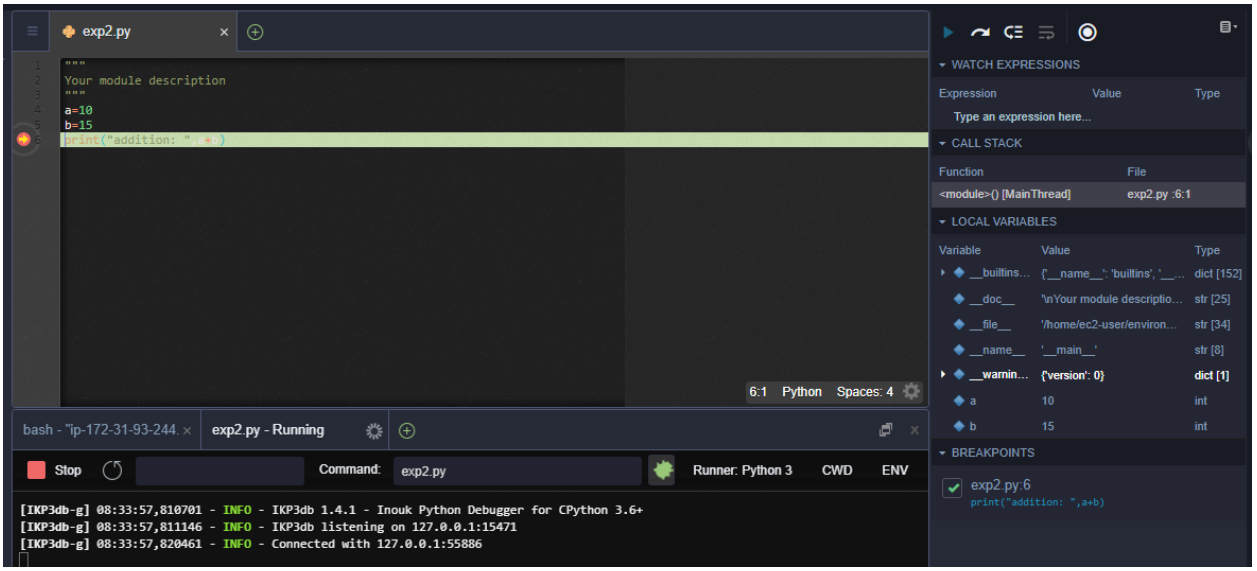
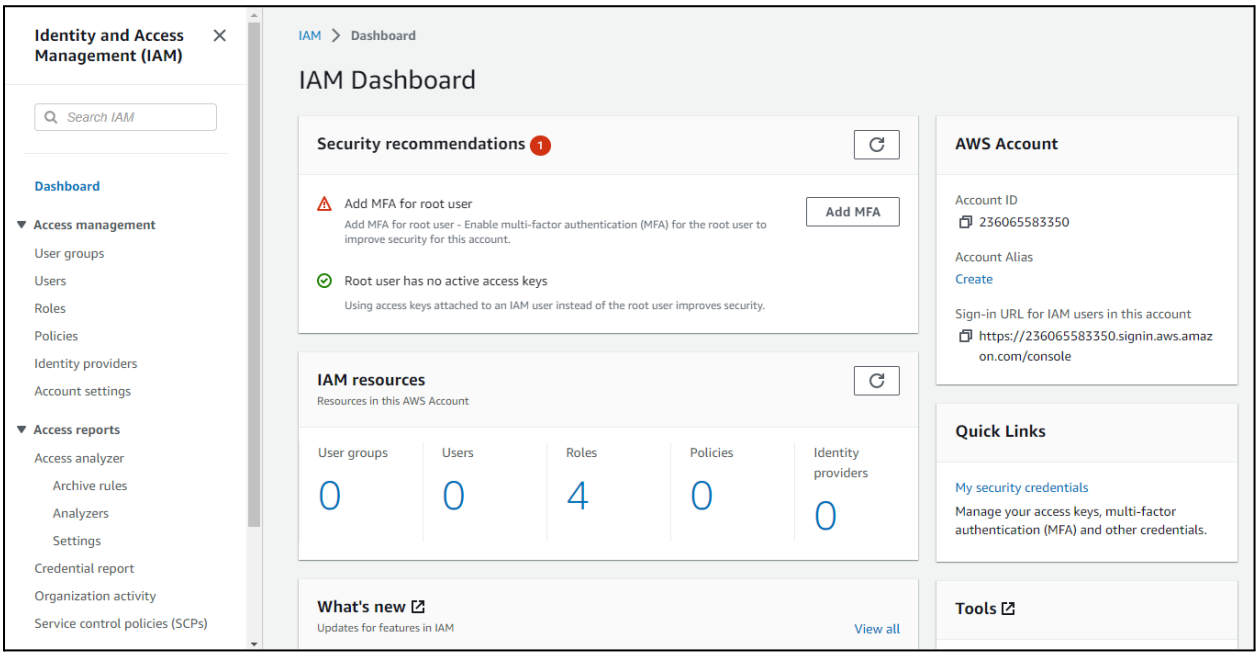
CloudFormation
Stacks
StackSets
Exports
Designer
Registry
Public extensions
Activated extensions
CloudFormation > Stacks
Stacks (1)
Delete
Update
Stack actions
Create stack
Filter by stack name
Filter status
Active
View nested
Stack name
Status
Created time
Description
aws-cloud9-exp2env-0e0f2d8a40f64086aeebfdf64f9f7ca5
CREATE_COMPLETE
2023-08-01 13:35:47 UTC+0530

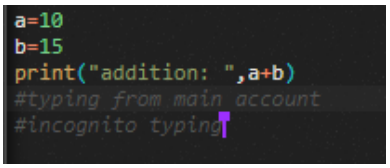

CloudFormation > Stacks > aws-cloud9-exp2env-0e0f2d8a40f64086aeebfdf64f9f7ca5
Stacks (1)
Filter by stack name
Filter status
Active
View nested
Stacks
aws-cloud9-exp2env-0e0f2d8a40f64086aeebfdf64f9f7ca5
2023-08-01 13:35:47 UTC+0530
CREATE_COMPLETE
aws-cloud9-exp2env-0e0f2d8a40f64086aeebfdf64f9f7ca5
Delete
Update
Stack actions
Create stack
Stack info
Events
Resources
Outputs
Parameters
Template
Overview
Stack ID
arn:aws:cloudformation:us-east-1:236065583350:stack/aws-cloud9-exp2env-0e0f2d8a40f64086aeebfdf64f9f7ca5/38cedd40-3042-11ee-8fc8-12d08bb1f9dd
Description
Status
CREATE_COMPLETE
Status reason
Root stack
Parent stack
Created time
2023-08-01 13:35:47 UTC+0530
Deleted time
Updated time
Drift status
NOT_CHECKED
Last drift check time


File Edit Find View Go Run Tools Window Support Preview Run
Go to Anything (Ctrl-P)
exp2env - /home/
.c9
README.md
Preferences
Project Settings
User Settings
AWS Settings
Keybindings
Themes
Experimental
Themes
Flat Theme:
Jett Theme:
Classic Theme:
Syntax Theme:
Ambiance


Go to Anything (Ctrl-P)
exp2env - /home/
exp2.py
README.md
exp2.py
"""
Your module description
"""
a=10
b=15
print("addition: ",a+b)
bash - "ip-172-31-93-244.
exp2.py - Stopped
Run
Command:
exp2.py
addition: 25
Process exited with code: 0


exp2.py
"""
Your module description
"""
a=10
b=15
print("addition: ",a+b)
WATCH EXPRESSIONS
Expression
Value
Type
Type an expression here...
CALL STACK
Function
File
<module>() [MainThread]
exp2.py :6:1
LOCAL VARIABLES
Variable
Value
Type
__builtins...
__doc__
__file__
__name__
__warnin...
a
b
BREAKPOINTS
exp2.py:6
print("addition: ",a+b)
6:1 Python Spaces: 4
bash - "ip-172-31-93-244.
exp2.py - Running
Stop
Command: exp2.py
Runner: Python 3
CWD
ENV
[IKP3db-g] 08:33:57,810701 - INFO - IKP3db 1.4.1 - Inouk Python Debugger for CPython 3.6+
[IKP3db-g] 08:33:57,811146 - INFO - IKP3db listening on 127.0.0.1:15471
[IKP3db-g] 08:33:57,820461 - INFO - Connected with 127.0.0.1:55886


Identity and Access Management (IAM)
Search IAM
Dashboard
Access management
User groups
Users
Roles
Policies
Identity providers
Account settings
Access reports
Access analyzer
Archive rules
Analyzers
Settings
Credential report
Organization activity
Service control policies (SCPs)
IAM > Dashboard
IAM Dashboard
Security recommendations 1
Add MFA for root user
Add MFA for root user - Enable multi-factor authentication (MFA) for the root user to improve security for this account.
Add MFA
Root user has no active access keys
Using access keys attached to an IAM user instead of the root user improves security.
IAM resources
Resources in this AWS Account
User groups
0
Users
0
Roles
4
Policies
0
Identity providers
0
What's new
Updates for features in IAM
View all
AWS Account
Account ID
236065583350
Account Alias
Create
Sign-in URL for IAM users in this account
https://236065583350.signin.aws.amazon.com/console
Quick Links
My security credentials
Manage your access keys, multi-factor authentication (MFA) and other credentials.
Tools


a=10
b=15
print("addition: ",a+b)
#typing from main account
#incognito typing