

Experiment 1

AIM: To understand the benefits of Cloud Infrastructure and Setup AWS Cloud9 IDE, Launch AWS Cloud9 IDE and Perform Collaboration Demonstration.

Cloud 9:

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. AWS 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 AWS Cloud9 IDE is cloud-based, you can work on your projects from your office, home, or anywhere using an internet-connected machine. AWS Cloud9 also provides a seamless experience for developing serverless applications, allowing you to easily define resources, debug, and switch between local and remote execution of serverless applications. With AWS 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.

S3 bucket:

Amazon Simple Storage Service (Amazon S3) is an object storage service offering industry-leading scalability, data availability, security, and performance. Millions of customers of all sizes and industries store, manage, analyze, and protect any amount of data for virtually any use case, such as data lakes, cloud-native applications, and mobile apps. With cost-effective storage classes and easy-to-use management features, you can optimize costs, organize and analyze data, and configure fine-tuned access controls to meet specific business and compliance requirements.

Ec2 instance:

Amazon Elastic Compute Cloud (Amazon EC2) offers the broadest and deepest compute platform, with over 750 instances and choice of the latest processor, storage, networking, operating system, and purchase model to help you best match the needs of your workload. We are the first major cloud provider that supports Intel, AMD, and Arm processors, the only cloud with on-demand EC2 Mac instances, and the only cloud with 400 Gbps Ethernet networking. We offer the best price performance for machine learning training, as well as the lowest cost per inference instances in the cloud. More SAP, high performance computing (HPC), ML, and Windows workloads run on AWS than any other cloud.

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

1. Create cloud9 environment

For capabilities similar to AWS Cloud9, explore AWS Toolkits in your own IDE and AWS CloudShell in the AWS Management Console. [Learn more](#)

AWS Cloud9 > Environments > Create environment

Create environment [Info](#)

Details

Name 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.

AWS Cloud9 > Environments

Environments (2)						Delete	View details	Open in Cloud9	Create environment
My environments								< 1 >	⚙️
	Name	Cloud9 IDE	Environment type	Connection	Permission	Owner ARN			
Mahvish09	Open	EC2 instance	Secure Shell (SSH)	Owner	arn:aws:sts::351107628563:assumed-role/voclabs/user3387467=RASAM_SHRAVANI_				

AWS Cloud9 > Environments > Mahvish09

Mahvish09

[Delete](#) [Open in Cloud9](#)

Details		Edit
Name	Owner ARN	Status
Mahvish09	arn:aws:sts::351107628563:assumed-role/voclabs/user3387467=RASAM_SHRAVANI_	Ready
Description		Lifecycle status
-		Created
Environment type	Number of members	
EC2 instance	1	

2. Create a basic html website for hosting

The screenshot shows the AWS Cloud9 IDE interface. On the left, the file structure for 'Mahvish09 - /home' includes 'Index.html' and 'README.md'. The main workspace has three tabs: 'Welcome' (code editor), 'index.html' (code editor), and '/index.html' (Browser). The code editor shows the following HTML and CSS:

```

<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>My Personal Website</title>
<style>
body {
    font-family: 'Segoe UI', Tahoma, sans-serif;
    margin: 0;
    padding: 0;
    background-color: #f0f0f0;
    color: #333;
}

header {
    background-color: #333;
    color: #fff;
    padding: 15px 0;
    text-align: center;
}

```

The browser tab displays the generated website with the following content:

Hello, Mahvish here..

Welcome to my personal website! I'm a web developer with a passion for creating modern and user-friendly websites. This site is a showcase of my work, interests, and a little bit about who I am.

Feel free to explore and learn more about what I do. Whether you're here to see my projects, get in touch, or just learn a bit,

User name

The user name can have up to 64 characters. Valid characters: A-Z, a-z, 0-9, and + = , . @ _ - (hyphen)

Provide user access to the AWS Management Console - *optional*
If you're providing console access to a person, it's a best practice [to manage their access in IAM Identity Center](#).

Are you providing console access to a person?

User type

Specify a user in Identity Center - Recommended
We recommend that you use Identity Center to provide console access to a person. With Identity Center, you can centrally manage user access to their AWS accounts and cloud applications.

I want to create an IAM user
We recommend that you create IAM users only if you need to enable programmatic access through access keys, service-specific credentials for AWS CodeCommit or Amazon Keypairs, or a backup credential for emergency account access.

Console password

Autogenerated password
You can view the password after you create the user.

Custom password
Enter a custom password for the user.

Show password

Users must create a new password at next sign-in - Recommended
Users automatically get the [IAMUserChangePassword](#) policy to allow them to change their own password.

If you are creating programmatic access through access keys or service-specific credentials for AWS CodeCommit or Amazon Keypairs, you can generate them after you create this IAM user. [Learn more](#)

[Cancel](#)
Next

3. Set permissions on cloud9

Set permissions

Add user to an existing group or create a new one. Using groups is a best-practice way to manage user's permissions by job functions. [Learn more](#)

Permissions options

Add user to group
Add user to an existing group, or create a new group. We recommend using groups to manage user permissions by job function.

Copy permissions
Copy all group memberships, attached managed policies, and inline policies from an existing user.

Attach policies directly
Attach a managed policy directly to a user. As a best practice, we recommend attaching policies to a group instead. Then, add the user to the appropriate group.

Get started with groups
Create a group and select policies to attach to the group. We recommend using groups to manage user permissions by job function, AWS service access, or custom permissions. [Learn more](#)

[Create group](#)

▼ Set permissions boundary - *optional*

Set a permissions boundary to control the maximum permissions for this user. Use this advanced feature used to delegate permission management to others. [Learn more](#)

Use a permissions boundary to control the maximum permissions
You can select one of the existing permissions policies to define the boundary.

[Cancel](#)
Previous
Next

4. Create a user group and add necessary permissions.

Create user group

Create a user group and select policies to attach to the group. We recommend using groups to manage job function, AWS service access, or custom permissions. [Learn more](#)

User group name
Enter a meaningful name to identify this group.

Maximum 128 characters. Use alphanumeric and '+,-,@,_' characters.

Permissions policies (946)

Filter by Type

<input type="checkbox"/> Policy name	Type	Use...	Description
<input type="checkbox"/> AdministratorAccess	AWS managed ...	None	Provides full...
<input type="checkbox"/> AdministratorAcce...	AWS managed	None	Grants accou...
<input type="checkbox"/> AdministratorAcce...	AWS managed	None	Grants accou...
<input type="checkbox"/> AlexaForBusinessD...	AWS managed	None	Provide devi...

User groups (1/1)

<input checked="" type="checkbox"/> Group name	Users	Attached policies	Created
<input checked="" type="checkbox"/> webappgrp	0	-	2024-07-30 (1 minute ago)

▼ Set permissions boundary - optional

Set a permissions boundary to control the maximum permissions for this user. Use this advanced feature used to delegate permission management to others. [Learn more](#)

Use a permissions boundary to control the maximum permissions
You can select one of the existing permissions policies to define the boundary.

Retrieve password

You can view and download the user's password below or email users instructions for signing in to the AWS Management Console. This is the only time you can view and download this password.

Console sign-in details

[Email sign-in instructions](#)

Console sign-in URL

 <https://011528263675.signin.aws.amazon.com/console>

User name

 Mahvish

Console password

 ***** [Show](#)

[Cancel](#)

[Download .csv file](#)

[Return to users list](#)

- s3 bucket

1. Create a s3 bucket

Amazon S3 > Buckets > Create bucket

Create bucket Info

Buckets are containers for data stored in S3.

General configuration

AWS Region
US East (N. Virginia) us-east-1

Bucket type Info

General purpose
Recommended for most use cases and access patterns. General purpose buckets are the original S3 bucket type. They allow a mix of storage classes that redundantly store objects across multiple Availability Zones.

Directory - New
Recommended for low-latency use cases. These buckets use only the S3 Express One Zone storage class, which provides faster processing of data within a single Availability Zone.

Bucket name Info

Bucket name must be unique within the global namespace and follow the bucket naming rules. [See rules for bucket naming](#)

Copy settings from existing bucket - *optional*
Only the bucket settings in the following configuration are copied.

[Choose bucket](#)

Format: s3://bucket/prefix

Default encryption [Info](#)

Server-side encryption is automatically applied to new objects stored in this bucket.

Encryption type | [Info](#)

- Server-side encryption with Amazon S3 managed keys (SSE-S3)
- Server-side encryption with AWS Key Management Service keys (SSE-KMS)
- Dual-layer server-side encryption with AWS Key Management Service keys (DSSE-KMS)

Secure your objects with two separate layers of encryption. For details on pricing, see [DSSE-KMS pricing](#) on the Storage tab of the [Amazon S3 pricing page](#).

Bucket Key

Using an S3 Bucket Key for SSE-KMS reduces encryption costs by lowering calls to AWS KMS. S3 Bucket Keys aren't supported for DSSE-KMS. [Learn more](#)

- Disable
- Enable

► Advanced settings

Info After creating the bucket, you can upload files and folders to the bucket, and configure additional bucket settings.

[Cancel](#) [Create bucket](#)

<p>Success Successfully created bucket "test-mahwish"</p> <p>To upload files and folders, or to configure additional bucket settings, choose View details.</p>																															
<p>Amazon S3 > Buckets</p>																															
<p>► Account snapshot - updated every 24 hours All AWS Regions</p> <p>Storage lens provides visibility into storage usage and activity trends. Learn more</p>																															
<p>View Storage Lens dashboard</p>																															
<p>General purpose buckets Directory buckets</p>																															
<table border="1"> <thead> <tr> <th colspan="2">General purpose buckets (1) Info All AWS Regions</th> <th colspan="4" style="text-align: right;">Create bucket</th> </tr> <tr> <td colspan="6">Buckets are containers for data stored in S3.</td> </tr> </thead> <tbody> <tr> <td colspan="2"> <input type="text" value="Find buckets by name"/> </td> <td colspan="4" style="text-align: right;"> < 1 > @ </td> </tr> <tr> <th>Name</th> <th>AWS Region</th> <th>IAM Access Analyzer</th> <th>Creation date</th> <th colspan="2"></th> </tr> <tr> <td>test-mahwish</td> <td>US East (N. Virginia) us-east-1</td> <td>View analyzer for us-east-1</td> <td>August 12, 2024, 20:04:18 (UTC+05:30)</td> <td colspan="2"></td> </tr> </tbody> </table>		General purpose buckets (1) Info All AWS Regions		Create bucket				Buckets are containers for data stored in S3.						<input type="text" value="Find buckets by name"/>		< 1 > @				Name	AWS Region	IAM Access Analyzer	Creation date			test-mahwish	US East (N. Virginia) us-east-1	View analyzer for us-east-1	August 12, 2024, 20:04:18 (UTC+05:30)		
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2. Upload a test.txt file in your bucket

Amazon S3 > Buckets > test-mahvish > Upload

Upload Info

Add the files and folders you want to upload to S3. To upload a file larger than 160GB, use the AWS CLI, AWS SDK or Amazon S3 REST API. [Learn more](#)

Drag and drop files and folders you want to upload here, or choose **Add files** or **Add folder**.

Files and folders (1 Total, 50.0 B)				
All files and folders in this table will be uploaded.				
	Name	Folder	Type	Size
<input type="checkbox"/>	test.txt	-	text/plain	50.0 B

Destination Info

Destination
<s3://test-mahvish>

Upload succeeded
View details below.

Upload: status

The information below will no longer be available after you navigate away from this page.

Summary		
Destination	Succeeded	Failed
s3://test-mahvish	1 file, 287.0 B (100.00%)	0 files, 0 B (0%)

Files and folders Configuration

Files and folders (1 Total, 287.0 B)					
Find by name					
Name	Folder	Type	Size	Status	Error
test.html	-	text/html	287.0 B	Succeeded	-

3. Upload the static website created earlier in the s3 bucket

Amazon S3 > Buckets > test-mahvish > test.html

test.html [Info](#)

[Properties](#) [Permissions](#) [Versions](#)

Object overview

Owner	s3://test-mahvish/test.html
awslabsc0w3698888t1642940625	
AWS Region	Amazon Resource Name (ARN)
US East (N. Virginia) us-east-1	arn:aws:s3:::test-mahvish/test.html
Last modified	Entity tag (Etag)
August 12, 2024, 22:33:51 (UTC+05:30)	7a3411f1dad97a2779c8dc65580432d2
Size	Object URL
287.0 B	https://test-mahvish.s3.amazonaws.com/test.html
Type	
html	
Key	
test.html	

4. Change some configuration settings for the bucket.

Amazon S3 > Buckets > test-mahvish > Edit static website hosting

Edit static website hosting [Info](#)

Static website hosting

Use this bucket to host a website or redirect requests. [Learn more](#)

Static website hosting

Disable

Enable

Hosting type

Host a static website

Use the bucket endpoint as the web address. [Learn more](#)

Redirect requests for an object

Redirect requests to another bucket or domain. [Learn more](#)

Amazon S3 > Buckets > test-mahvish

test-mahvish [Info](#)

Objects Properties **Permissions** Metrics Management Access Points

Permissions overview

Access finding
Access findings are provided by IAM external access analyzers. Learn more about [How IAM analyzer findings work](#).
[View analyzer for us-east-1](#)

Block public access (bucket settings)

Public access is granted to buckets and objects through access control lists (ACLs), bucket policies, access point policies, or all. In order to ensure that public access to all your S3 buckets and objects is blocked, turn on Block all public access. These settings apply only to this bucket and its access points. AWS recommends that you turn on Block all public access, but before applying any of these settings, ensure that your applications will work correctly without public access. If you require some level of public access to your buckets or objects within, you can customize the individual settings below to suit your specific storage use cases. [Learn more](#).

Edit

Block all public access
 On
► Individual Block Public Access settings for this bucket

Bucket policy

The bucket policy, written in JSON, provides access to the objects stored in the bucket. Bucket policies don't apply to objects owned by other accounts. [Learn more](#).

Edit **Delete**

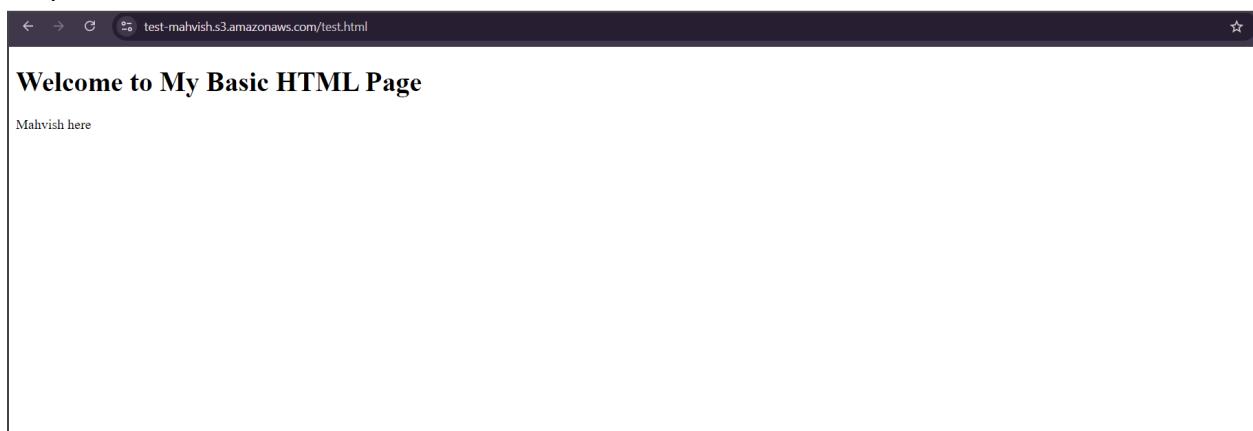
5. Add appropriate bucket policy

Bucket policy

The bucket policy, written in JSON, provides access to the objects stored in the bucket. Bucket policies don't apply to objects owned by other accounts. [Learn more](#).

```
{  
    "Version": "2012-10-17",  
    "Statement": [  
        {  
            "Sid": "PublicReadGetObject",  
            "Effect": "Allow",  
            "Principal": "*",  
            "Action": "s3:GetObject",  
            "Resource": "arn:aws:s3:::test-mahvish/*"  
        }  
    ]  
}
```

Output:



- Launching an EC2 instance

1. Create a new ec2 instance

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

Name Add additional tags

2. Choose ubuntu

Quick Start

Amazon Linux 

macOS 

Ubuntu 

Windows 

Red Hat 

SUSE Li 

Browse more AMIs 
Including AMIs from AWS, Marketplace and the Community

Amazon Machine Image (AMI)

Ubuntu Server 24.04 LTS (HVM), SSD Volume Type Free tier eligible ▾
ami-04a81a99f5ec58529 (64-bit (x86)) / ami-0c14ff330901e49ff (64-bit (Arm))
Virtualization: hvm ENA enabled: true Root device type: ebs

Description

Ubuntu Server 24.04 LTS (HVM),EBS General Purpose (SSD) Volume Type. Support available from Canonical (<http://www.ubuntu.com/cloud/services>).

Architecture

64-bit (x86) ▾

AMI ID

ami-04a81a99f5ec58529

Verified provider

▼ Instance type [Info](#) | [Get advice](#)

Instance type

t2.micro	Free tier eligible		
Family: t2	1 vCPU	1 GiB Memory	Current generation: true
On-Demand Windows base pricing: 0.0162 USD per Hour			
On-Demand SUSE base pricing: 0.0116 USD per Hour			
On-Demand RHEL base pricing: 0.026 USD per Hour			
On-Demand Linux base pricing: 0.0116 USD per Hour			

All generations

Compare instance types

Additional costs apply for AMIs with pre-installed software

3. Keep the default configuration settings.

▼ Configure storage [Info](#) [Advanced](#)

1x GiB ▾ Root volume (Not encrypted)

ⓘ Free tier eligible customers can get up to 30 GB of EBS General Purpose (SSD) or Magnetic storage X

[Add new volume](#)

ⓘ Click refresh to view backup information C
The tags that you assign determine whether the instance will be backed up by any Data Lifecycle Manager policies.

0 x File systems [Edit](#)

▼ Network settings [Info](#)

[Edit](#)

Network | [Info](#)
vpc-073a9e2489cd0d33c

Subnet | [Info](#)
No preference (Default subnet in any availability zone)

Auto-assign public IP | [Info](#)
Enable

[Additional charges apply](#) when outside of [free tier allowance](#)

Firewall (security groups) | [Info](#)
A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.

Create security group Select existing security group

We'll create a new security group called '**launch-wizard-1**' with the following rules:

Allow SSH traffic from Anywhere
Helps you connect to your instance
0.0.0.0/0

Allow HTTPS traffic from the internet
To set up an endpoint, for example when creating a web server

Allow HTTP traffic from the internet
To set up an endpoint, for example when creating a web server

4. Check allow ssh traffic and click on create

[EC2](#) > [Instances](#) > [Launch an instance](#)

Success
Successfully initiated launch of instance ([i-0e39cd326d64588eb](#))

▼ Launch log

Initializing requests	<input checked="" type="checkbox"/> Succeeded
Creating security groups	<input checked="" type="checkbox"/> Succeeded
Creating security group rules	<input checked="" type="checkbox"/> Succeeded
Launch initiation	<input checked="" type="checkbox"/> Succeeded

Instances (1) Info								
		Connect		Instance state ▾		Actions ▾		Launch instances ▾
<input type="text"/> Find Instance by attribute or tag (case-sensitive)		All states ▾						
	Name ▾	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public I
<input type="checkbox"/>	Mahvish	i-0e39cd326d64588eb	Running View Logs	t2.micro	2/2 checks passed View alarms +	View alarms +	us-east-1a	ec2-34-

Instances (1/1) Info								
		Connect		Instance state ▾		Actions ▾		Launch instances ▾
<input type="text"/> Find Instance by attribute or tag (case-sensitive)		All states ▾						
	Name ▾	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public I
<input checked="" type="checkbox"/>	Mahvish	i-0e39cd326d64588eb	Running View Logs	t2.micro	2/2 checks passed View alarms +	View alarms +	us-east-1a	ec2-34-

i-0e39cd326d64588eb (Mahvish)		
Details	Status and alarms	Monitoring
Security	Networking	Storage
Tags		
Instance summary Info		
Instance ID i-0e39cd326d64588eb (Mahvish)	Public IPv4 address 34.201.2.60 open address	Private IPv4 addresses 172.31.13.190
IPv6 address -	Instance state Running	Public IPv4 DNS ec2-34-201-2-60.compute-1.amazonaws.com open address
Hostname type IP name: ip-172-31-13-190.ec2.internal	Private IP DNS name (IPv4 only) ip-172-31-13-190.ec2.internal	Elastic IP addresses
Answer private resource DNS name	Instance type	

5. Click on connect to connect via ssh and run some linux commands

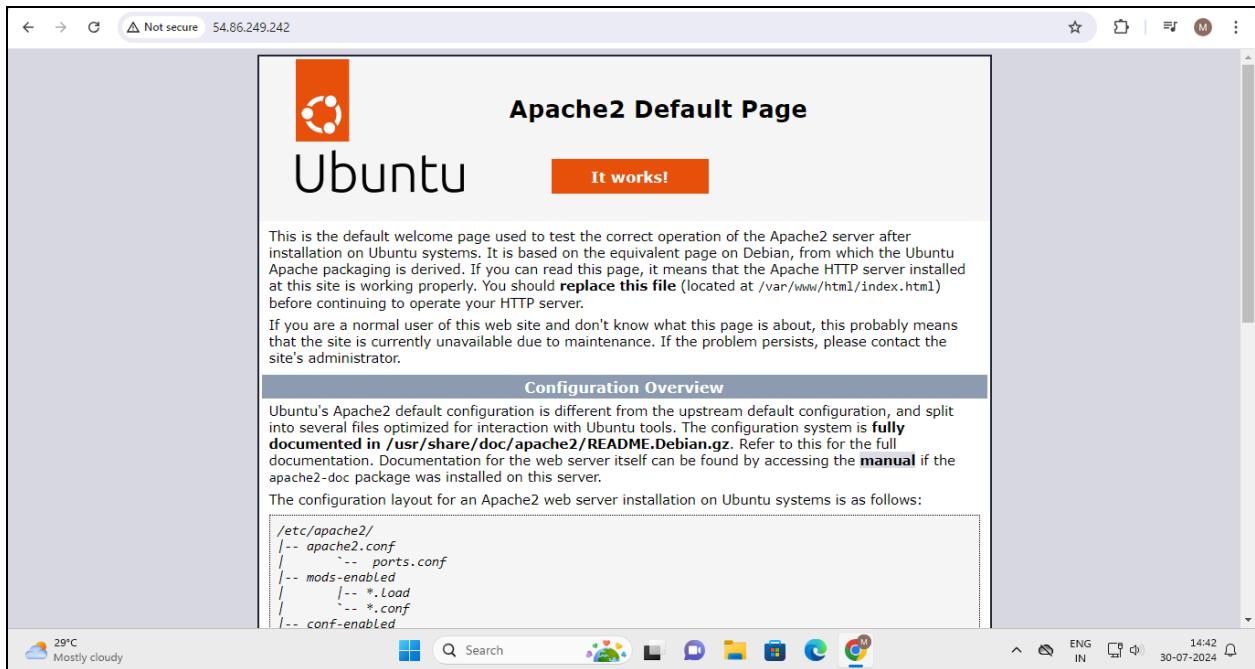
```
[ec2-user@ip-172-31-13-190 ~]$ ls
[ec2-user@ip-172-31-13-190 ~]$ echo "hello"
hello
[ec2-user@ip-172-31-13-190 ~]$ cat > myfile.txt
this is advanced devops lab
^C
[ec2-user@ip-172-31-13-190 ~]$ cat myfile
cat: myfile: No such file or directory
[ec2-user@ip-172-31-13-190 ~]$ cat myfile.txt
this is advanced devops lab
[ec2-user@ip-172-31-13-190 ~]$
```

```
root@ip-172-31-32-173:~# sudo su
root@ip-172-31-32-173:~# apt install apache2
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  apache2-bin apache2-data apache2-utils libapr1t64 libaprutil1-dbd-sql:
Suggested packages:
  apache2-doc apache2-suexec-pristine | apache2-suexec-custom www-browser
The following NEW packages will be installed:
  apache2 apache2-bin apache2-data apache2-utils libapr1t64 libaprutil1-
0 upgraded, 10 newly installed, 0 to remove and 26 not upgraded.
Need to get 1680 kB/2083 kB of archives.
After this operation, 8094 kB of additional disk space will be used.
```

```
root@ip-172-31-32-173:~# systemctl status apache2
● apache2.service - The Apache HTTP Server
  Loaded: loaded (/usr/lib/systemd/system/apache2.service; enabled; preset: enabled)
  Active: active (running) since Tue 2024-07-30 08:58:11 UTC; 44s ago
    Docs: https://httpd.apache.org/docs/2.4/
   Main PID: 2619 (apache2)
     Tasks: 55 (limit: 1130)
    Memory: 5.4M (peak: 5.5M)
       CPU: 40ms
      CGroup: /system.slice/apache2.service
              ├─2619 /usr/sbin/apache2 -k start
              ├─2621 /usr/sbin/apache2 -k start
              └─2623 /usr/sbin/apache2 -k start

Jul 30 08:58:11 ip-172-31-32-173 systemd[1]: Starting apache2.service - The Apache HTTP Server...
Jul 30 08:58:11 ip-172-31-32-173 systemd[1]: Started apache2.service - The Apache HTTP Server.
```

```
Jul 30 08:58:11 ip-172-31-32-173 systemd[1]: Starting apache2.service - The Apache HTTP Server...
Jul 30 08:58:11 ip-172-31-32-173 systemd[1]: Started apache2.service - The Apache HTTP Server.
root@ip-172-31-32-173:~# cd /var/www/html
```



```
root@ip-172-31-32-173:/var/www/html# nano index2.html
root@ip-172-31-32-173:/var/www/html# cat index2.html
<h1>Hi..Mahvish here<h1>
root@ip-172-31-32-173:/var/www/html#
```



Experiment 2

Aim: To Build Your Application using AWS CodeBuild and Deploy on S3 / SEBS using AWS CodePipeline, deploy Sample Application on EC2 instance using AWS CodeDeploy.

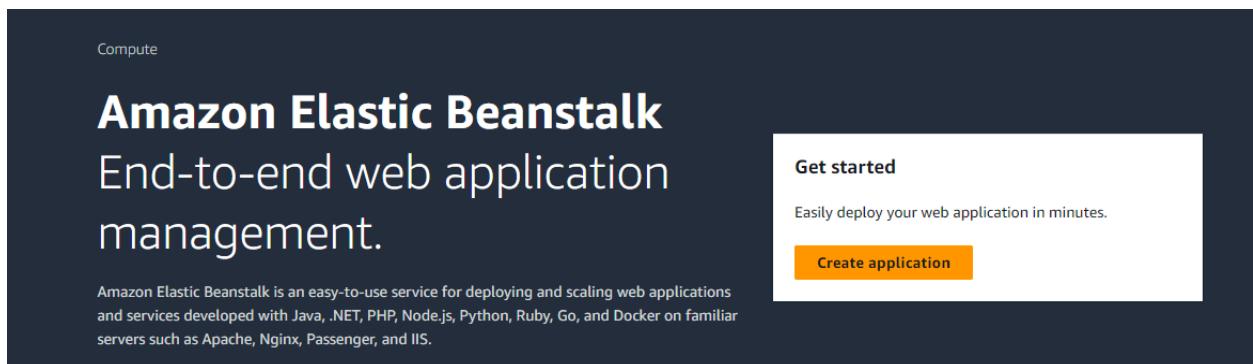
Elastic beanstalk

AWS Elastic Beanstalk is an AWS-managed service for web applications. Elastic Beanstalk is a pre-configured EC2 server that can directly take up your application code and environment configurations and use it to automatically provision and deploy the required resources within AWS to run the web application. Unlike EC2 which is Infrastructure as a service, Elastic Beanstalk is a Platform As A Service (PAAS) as it allows users to directly use a pre-configured server for their application. Of course, you can deploy applications without ever having to use elastic beanstalk but that would mean having to choose the appropriate service from the vast array of services offered by AWS, manually provisioning these AWS resources, and stitching them up together to form a complete web application. Elastic Beanstalk abstracts the underlying configuration work and allows you as a user to focus on more pressing matters.

This raises a concern that if elastic Beanstalk configures most of the resources itself and abstracts the underlying details. Can developers change the configuration if needed? The answer is Yes. Elastic Beanstalk is provided to make application deployment simpler but at no level will it restrict the developers from changing any configurations.

How Elastic Beanstalk Works

Elastic Beanstalk is a fully managed service provided by AWS that makes it easy to deploy and manage applications in the cloud without worrying about the underlying infrastructure. First, create an application and select an environment, configure the environment, and deploy the application.



1. Create a new elastic beanstalk

Configure environment Info

Environment tier Info

Amazon Elastic Beanstalk has two types of environment tiers to support different types of web applications.

Web server environment

Run a website, web application, or web API that serves HTTP requests. [Learn more](#)

Worker environment

Run a worker application that processes long-running workloads on demand or performs tasks on a schedule. [Learn more](#)

Application information Info

Application name

mahvish-web

Maximum length of 100 characters.

► Application tags (optional)

Platform Info

Platform type

Managed platform

Platforms published and maintained by Amazon Elastic Beanstalk. [Learn more](#)

Custom platform

Platforms created and owned by you. This option is unavailable if you have no platforms.

Platform

Node.js



Platform branch

Node.js 20 running on 64bit Amazon Linux 2023



Platform version

6.2.0 (Recommended)



Review Info

Step 1: Configure environment

Edit

Environment information

Environment tier	Application name
Web server environment	mahvish-web
Environment name	Application code
Mahvish-web-env	Sample application
Platform	
arn:aws:elasticbeanstalk:eu-north-1::platform/PHP 8.3 running on 64bit Amazon Linux 2023/4.3.2	

Step 2: Configure service access

Edit

Service access Info

Configure the service role and EC2 instance profile that Elastic Beanstalk uses to manage your environment. Choose an EC2 key pair to securely log in to your EC2 instances.

Service role	EC2 instance profile
--------------	----------------------

Lifecycle	Log streaming	Allow URL fopen						
false	Deactivated	On						
Display errors	Document root	Max execution time						
Off	-	60						
Memory limit	Zlib output compression	Proxy server						
256M	Off	nginx						
Logs retention	Rotate logs	Update level						
7	Deactivated	minor						
X-Ray enabled								
Deactivated								
Environment properties								
<table border="1"> <thead> <tr> <th>Key</th> <th>▲ Value</th> </tr> </thead> <tbody> <tr> <td colspan="2">No environment properties</td> </tr> <tr> <td colspan="2">There are no environment properties defined</td> </tr> </tbody> </table>			Key	▲ Value	No environment properties		There are no environment properties defined	
Key	▲ Value							
No environment properties								
There are no environment properties defined								
<input type="button" value="Cancel"/> <input type="button" value="Previous"/> <input style="background-color: orange; color: white; border: none;" type="button" value="Submit"/>								

Elastic Beanstalk is launching your environment. This will take a few minutes. X

[Elastic Beanstalk](#) > [Environments](#) > Mahvish-web-env

Mahvish-web-env Info

[C](#) [Actions ▾](#) [Upload and deploy](#)

Environment overview	Platform
Health Unknown	Platform Node.js 20 running on 64bit Amazon Linux 2023/6.2.0
Domain -	Running version -
Environment ID e-trkmirvuz	Platform state Supported
Application name mahvish-web	

Congratulations

Your first AWS Elastic Beanstalk Node.js application is now running on your own dedicated environment in the AWS Cloud

This environment is launched with Elastic Beanstalk Node.js Platform

What's Next?

- [AWS Elastic Beanstalk overview](#)
- [AWS Elastic Beanstalk concepts](#)
- [Deploying an Express Application to AWS Elastic Beanstalk](#)
- [Deploying an Express application with clustering to Elastic Beanstalk](#)
- [Customizing and Configuring a Node.js Container](#)
- [Working with Logs](#)

Experiment 3

Aim: To understand the Kubernetes Cluster Architecture, install and Spin Up a Kubernetes Cluster on Linux Machines/Cloud Platforms.

Theory: Container-based microservices architectures have revolutionized how development and operations teams test and deploy modern software. Containers allow companies to scale and deploy applications more efficiently, but they also introduce new challenges, adding complexity by creating a whole new infrastructure ecosystem.

Today, both large and small software companies are deploying thousands of container instances daily. Managing this level of complexity at scale requires advanced tools. Enter Kubernetes. Originally developed by Google, Kubernetes is an open-source container orchestration platform designed to automate the deployment, scaling, and management of containerized applications. Kubernetes has quickly become the de facto standard for container orchestration and is the flagship project of the Cloud Native Computing Foundation (CNCF), supported by major players like Google, AWS, Microsoft, IBM, Intel, Cisco, and Red Hat.

Step 1:

Create 2 Security Groups for Master and Nodes and add the following rules inbound rules in those Groups.

The screenshot shows the AWS EC2 Security Groups interface. At the top, a green success message states: "Security group (sg-00b928c599e4bfcea | master_group) was created successfully". Below this, the "Details" section displays the security group's name, ID, description, owner, and VPC ID. The "Inbound rules" tab is selected, showing 8 permission entries. A search bar and navigation controls are visible at the bottom of the rule list.

Security group (sg-02442b6c1aa42e308 | node_security_group) was created successfully

[Details](#)

[EC2](#) > [Security Groups](#) > sg-02442b6c1aa42e308 - node_security_group

sg-02442b6c1aa42e308 - node_security_group

[Actions ▾](#)

Details			
Security group name node_security_group	Security group ID sg-02442b6c1aa42e308	Description security group for nodes	VPC ID vpc-08e88c85fcc263608
Owner 724772084448	Inbound rules count 6 Permission entries	Outbound rules count 1 Permission entry	

[Inbound rules](#) [Outbound rules](#) [Tags](#)

Inbound rules (6)

[Search](#) [Create inbound rule](#) [Manage tags](#) [Edit inbound rules](#)

< 1 > [Filter](#)

Application and OS Images (Amazon Machine Image) [Info](#)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below

[Search our full catalog including 1000s of application and OS images](#)

Quick Start

Amazon Linux	macOS	Ubuntu	Windows	Red Hat	SUSE Li	Browse more AMIs
						Including AMIs from AWS, Marketplace and the Community

Amazon Machine Image (AMI)

Ubuntu Server 24.04 LTS (HVM), SSD Volume Type
Free tier eligible

ami-04cd91e49cb06165 (64-bit (x86)) / ami-02b7539372433cf6b (64-bit (Arm))
Virtualization: hvm ENA enabled: true Root device type: ebs

Description
Ubuntu Server 24.04 LTS (HVM), EBS General Purpose (SSD) Volume Type. Support available from Canonical (<http://www.ubuntu.com/cloud/services>).

Summary

Number of instances [Info](#)
1

Software Image (AMI)
Canonical, Ubuntu, 24.04, amd6...[read more](#)
ami-04cd91e49cb06165

Virtual server type (instance type)
t3.medium

Firewall (security group)
master_group

Storage (volumes)
1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance

[Cancel](#) [Launch instance](#) [Review commands](#)

Instance type [Info](#) | [Get advice](#)

Instance type
t3.medium
Family: t3 2 vCPU 4 GiB Memory Current generation: true
On-Demand RHEL base pricing: 0.072 USD per Hour
On-Demand Linux base pricing: 0.0432 USD per Hour
On-Demand Windows base pricing: 0.0616 USD per Hour
On-Demand SUSE base pricing: 0.0995 USD per Hour

All generations Compare instance types

Additional costs apply for AMIs with pre-installed software

Key pair (login) [Info](#)

You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

Key pair name - required
 [Create new key pair](#)

Network settings [Info](#)

Network [Info](#)

Summary

Number of instances [Info](#)

Software Image (AMI)
Canonical, Ubuntu, 24.04, amd6...read more
ami-04cdc91e49cb06165

Virtual server type (instance type)
t3.medium

Firewall (security group)
master_group

Storage (volumes)
1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance [X](#)

[Cancel](#) [Launch instance](#) [Review commands](#)

Subnet [Info](#)
No preference (Default subnet in any availability zone)

Auto-assign public IP [Info](#)

Enable

Additional charges apply when outside of [free tier allowance](#)

Firewall (security groups) [Info](#)
A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.

Create security group Select existing security group

Common security groups [Info](#)

Select security groups [▼](#)

master_group sg-00b928c599e4bfcea X
VPC: vpc-08e88c85fcc263608

Compare security group rules

Security groups that you add or remove here will be added to or removed from all your network interfaces.

Configure storage [Info](#) Advanced

1x GiB gp3 Root volume (Not encrypted)

Free tier eligible customers can get up to 30 GB of EBS General Purpose (SSD) or Magnetic storage [X](#)

Summary

Number of instances [Info](#)

Software Image (AMI)
Canonical, Ubuntu, 24.04, amd6...read more
ami-04cdc91e49cb06165

Virtual server type (instance type)
t3.medium

Firewall (security group)
master_group

Storage (volumes)
1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance [X](#)

[Cancel](#) [Launch instance](#) [Review commands](#)

EC2 > Instances > Launch an instance

Success
Successfully initiated launch of instance (i-0d309ff71c5fec6b7)

[Launch log](#)

Instances (2) Info		Last updated C less than a minute ago	Connect	Instance state ▾	Actions ▾	Launch instances ▾		
			All states ▾					
<input type="checkbox"/>	Name ▾	Instance ID	Instance state ▾	Instance type ▾	Status check	Alarm status	Availability Zone ▾	Public
<input type="checkbox"/>	Master	i-0d309ff71c5feceb7	Running ⓘ ⓘ	t3.medium	Initializing ⓘ	View alarms +	eu-north-1b	ec2-13-
<input type="checkbox"/>	Node1	i-0475ac9631a14fc29	Running ⓘ ⓘ	t3.medium	Initializing ⓘ	View alarms +	eu-north-1b	ec2-13-

Connect to instance [Info](#)

Connect to your instance i-0d309ff71c5feceb7 (Master) using any of these options

EC2 Instance Connect | Session Manager | **SSH client** | EC2 serial console

Instance ID
 [i-0d309ff71c5feceb7 \(Master\)](#)

1. Open an SSH client.
 2. Locate your private key file. The key used to launch this instance is master_ec2_key.pem
 3. Run this command, if necessary, to ensure your key is not publicly viewable.
 chmod 400 "master_ec2_key.pem"
 4. Connect to your instance using its Public DNS:
 [ec2-13-61-9-8.eu-north-1.compute.amazonaws.com](#)

Command copied

ssh -i "master_ec2_key.pem" ubuntu@ec2-13-61-9-8.eu-north-1.compute.amazonaws.com

Note: In most cases, the guessed username is correct. However, read your AMI usage instructions to check if the AMI owner has changed the default AMI username.

Step 3: Now open the folder in the terminal 3 times for Master, Node1& Node 2 where our .pem key is stored and paste the Example command

```
ubuntu@ip-172-31-43-14: ~ × + ▾
C:\Users\siddi\Downloads\exp3 advDevops>ssh -i "master_ec2_key.pem" ubuntu@ec2-13-61-9-8.eu-north-1.compute.amazonaws.com
The authenticity of host 'ec2-13-61-9-8.eu-north-1.compute.amazonaws.com (64:ff9b::d3d:908)' can't be established.
ED25519 key fingerprint is SHA256:RUtv18E0T8Ykl3fH8HrRQ7gFcC7Buc4Z5d1X3lqnrvK.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'ec2-13-61-9-8.eu-north-1.compute.amazonaws.com' (ED25519) to the list of known hosts.
Welcome to Ubuntu 24.04 LTS (GNU/Linux 6.8.0-1012-aws x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/pro
```

```
The list of available updates is more than a week old.  
To check for new updates run: sudo apt update
```

```
The programs included with the Ubuntu system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*copyright.
```

```
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by  
applicable law.
```

```
To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo_root" for details.
```

```
ubuntu@ip-172-31-43-14:~$ |
```

Step 4: Run on Master,Node 1, and Node 2 the below commands to install and setup Docker in Master, Node1, and Node2.

```
curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo apt-key add -  
curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo tee  
/etc/apt/trusted.gpg.d/docker.gpg > /dev/null  
sudo add-apt-repository "deb [arch=amd64] https://download.docker.com/linux/ubuntu  
$(lsb_release -cs) stable"
```

```
ubuntu@ip-172-31-43-14:~$ curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo apt-key add -  
curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo tee  
/etc/apt/trusted.gpg.d/docker.gpg > /dev/null  
sudo add-apt-repository "deb [arch=amd64] https://download.docker.com/linux/ubuntu  
$(lsb_release -cs) stable"  
Warning: apt-key is deprecated. Manage keyring files in trusted.gpg.d instead (see apt-key(8)).  
OK  
-----BEGIN PGP PUBLIC KEY BLOCK-----  
mQINBFit2ioBEADhWpZ8/wvZ6hUTiXOwQHXMAlaFHCpPH9hAtr4F1y2+0YdbtMuth  
lqwp028AqyY+PRfVMTSYMbjuQuu5byyKR01BbqYhuS3jtqQmljZ/bJvXqnmivXh  
38UuLat+z077PxxyxQhu5BbqntTPQMf1yqEiu+BKbq2wANUkQf+1AmZY/IruOXbnq  
L4C1+gJ8vfmXQt99npCaxEjaNRVYf0S8QcixNzHUYnb6emjlANyEVlZzeqo7XKl7  
UrwwV5inawTSzWWvtjEej4nJL8NsLwscpLPQUhTQ+7BbQXAwAmeHCUTQIvvWXqw0N  
cmhh4HgeQscQHYgOjjDVoY5MucvglbIgCqfzAHw9jxmRL4qbMZj+b1XoePEtht  
ku4bIQN1X5P07fNWzIgaRL5Z4POXDDZTLI0/El58j9kp4bnWRCJW0lya+f8ocodo  
vZz+Doi+fy4D5ZGrL4XEcI0P/Lv5ufyf+k0tl/94VFYVJ0LeAv8W92KdgDkhTcTD
```

```
Get:47 http://security.ubuntu.com/ubuntu noble-security/restricted Translation-en [68.1 kB]  
Get:48 http://security.ubuntu.com/ubuntu noble-security/restricted amd64 c-n-f Metadata [428 B]  
Get:49 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 Packages [10.9 kB]  
Get:50 http://security.ubuntu.com/ubuntu noble-security/multiverse Translation-en [2808 B]  
Get:51 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 Components [208 B]  
Get:52 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 c-n-f Metadata [344 B]  
Fetched 29.1 MB in 5s (6027 kB/s)  
Reading package lists... Done  
W: https://download.docker.com/linux/ubuntu/dists/noble/InRelease: Key is stored in legacy trusted.gpg keyring (/etc/a  
/trusted.gpg), see the DEPRECATION section in apt-key(8) for details.  
ubuntu@ip-172-31-43-14:~$ |
```

```
sudo apt-get update sudo apt-get install -y docker-ce
```

```
ubuntu@ip-172-31-43-14:~$ sudo apt-get update
sudo apt-get install -y docker-ce
Hit:1 http://eu-north-1.ec2.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://eu-north-1.ec2.archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:3 http://eu-north-1.ec2.archive.ubuntu.com/ubuntu noble-backports InRelease
Hit:4 https://download.docker.com/linux/ubuntu noble InRelease
Hit:5 http://security.ubuntu.com/ubuntu noble-security InRelease
Reading package lists... Done
W: https://download.docker.com/linux/ubuntu/dists/noble/InRelease: Key is stored in legacy trusted.gpg keyring (/etc/apt/trusted.gpg), see the DEPRECATION section in apt-key(8) for details.
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  containerd.io docker-buildx-plugin docker-ce-cli docker-ce-rootless-extras docker-compose-plugin libltdl7 libslirp0
  pigz slirp4netns
Suggested packages:
  aufs-tools cgroupfs-mount | cgroup-lite
The following NEW packages will be installed:
  containerd.io docker-buildx-plugin docker-ce docker-ce-cli docker-ce-rootless-extras docker-compose-plugin libltdl7
  libslirp0 pigz slirp4netns
0 upgraded, 10 newly installed, 0 to remove and 139 not upgraded.
Need to get 123 MB of archives.
After this operation, 442 MB of additional disk space will be used.
Get:1 http://eu-north-1.ec2.archive.ubuntu.com/ubuntu noble/universe amd64 pigz amd64 2.8-1 [65.6 kB]
Get:2 http://eu-north-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libltdl7 amd64 2.4.7-7build1 [40.3 kB]
Get:3 http://eu-north-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libslirp0 amd64 4.7.0-1ubuntu3 [63.8 kB]
Get:4 http://eu-north-1.ec2.archive.ubuntu.com/ubuntu noble/universe amd64 slirp4netns amd64 1.2.1-1build2 [34.9 kB]
```

```
Created symlink /etc/systemd/system/multi-user.target.wants/docker.service → /usr/lib/systemd/system/docker.service.
Created symlink /etc/systemd/system/sockets.target.wants/docker.socket → /usr/lib/systemd/system/docker.socket.
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for libc-bin (2.39-0ubuntu8.2) ...
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
ubuntu@ip-172-31-43-14:~$ |
```

```
sudo mkdir -p /etc/docker
cat <<EOF | sudo tee /etc/docker/daemon.json
{
  "exec-opts": ["native.cgroupdriver=systemd"]
}
EOF
```

```
ubuntu@ip-172-31-43-14:~$ sudo mkdir -p /etc/docker
cat <<EOF | sudo tee /etc/docker/daemon.json
{
  "exec-opts": ["native.cgroupdriver=systemd"]
}
EOF
{
  "exec-opts": ["native.cgroupdriver=systemd"]
}
ubuntu@ip-172-31-43-14:~$ |
```

```
sudo systemctl enable docker
```

```
sudo systemctl daemon-reload  
sudo systemctl restart docker
```

```
ubuntu@ip-172-31-43-14:~$ sudo systemctl enable docker  
sudo systemctl daemon-reload  
sudo systemctl restart docker  
Synchronizing state of docker.service with SysV service script with /usr/lib  
/systemd/systemd-sysv-install.  
Executing: /usr/lib/systemd/systemd-sysv-install enable docker  
ubuntu@ip-172-31-43-14:~$ |
```

Step 5: Run the below command to install Kubernets.

```
curl -fsSL https://pkgs.k8s.io/core:/stable:/v1.31/deb/Release.key | sudo gpg --dearmor -o  
/etc/apt/keyrings/kubernetes-apt-keyring.gpg
```

```
echo 'deb [signed-by=/etc/apt/keyrings/kubernetes-apt-keyring.gpg]  
https://pkgs.k8s.io/core:/stable:/v1.31/deb/ /' | sudo tee /etc/apt/sources.list.d/kubernetes.list  
ubuntu@ip-172-31-43-14:~$ curl -fsSL https://pkgs.k8s.io/core:/stable:/v1.31/  
/deb/Release.key | sudo gpg --dearmor -o /etc/apt/keyrings/kubernetes-apt-ke  
yring.gpg  
echo 'deb [signed-by=/etc/apt/keyrings/kubernetes-apt-keyring.gpg]  
https://pkgs.k8s.io/core:/stable:/v1.31/deb/ /' | sudo tee /etc/apt/sources.  
list.d/kubernetes.list  
deb [signed-by=/etc/apt/keyrings/kubernetes-apt-keyring.gpg]  
https://pkgs.k8s.io/core:/stable:/v1.31/deb/ /  
ubuntu@ip-172-31-43-14:~$ |
```

error:

```
ubuntu@ip-172-31-43-14:~$ sudo apt-get update  
sudo apt-get install -y kubelet kubeadm kubectl  
sudo apt-mark hold kubelet kubeadm kubectl  
sudo mkdir -p /etc/apt/keyrings i  
E: Malformed entry 1 in list file /etc/apt/sources.list.d/kubernetes.list (U  
RI)  
E: The list of sources could not be read.  
E: Malformed entry 1 in list file /etc/apt/sources.list.d/kubernetes.list (U  
RI)  
E: The list of sources could not be read.  
E: Malformed entry 1 in list file /etc/apt/sources.list.d/kubernetes.list (U  
RI)  
E: The list of sources could not be read.
```

Resolving the error:

```
ubuntu@ip-172-31-43-14:~$ sudo mkdir -p /etc/apt/keyrings
ubuntu@ip-172-31-43-14:~$ curl -fsSL https://pkgs.k8s.io/core:/stable:/v1.31
/deb/Release.key | sudo gpg --dearmor -o /etc/apt/keyrings/kubernetes-apt-ke
yring.gpg
File '/etc/apt/keyrings/kubernetes-apt-keyring.gpg' exists. Overwrite? (y/N)
y
ubuntu@ip-172-31-43-14:~$ echo "deb [signed-by=/etc/apt/keyrings/kubernetes-
apt-keyring.gpg] https://pkgs.k8s.io/core:/stable:/v1.31/deb/ " | sudo tee
/etc/apt/sources.list.d/kubernetes.list
deb [signed-by=/etc/apt/keyrings/kubernetes-apt-keyring.gpg] https://pkgs.k8
s.io/core:/stable:/v1.31/deb/
ubuntu@ip-172-31-43-14:~$ sudo apt-get update
Hit:1 http://eu-north-1.ec2.archive.ubuntu.com/ubuntu noble InRelease
Get:2 http://eu-north-1.ec2.archive.ubuntu.com/ubuntu noble-updates InReleas
e [126 kB]
Hit:3 http://eu-north-1.ec2.archive.ubuntu.com/ubuntu noble-backports InRele
ase
Hit:4 https://download.docker.com/linux/ubuntu noble InRelease
Hit:5 http://security.ubuntu.com/ubuntu noble-security InRelease
Get:7 http://eu-north-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd
64 Packages [530 kB]
Get:6 https://prod-cdn.packages.k8s.io/repositories/isv:/kubernetes:/core:/s
table:/v1.31/deb InRelease [1186 B]
Get:8 http://eu-north-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main Tra
nslation-en [128 kB]
Get:9 https://prod-cdn.packages.k8s.io/repositories/isv:/kubernetes:/core:/s
table:/v1.31/deb Packages [4865 B]
Fetched 791 kB in 1s (1080 kB/s)
Reading package lists... Done
W: https://download.docker.com/linux/ubuntu/dists/noble/InRelease: Key is st
ored in legacy trusted.gpg keyring (/etc/apt/trusted.gpg), see the DEPRECATI
ON section in apt-key(8) for details.
```

sudo apt-get install -y kubelet kubeadm kubectl

sudo apt-mark hold kubelet kubeadm kubectl

```
ubuntu@ip-172-31-43-14:~$ sudo apt-get install -y kubelet kubeadm kubectl
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  conntrack cri-tools kubernetes-cni
The following NEW packages will be installed:
  conntrack cri-tools kubeadm kubectl kubelet kubernetes-cni
0 upgraded, 6 newly installed, 0 to remove and 139 not upgraded.
Need to get 87.4 MB of archives.
After this operation, 314 MB of additional disk space will be used.
Get:1 http://eu-north-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 conntrack amd64 1:1.4.8-1ubuntu1 [37.9 kB]
Get:2 https://prod-cdn.packages.k8s.io/repositories/isv:/kubernetes:/core:/stable:/v1.31/deb cri-tools 1.31.1-1.1 [15.7 MB]
Get:3 https://prod-cdn.packages.k8s.io/repositories/isv:/kubernetes:/core:/stable:/v1.31/deb kubeadm 1.31.1-1.1 [11.4 MB]
Get:4 https://prod-cdn.packages.k8s.io/repositories/isv:/kubernetes:/core:/stable:/v1.31/deb kubectl 1.31.1-1.1 [11.2 MB]
Get:5 https://prod-cdn.packages.k8s.io/repositories/isv:/kubernetes:/core:/stable:/v1.31/deb kubernetes-cni 1.5.1-1.1 [33.9 MB]
Get:6 https://prod-cdn.packages.k8s.io/repositories/isv:/kubernetes:/core:/stable:/v1.31/deb kubelet 1.31.1-1.1 [15.2 MB]
Fetched 87.4 MB in 1s (66.9 MB/s)
Selecting previously unselected package conntrack.
(Reading database ... 68007 files and directories currently installed.)
Preparing to unpack .../0-conntrack_1%3a1.4.8-1ubuntu1_amd64.deb ...
Unpacking conntrack (1:1.4.8-1ubuntu1) ...
Selecting previously unselected package cri-tools.
Preparing to unpack .../1-cri-tools_1.31.1-1.1_amd64.deb ...
Unpacking cri-tools (1.31.1-1.1) ...
Selecting previously unselected package kubeadm.
Preparing to unpack .../2-kubeadm_1.31.1-1.1_amd64.deb ...
Unpacking kubeadm (1.31.1-1.1) ...
Selecting previously unselected package kubectl.
Preparing to unpack .../3-kubectl_1.31.1-1.1_amd64.deb ...
Unpacking kubectl (1.31.1-1.1) ...
Selecting previously unselected package kubernetes-cni.
Preparing to unpack .../4-kubernetes-cni_1.5.1-1.1_amd64.deb ...
Unpacking kubernetes-cni (1.5.1-1.1) ...
```

```
Setting up kubeadm (1.31.1-1.1) ...
Setting up kubelet (1.31.1-1.1) ...
Processing triggers for man-db (2.12.0-4build2) ...
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
ubuntu@ip-172-31-43-14:~$ sudo apt-mark hold kubelet kubeadm kubectl
kubelet set on hold.
kubeadm set on hold.
kubectl set on hold.
ubuntu@ip-172-31-43-14:~$ |
```

```
sudo systemctl enable --now kubelet
sudo apt-get install -y containerd
```

```
ubuntu@ip-172-31-43-14:~$ sudo systemctl enable --now kubelet
sudo apt-get install -y containerd
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  docker-buildx-plugin docker-ce-cli docker-ce-rootless-extras
  docker-compose-plugin libltdl7 libslirp0 pigz slirp4netns
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  runc
The following packages will be REMOVED:
  containerd.io docker-ce
The following NEW packages will be installed:
  containerd runc
0 upgraded, 2 newly installed, 2 to remove and 139 not upgraded.
```

```
Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
ubuntu@ip-172-31-43-14:~$ |
```

```
sudo mkdir -p /etc/containerd  
sudo containerd config default | sudo tee /etc/containerd/config.toml
```

```
ubuntu@ip-172-31-43-14:~$ sudo mkdir -p /etc/containerd  
sudo containerd config default | sudo tee /etc/containerd/config.toml  
disabled_plugins = []  
imports = []  
oom_score = 0  
plugin_dir = ""  
required_plugins = []  
root = "/var/lib/containerd"  
state = "/run/containerd"  
temp = ""  
version = 2  
  
[cgroup]  
    path = ""  
  
[debug]  
    address = ""  
    format = ""  
    gid = 0  
    level = ""  
    uid = 0  
  
[stream_processors."io.containerd.ocicrypt.decoder.v1.tar.gzip"]  
    accepts = ["application/vnd.oci.image.layer.v1.tar+gzip+encrypted"]  
    args = ["--decryption-keys-path", "/etc/containerd/ocicrypt/keys"]  
    env = ["OCICRYPT_KEYPROVIDER_CONFIG=/etc/containerd/ocicrypt/ocicrypt_ke  
yprovider.conf"]  
    path = "ctd-decoder"  
    returns = "application/vnd.oci.image.layer.v1.tar+gzip"  
  
[timeouts]  
    "io.containerd.timeout.bolt.open" = "0s"  
    "io.containerd.timeout.metrics.shimstats" = "2s"  
    "io.containerd.timeout.shim.cleanup" = "5s"  
    "io.containerd.timeout.shim.load" = "5s"  
    "io.containerd.timeout.shim.shutdown" = "3s"  
    "io.containerd.timeout.task.state" = "2s"  
  
[ttrpc]  
    address = ""  
    gid = 0  
    uid = 0  
ubuntu@ip-172-31-43-14:~$ |
```

```
sudo systemctl restart containerd  
sudo systemctl enable containerd  
sudo systemctl status containerd
```

```
ubuntu@ip-172-31-43-14:~$ sudo systemctl restart containerd  
sudo systemctl enable containerd  
sudo systemctl status containerd  
● containerd.service - containerd container runtime  
  Loaded: loaded (/usr/lib/systemd/system/containerd.service; enabled; p  
  Active: active (running) since Tue 2024-09-24 16:40:33 UTC; 327ms ago  
    Docs: https://containerd.io  
  Main PID: 4933 (containerd)  
    Tasks: 8  
   Memory: 13.6M (peak: 13.9M)  
     CPU: 86ms  
   CGroup: /system.slice/containerd.service  
          └─4933 /usr/bin/containerd  
  
Sep 24 16:40:33 ip-172-31-43-14 containerd[4933]: time="2024-09-24T16:40:33Z"  
Sep 24 16:40:33 ip-172-31-43-14 systemd[1]: Started containerd.service - co
```

```
ubuntu@ip-172-31-43-14:~$ sudo systemctl restart containerd
sudo systemctl enable containerd
sudo systemctl status containerd
● containerd.service - containerd container runtime
   Loaded: loaded (/usr/lib/systemd/system/containerd.service; enabled; p>
   Active: active (running) since Tue 2024-09-24 16:43:53 UTC; 326ms ago
     Docs: https://containerd.io
   Main PID: 5143 (containerd)
      Tasks: 7
     Memory: 13.5M (peak: 14.3M)
        CPU: 110ms
      CGroup: /system.slice/containerd.service
              └─5143 /usr/bin/containerd

Sep 24 16:43:53 ip-172-31-43-14 containerd[5143]: time="2024-09-24T16:43:53>
Sep 24 16:43:53 ip-172-31-43-14 systemd[1]: Started containerd.service - co>
Lines 1-21/21 (END)

● containerd.service - containerd container runtime
   Loaded: loaded (/usr/lib/systemd/system/containerd.service; enabled; preset: enabled)
   Active: active (running) since Tue 2024-09-24 16:43:53 UTC; 326ms ago
     Docs: https://containerd.io
   Main PID: 5143 (containerd)
      Tasks: 7
     Memory: 13.5M (peak: 14.3M)
        CPU: 110ms
      CGroup: /system.slice/containerd.service
              └─5143 /usr/bin/containerd
```

sudo apt-get install -y socat

```
ubuntu@ip-172-31-43-14:~$ sudo apt-get install -y socat
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  docker-buildx-plugin docker-ce-cli docker-ce-rootless-extras
  docker-compose-plugin libltdl7 libslirp0 pigz slirp4netns
Use 'sudo apt autoremove' to remove them.
The following NEW packages will be installed:
  socat
0 upgraded, 1 newly installed, 0 to remove and 139 not upgraded.
Need to get 374 kB of archives.
After this operation, 1649 kB of additional disk space will be used.
Get:1 http://eu-north-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 socat
  amd64 1.8.0.0-4build3 [374 kB]
Fetched 374 kB in 0s (13.1 MB/s)
Selecting previously unselected package socat.
(Reading database ... 68108 files and directories currently installed.)
Preparing to unpack .../socat_1.8.0.0-4build3_amd64.deb ...
Unpacking socat (1.8.0.0-4build3) ...
Setting up socat (1.8.0.0-4build3) ...
Processing triggers for man-db (2.12.0-4build2) ...
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
ubuntu@ip-172-31-43-14:~$ |
```

Run on master only

Step 6: Initialize the Kubecluster .

```
sudo kubeadm init --pod-network-cidr=10.244.0.0/16
```

```
ubuntu@ip-172-31-43-14:~$ sudo kubeadm init --pod-network-cidr=10.244.0.0/16
[init] Using Kubernetes version: v1.31.0
[preflight] Running pre-flight checks
[preflight] Pulling images required for setting up a Kubernetes cluster
[preflight] This might take a minute or two, depending on the speed of your
internet connection
[preflight] You can also perform this action beforehand using 'kubeadm config images pull'
W0924 16:50:39.484946      5597 checks.go:846] detected that the sandbox image
"registry.k8s.io/pause:3.8" of the container runtime is inconsistent with t
hat used by kubeadm. It is recommended to use "registry.k8s.io/pause:3.10" as
the CRI sandbox image.
```

```
You should now deploy a pod network to the cluster.  
Run "kubectl apply -f [podnetwork].yaml" with one of the options listed at:  
https://kubernetes.io/docs/concepts/cluster-administration/addons/
```

Then you can join any number of worker nodes by running the following on each as root:

```
kubeadm join 172.31.43.14:6443 --token b84q3o.sj81phrsio2i35r9 \  
--discovery-token-ca-cert-hash sha256:1910a628058fc97f2da7c6121dfc1ed022fc1d68301f07bdd2afa0f7311c454  
ubuntu@ip-172-31-43-14:~$
```

Run this command on master and also copy and save the Join command from above.
mkdir -p \$HOME/.kube sudo cp -i /etc/kubernetes/admin.conf \$HOME/.kube/config
sudo chown \$(id -u):\$(id -g) \$HOME/.kube/config

```
ubuntu@ip-172-31-43-14:~$ mkdir -p $HOME/.kube  
sudo cp -i /etc/kubernetes/admin.conf $HOME/.kube/config  
sudo chown $(id -u):$(id -g) $HOME/.kube/config  
ubuntu@ip-172-31-43-14:~$ |
```

Step 7: Now Run the command kubectl get nodes to see the nodes before executing Join command on nodes.

```
ubuntu@ip-172-31-43-14:~$ kubectl get nodes  
NAME           STATUS    ROLES      AGE   VERSION  
ip-172-31-43-14  NotReady control-plane  2m34s  v1.31.1  
ubuntu@ip-172-31-43-14:~$ |
```

Run on node:

```
ubuntu@ip-172-31-32-65:~$ sudo kubeadm join 172.31.43.14:6443 --token b84q3o
.sj81phrsio2i35r9 \
    --discovery-token-ca-cert-hash sha256:1910a628058fc97f2da7c6121dfc1e
d022fc1d68301f07bdd2afa0f7311c454
[preflight] Running pre-flight checks
[preflight] Reading configuration from the cluster...
[preflight] FYI: You can look at this config file with 'kubectl -n kube-syst
em get cm kubeadm-config -o yaml'
[kubelet-start] Writing kubelet configuration to file "/var/lib/kubelet/conf
ig.yaml"
[kubelet-start] Writing kubelet environment file with flags to file "/var/li
b/kubelet/kubeadm-flags.env"
[kubelet-start] Starting the kubelet
[kubelet-check] Waiting for a healthy kubelet at http://127.0.0.1:10248/heal
thz. This can take up to 4m0s
[kubelet-check] The kubelet is healthy after 501.634348ms
[kubelet-start] Waiting for the kubelet to perform the TLS Bootstrap

This node has joined the cluster:
* Certificate signing request was sent to apiserver and a response was recei
ved.
* The Kubelet was informed of the new secure connection details.

Run 'kubectl get nodes' on the control-plane to see this node join the clust
er.

ubuntu@ip-172-31-32-65:~$ |
```

On master

Step 9: Now Run the command kubectl get nodes to see the nodes after executing Join command on nodes.

```
ubuntu@ip-172-31-43-14:~$ kubectl get nodes
NAME           STATUS      ROLES      AGE      VERSION
ip-172-31-32-65  NotReady   <none>     2m24s   v1.31.1
ip-172-31-43-14  NotReady   control-plane 48m     v1.31.1
ubuntu@ip-172-31-43-14:~$ |
```

Step 10: Since Status is NotReady we have to add a network plugin. And also we have to give the name to the nodes.

```
kubectl apply -f https://docs.projectcalico.org/manifests/calico.yaml
```

```
ubuntu@ip-172-31-43-14:~$ kubectl apply -f https://docs.projectcalico.org/ma
nifests/calico.yaml
poddisruptionbudget.policy/calico-kube-controllers created
serviceaccount/calico-kube-controllers created
serviceaccount/calico-node created
configmap/calico-config created
customresourcedefinition.apiextensions.k8s.io/bgpconfigurations.crd.projectc
alico.org created
customresourcedefinition.apiextensions.k8s.io/bgppeers.crd.projectcalico.org
created
customresourcedefinition.apiextensions.k8s.io/blockaffinities.crd.projectcal
ico.org created
customresourcedefinition.apiextensions.k8s.io/caliconodestatuses.crd.project
calico.org created
customresourcedefinition.apiextensions.k8s.io/clusterinformations.crd.proje
tcalico.org created
customresourcedefinition.apiextensions.k8s.io/felixconfigurations.crd.proje
tcalico.org created
customresourcedefinition.apiextensions.k8s.io/globalnetworkpolicies.crd.proje
ctcalico.org created
customresourcedefinition.apiextensions.k8s.io/globalnetworksets.crd.projectc
alico.org created
customresourcedefinition.apiextensions.k8s.io/hostendpoints.crd.projectcalic
o.org created
customresourcedefinition.apiextensions.k8s.io/ipamblocks.crd.projectcalico.o
rg created
```

```
sudo systemctl status kubelet
```

```

ubuntu@ip-172-31-43-14:~$ sudo systemctl status kubelet
● kubelet.service - kubelet: The Kubernetes Node Agent
  Loaded: loaded (/usr/lib/systemd/system/kubelet.service; enabled; pres-
  Drop-In: /usr/lib/systemd/system/kubelet.service.d
    └─10-kubeadm.conf
  Active: active (running) since Tue 2024-09-24 16:51:06 UTC; 50min ago
    Docs: https://kubernetes.io/docs/
  Main PID: 6271 (kubelet)
    Tasks: 11 (limit: 4586)
   Memory: 34.8M (peak: 35.5M)
      CPU: 55.314s
     CGroup: /system.slice/kubelet.service
             └─6271 /usr/bin/kubelet --bootstrap-kubeconfig=/etc/kubernetes/
               kubeconfig --config=/etc/kubernetes/manifests --v=2

Sep 24 17:41:09 ip-172-31-43-14 kubelet[6271]: > pod="kube-system/calico-k
Sep 24 17:41:09 ip-172-31-43-14 kubelet[6271]: E0924 17:41:09.662382 627
Sep 24 17:41:09 ip-172-31-43-14 kubelet[6271]:           rpc error: code = Un
Sep 24 17:41:09 ip-172-31-43-14 kubelet[6271]:           : unknown
Sep 24 17:41:09 ip-172-31-43-14 kubelet[6271]: > podSandboxID="55cd262ca32
Sep 24 17:41:09 ip-172-31-43-14 kubelet[6271]: E0924 17:41:09.662435 627
Sep 24 17:41:09 ip-172-31-43-14 kubelet[6271]: E0924 17:41:09.662494 627
Sep 24 17:41:09 ip-172-31-43-14 kubelet[6271]: I0924 17:41:09.756328 627
Sep 24 17:41:11 ip-172-31-43-14 kubelet[6271]: I0924 17:41:11.685597 627
Sep 24 17:41:11 ip-172-31-43-14 kubelet[6271]: E0924 17:41:11.685797 627

```

Now Run command kubectl get nodes -o wide we can see Status is ready.

```

ubuntu@ip-172-31-43-14:~$ kubectl get nodes -o wide
NAME      STATUS  ROLES      AGE     VERSION  INTERNAL-IP  EXTERNAL-IP  OS-IMAGE      KERNEL-VERSION  CONTAINER-RUNTIME
ip-172-31-32-65  Ready   <none>    4m50s   v1.31.1  172.31.32.65  <none>       Ubuntu 24.04 LTS  6.8.0-1012-aws  containerd://1.7.12
ip-172-31-43-14  Ready   control-plane  50m    v1.31.1  172.31.43.14  <none>       Ubuntu 24.04 LTS  6.8.0-1012-aws  containerd://1.7.12
ubuntu@ip-172-31-43-14:~$ |

```

Now to Rename run this command

kubectl label node ip-172-31-18-135 kubernetes.io/role=worker

Rename to Node 1:

kubectl label node ip-172-31-28-117 kubernetes.io/role=Node1

```

ubuntu@ip-172-31-43-14:~$ kubectl label node ip-172-31-32-65 kubernetes.io/r
ole=Node1
node/ip-172-31-32-65 labeled
ubuntu@ip-172-31-43-14:~$ |

```

```

ubuntu@ip-172-31-43-14:~$ kubectl get nodes -o wide
NAME      STATUS  ROLES      AGE     VERSION  INTERNAL-IP  EXTERNAL-IP  OS-IMAGE      KERNEL-VERSION  CONTAINER-RUNTIME
ip-172-31-32-65  Ready   Node1     7m31s   v1.31.1  172.31.32.65  <none>       Ubuntu 24.04 LTS  6.8.0-1012-aws  containerd://1.7.12
ip-172-31-43-14  Ready   control-plane  53m    v1.31.1  172.31.43.14  <none>       Ubuntu 24.04 LTS  6.8.0-1012-aws  containerd://1.7.12
ubuntu@ip-172-31-43-14:~$ |

```

run kubectl get nodes

```
ubuntu@ip-172-31-43-14:~$ kubectl get nodes
NAME           STATUS   ROLES      AGE     VERSION
ip-172-31-32-65 Ready    Node1      8m17s   v1.31.1
ip-172-31-43-14 Ready    control-plane 54m     v1.31.1
ubuntu@ip-172-31-43-14:~$ |
```

Experiment 4

Aim: To install Kubectl and execute Kubectl commands to manage the Kubernetes cluster and deploy Your First Kubernetes Application.

Step 1: Log in to your AWS Academy/personal account and launch a new Ec2 Instance. Select Ubuntu as AMI and t2.medium as Instance Type, create a key of type RSA with .pem extension, and move the downloaded key to the new folder

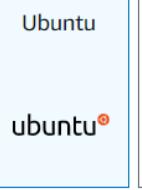
Name
experiment4 [Add additional tags](#)

▼ Application and OS Images (Amazon Machine Image) [Info](#)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below

Search our full catalog including 1000s of application and OS images

[Recents](#) [Quick Start](#)

 [Browse more AMIs](#)
Including AMIs from AWS, Marketplace and the Community

Amazon Machine Image (AMI)

Ubuntu Server 24.04 LTS (HVM), SSD Volume Type ami-04cdc91e49cb06165 (64-bit (x86)) / ami-02b7539372433cf6b (64-bit (Arm)) Virtualization: hvm ENA enabled: true Root device type: ebs	Free tier eligible
--	--------------------

▼ Instance type [Info](#) | [Get advice](#)

Instance type

t3.medium

Family: t3 2 vCPU 4 GiB Memory Current generation: true
On-Demand RHEL base pricing: 0.072 USD per Hour
On-Demand Linux base pricing: 0.0432 USD per Hour
On-Demand Windows base pricing: 0.0616 USD per Hour
On-Demand SUSE base pricing: 0.0995 USD per Hour

▼

All generations

[Compare instance types](#)

Additional costs apply for AMIs with pre-installed software

▼ Key pair (login) [Info](#)

You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

Key pair name - *required*

worker_key

▼

 [Create new key pair](#)

EC2 > Instances > Launch an instance

 Success
Successfully initiated launch of instance (i-09bc04278935d87f4)

▶ Launch log

Connect to instance Info

Connect to your instance i-09bc04278935d87f4 (experiment4) using any of these options

EC2 Instance Connect

Session Manager

SSH client

EC2 serial console

Instance ID

[i-09bc04278935d87f4 \(experiment4\)](#)

1. Open an SSH client.
2. Locate your private key file. The key used to launch this instance is `worker_key.pem`
3. Run this command, if necessary, to ensure your key is not publicly viewable.
 `chmod 400 "worker_key.pem"`
4. Connect to your instance using its Public DNS:
 `ec2-13-60-30-82.eu-north-1.compute.amazonaws.com`

Example:

`ssh -i "worker_key.pem" ubuntu@ec2-13-60-30-82.eu-north-1.compute.amazonaws.com`

i Note: In most cases, the guessed username is correct. However, read your AMI usage instructions to check if the AMI owner has changed the default AMI username.

Step 3: Now open the folder in the terminal where our .pem key is stored and paste the Example command

```
PS C:\Users\siddi\downloads> cd exp4
PS C:\Users\siddi\downloads\exp4> ssh -i "worker_key.pem" ubuntu@ec2-13-60-3
0-82.eu-north-1.compute.amazonaws.com
The authenticity of host 'ec2-13-60-30-82.eu-north-1.compute.amazonaws.com' (64:ff9b::d3c:1e52) can't be established.
ED25519 key fingerprint is SHA256:poqkTnWc7IrjE4zQbuKp8iPtPdLEF+pM5aZMfdtY9L
o.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'ec2-13-60-30-82.eu-north-1.compute.amazonaws.com' (ED25519) to the list of known hosts.
Welcome to Ubuntu 24.04 LTS (GNU/Linux 6.8.0-1012-aws x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/pro

System information as of Tue Sep 24 18:53:42 UTC 2024

System load: 0.11          Temperature:      -273.1 C
Usage of /: 22.8% of 6.71GB Processes:        112
Memory usage: 5%           Users logged in:   0
Swap usage: 0%             IPv4 address for ens5: 172.31.37.243
```

Step 4: Run the below commands to install and setup Docker. curl -fsSL

```
https://download.docker.com/linux/ubuntu/gpg | sudo apt-key add - curl -fsSL
```

```
https://download.docker.com/linux/ubuntu/gpg | sudo tee /etc/apt/trusted.gpg.d/docker.gpg > /dev/null
sudo add-apt-repository "deb [arch=amd64] https://download.docker.com/linux/ubuntu
$(lsb_release -cs) stable"
```

```
ubuntu@ip-172-31-37-243:~$ curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo apt-key add -
curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo tee /etc/apt/trusted.gpg.d/docker.gpg > /dev/null
sudo add-apt-repository "deb [arch=amd64] https://download.docker.com/linux/ubuntu
$(lsb_release -cs) stable"
Warning: apt-key is deprecated. Manage keyring files in trusted.gpg.d instead (see apt-key(8)).
OK
-----BEGIN PGP PUBLIC KEY BLOCK-----
mQINBFit2ioBEADhWpZ8/wvZ6hUTiX0wQHXMAlaFHcPH9hAtr4F1y2+0YdbtMuth
lqqwp028AqyY+PRfVmTSYMbjuQuu5byyKR01BbqYhuS3jtqQmljZ/bJvXqnmiVXh
38UuLa+z077PxyxQhu5BbqntTPQMfiyqEiU+BKbq2WmANUKQf+1AmZY/IruOXbnq
L4C1+gJ8vfmXQt99npCaxEjaNRVYf0S8QcixNzHUYnb6emj1ANyEVlZzeqo7XkL7
UrwV5inawTSzWNvtjEjj4nJL8NsLwscpLPQUhTQ+7BbQXAwAmeHCUTQIVvWXqw0N
cmhh4HgeQscQHYg0JjjDVfoY5MucvgIbIgCqfzAHW9jxmRL4qbMZj+b1XoePEht
ku4bIQN1X5P07fNWzIgaRL5Z4POXDDZTLIQ/E158j9kp4bnWRCJW0lya+f8ocodo
vZZ+Doi+fy4D5ZGrL4XEciQP/Lv5uFyf+kQtI/94VFYVJOleAv8W92KdgDkhTcTD
G7c0tIkVEKNUq48b3aQ64NOZQW7fVjfokwEZd0qPE72Pa45jrZzvUFxSpdiNk2tZ
XYukHjlxxEgBdC/J3cMMNRE1F4NCA3ApfV1Y7/hTeOnmDuDYwr9/obA8t016Yljj
```

```
on-en [2808 B]
Get:51 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 Components [208 B]
Get:52 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 c-n -f Metadata [344 B]
Fetched 29.1 MB in 5s (5866 kB/s)
Reading package lists... Done
W: https://download.docker.com/linux/ubuntu/dists/noble/InRelease: Key is stored in legacy trusted.gpg keyring (/etc/apt/trusted.gpg), see the DEPRECATION section in apt-key(8) for details.
ubuntu@ip-172-31-37-243:~$ |
```

sudo apt-get update

sudo apt-get install -y docker-ce

```
ubuntu@ip-172-31-37-243:~$ sudo apt-get update
sudo apt-get install -y docker-ce
Hit:1 http://eu-north-1.ec2.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://eu-north-1.ec2.archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:3 http://eu-north-1.ec2.archive.ubuntu.com/ubuntu noble-backports InRelease
Reading package lists... Done
W: https://download.docker.com/linux/ubuntu/dists/noble/InRelease: Key is stored in legacy trusted.gpg keyring (/etc/apt/trusted.gpg), see the DEPRECATION section in apt-key(8) for details.
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
```

```
Setting up docker-ce (5:27.3.1-1~ubuntu.24.04~noble) ...
Created symlink /etc/systemd/system/multi-user.target.wants/docker.service →
/usr/lib/systemd/system/docker.service.
Created symlink /etc/systemd/system/sockets.target.wants/docker.socket → /usr/lib/systemd/system/docker.socket.
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for libc-bin (2.39-0ubuntu8.2) ...
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
ubuntu@ip-172-31-37-243:~$ |
```

```
sudo mkdir -p /etc/docker
cat <<EOF | sudo tee /etc/docker/daemon.json
{
  "exec-opts": ["native.cgroupdriver=systemd"]
}
EOF
```

```
ubuntu@ip-172-31-37-243:~$ sudo mkdir -p /etc/docker
cat <<EOF | sudo tee /etc/docker/daemon.json
{
  "exec-opts": ["native.cgroupdriver=systemd"]
}
EOF
{
  "exec-opts": ["native.cgroupdriver=systemd"]
}
ubuntu@ip-172-31-37-243:~$ |
```

```
sudo systemctl enable docker
sudo systemctl daemon-reload
sudo systemctl restart docker
```

```
ubuntu@ip-172-31-37-243:~$ sudo systemctl enable docker
sudo systemctl daemon-reload
sudo systemctl restart docker
Synchronizing state of docker.service with SysV service script with /usr/lib
/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable docker
ubuntu@ip-172-31-37-243:~$ |
```

Step 5: Run the below command to install Kubernets.

```
curl -fsSL https://pkgs.k8s.io/core:/stable:/v1.31/deb/Release.key | sudo gpg --dearmor -o
/etc/apt/keyrings/kubernetes-apt-keyring.gpg echo 'deb
[signed-by=/etc/apt/keyrings/kubernetes-apt-keyring.gpg]
https://pkgs.k8s.io/core:/stable:/v1.31/deb/ /' |
```

```
sudo tee /etc/apt/sources.list.d/kubernetes.list
```

```
ubuntu@ip-172-31-37-243:~$ curl -fsSL https://pkgs.k8s.io/core:/stable:/v1.3
1/deb/Release.key | sudo gpg --dearmor -o
/etc/apt/keyrings/kubernetes-apt-keyring.gpg
echo 'deb [signed-by=/etc/apt/keyrings/kubernetes-apt-keyring.gpg]
https://pkgs.k8s.io/core:/stable:/v1.31/deb/ /' | sudo tee /etc/apt/sources.
list.d/kubernetes.list
gpg: missing argument for option "-o"
-bash: /etc/apt/keyrings/kubernetes-apt-keyring.gpg: No such file or directo
ry
deb [signed-by=/etc/apt/keyrings/kubernetes-apt-keyring.gpg]
https://pkgs.k8s.io/core:/stable:/v1.31/deb/
ubuntu@ip-172-31-37-243:~$ |
```

Error:

```
ubuntu@ip-172-31-37-243:~$ sudo apt-get update
sudo apt-get install -y kubelet kubeadm kubectl
sudo apt-mark hold kubelet kubeadm kubectl
E: Malformed entry 1 in list file /etc/apt/sources.list.d/kubernetes.list (U
RI)
E: The list of sources could not be read.
E: Malformed entry 1 in list file /etc/apt/sources.list.d/kubernetes.list (U
RI)
E: The list of sources could not be read.
E: Malformed entry 1 in list file /etc/apt/sources.list.d/kubernetes.list (U
RI)
E: The list of sources could not be read.
```

```
ubuntu@ip-172-31-37-243:~$ sudo mkdir -p /etc/apt/keyrings
ubuntu@ip-172-31-37-243:~$ curl -fsSL https://pkgs.k8s.io/core:/stable:/v1.3
1/deb/Release.key | sudo gpg --dearmor -o
/etc/apt/keyrings/kubernetes-apt-keyring.gpg
echo 'deb [signed-by=/etc/apt/keyrings/kubernetes-apt-keyring.gpg]
https://pkgs.k8s.io/core:/stable:/v1.31/deb/ /' | sudo tee /etc/apt/sources.
list.d/kubernetes.list
gpg: missing argument for option "-o"
-bash: /etc/apt/keyrings/kubernetes-apt-keyring.gpg: No such file or directo
ry
deb [signed-by=/etc/apt/keyrings/kubernetes-apt-keyring.gpg]
https://pkgs.k8s.io/core:/stable:/v1.31/deb/ /
ubuntu@ip-172-31-37-243:~$ sudo apt-get update
sudo apt-get install -y kubelet kubeadm kubectl
sudo apt-mark hold kubelet kubeadm kubectl
E: Malformed entry 1 in list file /etc/apt/sources.list.d/kubernetes.list (U
RI)
E: The list of sources could not be read.
E: Malformed entry 1 in list file /etc/apt/sources.list.d/kubernetes.list (U
RI)
E: The list of sources could not be read.
E: Malformed entry 1 in list file /etc/apt/sources.list.d/kubernetes.list (U
RI)
E: The list of sources could not be read.
ubuntu@ip-172-31-37-243:~$ sudo mkdir -p /etc/apt/keyrings
ubuntu@ip-172-31-37-243:~$ curl -fsSL https://pkgs.k8s.io/core:/stable:/v1.3
1/deb/Release.key | sudo gpg --dearmor -o /etc/apt/keyrings/kubernetes-apt-k
eyring.gpg
ubuntu@ip-172-31-37-243:~$ echo "deb [signed-by=/etc/apt/keyrings/kubernetes-
apt-keyring.gpg] https://pkgs.k8s.io/core:/stable:/v1.31/deb/ /" | sudo tee
/etc/apt/sources.list.d/kubernetes.list
deb [signed-by=/etc/apt/keyrings/kubernetes-apt-keyring.gpg] https://pkgs.k8
s.io/core:/stable:/v1.31/deb/
ubuntu@ip-172-31-37-243:~$ sudo apt-get update
Hit:1 http://eu-north-1.ec2.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://eu-north-1.ec2.archive.ubuntu.com/ubuntu noble-updates InReleas
e
Hit:3 http://eu-north-1.ec2.archive.ubuntu.com/ubuntu noble-backports InRele
ase
```

```
ubuntu@ip-172-31-37-243:~$ sudo apt-get install -y kubelet kubeadm kubectl
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  conntrack cri-tools kubernetes-cni
The following NEW packages will be installed:
  conntrack cri-tools kubeadm kubectl kubelet kubernetes-cni
0 upgraded, 6 newly installed, 0 to remove and 139 not upgraded.
Need to get 87.4 MB of archives.
After this operation, 314 MB of additional disk space will be used.
Get:1 http://eu-north-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 conntrack amd64 1:1.4.8-1ubuntu1 [37.9 kB]
Get:2 https://prod-cdn.packages.k8s.io/repositories/isv:/kubernetes:/core:/stable:/v1.31/deb cri-tools 1.31.1-1.1 [15.7 MB]
Get:3 https://prod-cdn.packages.k8s.io/repositories/isv:/kubernetes:/core:/stable:/v1.31/deb kubeadm 1.31.1-1.1 [11.4 MB]
Get:4 https://prod-cdn.packages.k8s.io/repositories/isv:/kubernetes:/core:/stable:/v1.31/deb kubectl 1.31.1-1.1 [11.2 MB]
Get:5 https://prod-cdn.packages.k8s.io/repositories/isv:/kubernetes:/core:/stable:/v1.31/deb kubernetes-cni 1.5.1-1.1 [33.9 MB]
Get:6 https://prod-cdn.packages.k8s.io/repositories/isv:/kubernetes:/core:/stable:/v1.31/deb kubelet 1.31.1-1.1 [15.2 MB]
Fetched 87.4 MB in 1s (78.5 MB/s)
Selecting previously unselected package conntrack.
(Reading database ... 68007 files and directories currently installed.)
Preparing to unpack .../0-conntrack_1%3a1.4.8-1ubuntu1_amd64.deb ...
Unpacking conntrack (1:1.4.8-1ubuntu1) ...
Selecting previously unselected package cri-tools.
Preparing to unpack .../1-cri-tools_1.31.1-1.1_amd64.deb ...
Unpacking cri-tools (1.31.1-1.1) ...
Selecting previously unselected package kubeadm.
Preparing to unpack .../2-kubeadm_1.31.1-1.1_amd64.deb ...
Unpacking kubeadm (1.31.1-1.1) ...
Selecting previously unselected package kubectl.

Setting up kubelet (1.31.1-1.1) ...
Setting up kubeadm (1.31.1-1.1) ...
Processing triggers for man-db (2.12.0-4build2) ...
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
ubuntu@ip-172-31-37-243:~$ sudo apt-mark hold kubelet kubeadm kubectl
kubelet set on hold.
kubeadm set on hold.
kubectl set on hold.
ubuntu@ip-172-31-37-243:~$ |
```

```
sudo systemctl enable --now kubelet
```

```
sudo kubeadm init --pod-network-cidr=10.244.0.0/16
```

```
ubuntu@ip-172-31-37-243:~$ sudo systemctl enable --now kubelet
sudo kubeadm init --pod-network-cidr=10.244.0.0/16
[init] Using Kubernetes version: v1.31.0
[preflight] Running pre-flight checks
W0924 19:06:55.141347    4241 checks.go:1080] [preflight] WARNING: Couldn't
create the interface used for talking to the container runtime: failed to cr
eate new CRI runtime service: validate service connection: validate CRI v1 r
untime API for endpoint "unix:///var/run/containerd/containerd.sock": rpc er
ror: code = Unimplemented desc = unknown service runtime.v1.RuntimeService
        [WARNING FileExisting-socat]: socat not found in system path
[preflight] Pulling images required for setting up a Kubernetes cluster
[preflight] This might take a minute or two, depending on the speed of your
internet connection
[preflight] You can also perform this action beforehand using 'kubeadm config
images pull'
error execution phase preflight: [preflight] Some fatal errors occurred:
failed to create new CRI runtime service: validate service connection: valid
ate CRI v1 runtime API for endpoint "unix:///var/run/containerd/containerd.s
ock": rpc error: code = Unimplemented desc = unknown service runtime.v1.Runt
imeService[preflight] If you know what you are doing, you can make a check n
on-fatal with '--ignore-preflight-errors=...'
To see the stack trace of this error execute with --v=5 or higher
ubuntu@ip-172-31-37-243:~$ |
```

```
sudo apt-get install -y containerd
```

```
ubuntu@ip-172-31-37-243:~$ sudo apt-get install -y containerd
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  docker-buildx-plugin docker-ce-cli docker-ce-rootless-extras
  docker-compose-plugin libltdl7 libslirp0 pigz slirp4netns
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  runc
The following packages will be REMOVED:
  containerd.io docker-ce
The following NEW packages will be installed:
  containerd runc
0 upgraded, 2 newly installed, 2 to remove and 139 not upgraded.
Need to get 47.2 MB of archives.
After this operation, 53.1 MB disk space will be freed.
Get:1 http://eu-north-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 runc amd64 1.1.12-0ubuntu3.1 [8599 kB]
Get:2 http://eu-north-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 containerd amd64 1.7.12-0ubuntu4.1 [38.6 MB]
Fetched 47.2 MB in 1s (81.0 MB/s)
(Reading database ... 68064 files and directories currently installed.)
Removing docker-ce (5:27.3.1-1~ubuntu.24.04~noble) ...
Removing containerd.io (1.7.22-1) ...
Selecting previously unselected package runc.
(Reading database ... 68044 files and directories currently installed.)
Preparing to unpack .../runc_1.1.12-0ubuntu3.1_amd64.deb ...
Unpacking runc (1.1.12-0ubuntu3.1) ...
Selecting previously unselected package containerd.
Preparing to unpack .../containerd_1.7.12-0ubuntu4.1_amd64.deb ...
Unpacking containerd (1.7.12-0ubuntu4.1) ...
Setting up runc (1.1.12-0ubuntu3.1) ...
Setting up containerd (1.7.12-0ubuntu4.1) ...
Processing triggers for man-db (2.12.0-4build2) ...
Scanning processes...
Scanning linux images...
```

```
sudo mkdir -p /etc/containerd  
sudo containerd config default | sudo tee /etc/containerd/config.toml
```

```
ubuntu@ip-172-31-37-243:~$ sudo mkdir -p /etc/containerd  
sudo containerd config default | sudo tee /etc/containerd/config.toml  
disabled_plugins = []  
imports = []  
oom_score = 0  
plugin_dir = ""  
required_plugins = []  
root = "/var/lib/containerd"  
state = "/run/containerd"  
temp = ""  
version = 2  
  
[cgroup]  
    path = ""  
  
[debug]  
    address = ""  
    format = ""  
    gid = 0  
    level = ""  
    uid = 0  
  
[timeouts]  
    "io.containerd.timeout.bolt.open" = "0s"  
    "io.containerd.timeout.metrics.shimstats" = "2s"  
    "io.containerd.timeout.shim.cleanup" = "5s"  
    "io.containerd.timeout.shim.load" = "5s"  
    "io.containerd.timeout.shim.shutdown" = "3s"  
    "io.containerd.timeout.task.state" = "2s"  
  
[ttrpc]  
    address = ""  
    gid = 0  
    uid = 0  
ubuntu@ip-172-31-37-243:~$
```

```
sudo systemctl restart containerd  
sudo systemctl enable containerd  
sudo systemctl status containerd
```

```
ubuntu@ip-172-31-37-243:~$ sudo systemctl restart containerd
sudo systemctl enable containerd
sudo systemctl status containerd
● containerd.service - containerd container runtime
   Loaded: loaded (/usr/lib/systemd/system/containerd.service; enabled; pres
   Active: active (running) since Tue 2024-09-24 19:09:13 UTC; 325ms ago
     Docs: https://containerd.io
Main PID: 4718 (containerd)
   Tasks: 8
  Memory: 13.2M (peak: 13.8M)
    CPU: 73ms
   CGroup: /system.slice/containerd.service
           └─4718 /usr/bin/containerd

Sep 24 19:09:13 ip-172-31-37-243 containerd[4718]: time="2024-09-24T19:09:13+00:00" level=info msg="Starting containerd"
Sep 24 19:09:13 ip-172-31-37-243 containerd[4718]: time="2024-09-24T19:09:13+00:00" level=info msg="Listening on /run/containerd/containerd.sock"
Sep 24 19:09:13 ip-172-31-37-243 containerd[4718]: time="2024-09-24T19:09:13+00:00" level=info msg="Listening on /run/containerd/containerd.sock"
Sep 24 19:09:13 ip-172-31-37-243 containerd[4718]: time="2024-09-24T19:09:13+00:00" level=info msg="Listening on /run/containerd/containerd.sock"
Sep 24 19:09:13 ip-172-31-37-243 containerd[4718]: time="2024-09-24T19:09:13+00:00" level=info msg="Listening on /run/containerd/containerd.sock"
Sep 24 19:09:13 ip-172-31-37-243 containerd[4718]: time="2024-09-24T19:09:13+00:00" level=info msg="Listening on /run/containerd/containerd.sock"
Sep 24 19:09:13 ip-172-31-37-243 containerd[4718]: time="2024-09-24T19:09:13+00:00" level=info msg="Listening on /run/containerd/containerd.sock"
Sep 24 19:09:13 ip-172-31-37-243 containerd[4718]: time="2024-09-24T19:09:13+00:00" level=info msg="Listening on /run/containerd/containerd.sock"
Sep 24 19:09:13 ip-172-31-37-243 containerd[4718]: time="2024-09-24T19:09:13+00:00" level=info msg="Listening on /run/containerd/containerd.sock"
Sep 24 19:09:13 ip-172-31-37-243 containerd[4718]: time="2024-09-24T19:09:13+00:00" level=info msg="Listening on /run/containerd/containerd.sock"
Sep 24 19:09:13 ip-172-31-37-243 systemd[1]: Started containerd.service - container runtime
Sep 24 19:09:13 ip-172-31-37-243 containerd[4718]: time="2024-09-24T19:09:13+00:00" level=info msg="Listening on /run/containerd/containerd.sock"
Lines 1-21/21 (END)
● containerd.service - containerd container runtime
   Loaded: loaded (/usr/lib/systemd/system/containerd.service; enabled; preset: enabled)
   Active: active (running) since Tue 2024-09-24 19:09:13 UTC; 325ms ago
     Docs: https://containerd.io
Main PID: 4718 (containerd)
   Tasks: 8
  Memory: 13.2M (peak: 13.8M)
    CPU: 73ms
   CGroup: /system.slice/containerd.service
           └─4718 /usr/bin/containerd
```

```
sudo apt-get install -y socat
```

```
ubuntu@ip-172-31-37-243:~$ sudo apt-get install -y socat
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  docker-buildx-plugin docker-ce-cli docker-ce-rootless-extras docker-compose-plugin libltdl7 libsslrp0 pigz slirp4netns
Use 'sudo apt autoremove' to remove them.
The following NEW packages will be installed:
  socat
0 upgraded, 1 newly installed, 0 to remove and 139 not upgraded.
Need to get 374 kB of archives.
After this operation, 1649 kB of additional disk space will be used.
Get:1 http://eu-north-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 socat amd64 1.8.0.0-4build3 [374 kB]
Fetched 374 kB in 0s (22.1 MB/s)
Selecting previously unselected package socat.
(Reading database ... 68108 files and directories currently installed.)
Preparing to unpack .../socat_1.8.0.0-4build3_amd64.deb ...
Unpacking socat (1.8.0.0-4build3) ...
Setting up socat (1.8.0.0-4build3) ...
Processing triggers for man-db (2.12.0-4build2) ...
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
ubuntu@ip-172-31-37-243:~$ |
```

Step 6: Initialize the Kubecluster

```
sudo kubeadm init --pod-network-cidr=10.244.0.0/16
```

```
ubuntu@ip-172-31-37-243:~$ sudo kubeadm init --pod-network-cidr=10.244.0.0/16
[init] Using Kubernetes version: v1.31.0
[preflight] Running pre-flight checks
[preflight] Pulling images required for setting up a Kubernetes cluster
[preflight] This might take a minute or two, depending on the speed of your
internet connection
[preflight] You can also perform this action beforehand using 'kubeadm config images pull'
W0924 19:12:15.863783      5009 checks.go:846] detected that the sandbox image
"registry.k8s.io/pause:3.8" of the container runtime is inconsistent with t
hat used by kubeadm. It is recommended to use "registry.k8s.io/pause:3.10" as
the CRI sandbox image.
[certs] Using certificateDir folder "/etc/kubernetes/pki"
[certs] Generating "ca" certificate and key
[certs] Generating "apiserver" certificate and key
[certs] apiserver serving cert is signed for DNS names [ip-172-31-37-243 kub
ernetes kubernetes.default kubernetes.default.svc kubernetes.default.svc.clu
ster.local] and IPs [10.96.0.1 172.31.37.243]
[certs] Generating "apiserver-kubelet-client" certificate and key
[certs] Generating "front-proxy-ca" certificate and key
[certs] Generating "front-proxy-client" certificate and key
[certs] Generating "etcd/ca" certificate and key
[certs] Generating "etcd/server" certificate and key
[certs] etcd/server serving cert is signed for DNS names [ip-172-31-37-243 l
ocalhost] and IPs [172.31.37.243 127.0.0.1 ::1]
[certs] Generating "etcd/peer" certificate and key
[certs] etcd/peer serving cert is signed for DNS names [ip-172-31-37-243 loc
alhost] and IPs [172.31.37.243 127.0.0.1 ::1]
[certs] Generating "etcd/healthcheck-client" certificate and key
[certs] Generating "apiserver-etcd-client" certificate and key
[certs] Generating "sa" key and public key
[kubeconfig] Using kubeconfig folder "/etc/kubernetes"
[kubeconfig] Writing "admin.conf" kubeconfig file
[kubeconfig] Writing "super-admin.conf" kubeconfig file
[kubeconfig] Writing "kubelet.conf" kubeconfig file
[kubeconfig] Writing "controller-manager.conf" kubeconfig file
[kubeconfig] Writing "scheduler.conf" kubeconfig file
[etcd] Creating static Pod manifest for local etcd in "/etc/kubernetes/manif
ests"
```

```
Your Kubernetes control-plane has initialized successfully!

To start using your cluster, you need to run the following as a regular user
:

mkdir -p $HOME/.kube
sudo cp -i /etc/kubernetes/admin.conf $HOME/.kube/config
sudo chown $(id -u):$(id -g) $HOME/.kube/config

Alternatively, if you are the root user, you can run:

export KUBECONFIG=/etc/kubernetes/admin.conf

You should now deploy a pod network to the cluster.
Run "kubectl apply -f [podnetwork].yaml" with one of the options listed at:
  https://kubernetes.io/docs/concepts/cluster-administration/addons/

Then you can join any number of worker nodes by running the following on each as root:

kubeadm join 172.31.37.243:6443 --token 83t146.gi18h4xivxue1bio \
    --discovery-token-ca-cert-hash sha256:d3833aa042f888a0a506ff97a41023
c5524cd0e0b533ba00adb635a5eff723d9
ubuntu@ip-172-31-37-243:~$ |
```

Copy the mkdir and chown commands from the top and execute them.

```
mkdir -p $HOME/.kube
sudo cp -i /etc/kubernetes/admin.conf $HOME/.kube/config
sudo chown $(id -u):$(id -g) $HOME/.kube/config
```

```
ubuntu@ip-172-31-37-243:~$ mkdir -p $HOME/.kube
sudo cp -i /etc/kubernetes/admin.conf $HOME/.kube/config
sudo chown $(id -u):$(id -g) $HOME/.kube/config
ubuntu@ip-172-31-37-243:~$ |
```

Add a common networking plugin called flannel as mentioned in the code.

```
kubectl apply -f
https://raw.githubusercontent.com/coreos/flannel/master/Documentation/kube-flannel.yml
```

```
ubuntu@ip-172-31-37-243:~$ kubectl apply -f https://raw.githubusercontent.com/coreos/flannel/master/Documentation/kube-flannel.yml
namespace/kube-flannel created
clusterrole.rbac.authorization.k8s.io/flannel created
clusterrolebinding.rbac.authorization.k8s.io/flannel created
serviceaccount/flannel created
configmap/kube-flannel-cfg created
daemonset.apps/kube-flannel-ds created
ubuntu@ip-172-31-37-243:~$ |
```

Step 7: Now that the cluster is up and running, we can deploy our nginx server on this cluster.

Apply this deployment file using this command to create a deployment
kubectl apply -f https://k8s.io/examples/application/deployment.yaml

```
ubuntu@ip-172-31-37-243:~$ kubectl apply -f https://k8s.io/examples/application/deployment.yaml
deployment.apps/nginx-deployment created
ubuntu@ip-172-31-37-243:~$ |
```

kubectl get pods
POD_NAME=\$(kubectl get pods -l app=nginx -o jsonpath=".items[0].metadata.name") kubectl port-forward \$POD_NAME 8081:80

kubectl taint nodes --all node-role.kubernetes.io/control-plane-node/ip-172-31-20-171 untainted
kubectl get nodes

```
ubuntu@ip-172-31-37-243:~$ kubectl get pods
NAME                           READY   STATUS    RESTARTS   AGE
nginx-deployment-d556bf558-ptclv 0/1     Pending   0          55s
nginx-deployment-d556bf558-rsgxw  0/1     Pending   0          55s
ubuntu@ip-172-31-37-243:~$ POD_NAME=$(kubectl get pods -l app=nginx -o jsonpath=".items[0].metadata.name")
ubuntu@ip-172-31-37-243:~$ kubectl port-forward $POD_NAME 8080:80
error: unable to forward port because pod is not running. Current status=Pending
ubuntu@ip-172-31-37-243:~$ kubectl taint nodes --all node-role.kubernetes.io/control-plane-node/ip-172-31-20-171 untainted
error: at least one taint update is required
ubuntu@ip-172-31-37-243:~$ kubectl get nodes
NAME           STATUS   ROLES      AGE   VERSION
ip-172-31-37-243 Ready    control-plane 10m   v1.31.1
ubuntu@ip-172-31-37-243:~$ kubectl taint nodes --all node-role.kubernetes.io/control-plane-
node/ip-172-31-37-243 untainted
ubuntu@ip-172-31-37-243:~$ kubectl get nodes
NAME           STATUS   ROLES      AGE   VERSION
ip-172-31-37-243 Ready    control-plane 10m   v1.31.1
ubuntu@ip-172-31-37-243:~$ |
```

```
ubuntu@ip-172-31-37-243:~$ POD_NAME=$(kubectl get pods -l app=nginx -o jsonpath=".items[0].metadata.name")
```

```
ubuntu@ip-172-31-37-243:~$ kubectl get pods
NAME                      READY   STATUS    RESTARTS   AGE
nginx-deployment-d556bf558-ptclv   1/1     Running   0          8m32s
nginx-deployment-d556bf558-rsgxw   1/1     Running   0          8m32s
ubuntu@ip-172-31-37-243:~$ |
```

```
ubuntu@ip-172-31-37-243:~$ kubectl port-forward $POD_NAME 8081:80
Forwarding from 127.0.0.1:8081 -> 80
Forwarding from [::1]:8081 -> 80
Forwarding from 127.0.0.1:8081 -> 80
Forwarding from [::1]:8081 -> 80
```

Step 8: Verify your deployment Open up a new terminal and ssh to your EC2 instance. Then, use this curl command to check if the Nginx server is running. curl --head http://127.0.0.1:8080

```
PS C:\Users\siddi\downloads\exp4> ssh -i "worker_key.pem" ubuntu@ec2-13-60-3
0-82.eu-north-1.compute.amazonaws.com
Welcome to Ubuntu 24.04 LTS (GNU/Linux 6.8.0-1012-aws x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/pro

System information as of Tue Sep 24 19:52:47 UTC 2024

System load: 0.01          Temperature:      -273.1 C
Usage of /:   55.5% of 6.71GB  Processes:       149
Memory usage: 20%           Users logged in:  1
Swap usage:   0%             IPv4 address for ens5: 172.31.37.243

Expanded Security Maintenance for Applications is not enabled.

143 updates can be applied immediately.
41 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

Last login: Tue Sep 24 19:41:15 2024 from 152.57.249.67
ubuntu@ip-172-31-37-243:~$ curl --head http://127.0.0.1:8080
HTTP/1.1 200 OK
Server: nginx/1.14.2
Date: Tue, 24 Sep 2024 19:53:04 GMT
Content-Type: text/html
Content-Length: 612
Last-Modified: Tue, 04 Dec 2018 14:44:49 GMT
Connection: keep-alive
ETag: "5c0692e1-264"
Accept-Ranges: bytes

ubuntu@ip-172-31-37-243:~$ |
```

Experiment 5

Aim: To understand terraform lifecycle, core concepts/terminologies and install it on a Linux Machine and Windows.

Terraform is a popular infrastructure-as-code tool that allows you to automate the provisioning and management of infrastructure resources. It uses configuration files written in the HashiCorp Configuration Language (HCL) to define the desired state of your infrastructure, and it uses various commands to apply those configurations and manage your infrastructure resources.

What is Hashicorp Terraform?

Terraform is an open-source infrastructure as code (IaC) software tool which can be used to provision the infrastructure of a cloud platform. The scripts which have been used to provision infrastructure can be human-readable configuration files that can be versioned, reused, and shared. You can use wide provision wide range of resources in the cloud by using terraform like compute, storage, networking, and application services, across a variety of cloud providers and on-premises environments.

The language used in the terraform is declarative type where you can just mention the required state no need of mentioning how to achieve that desired state. With the help of the state file terraform will create, modify, or destroy resources. If you want to dive deeper into using Terraform within a DevOps framework, the DevOps Engineering – Planning to Production course provides practical examples of infrastructure automation

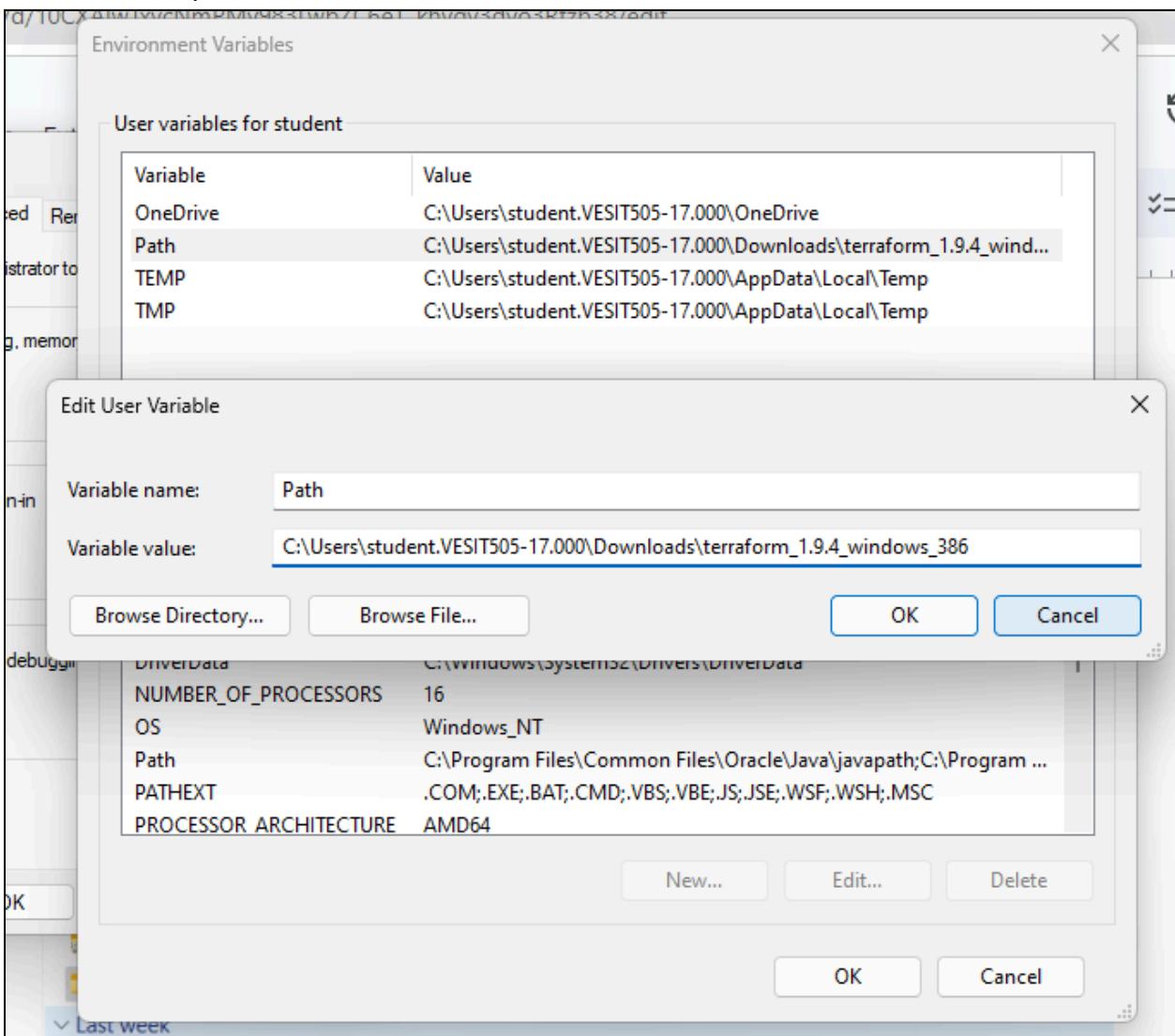
1. Download the terraform for windows

The screenshot shows the HashiCorp Terraform website's download section. At the top, there are navigation links: HashiCorp logo, Terraform logo, Install, Tutorials, Documentation, Registry, and Try Cloud. Below these, a sidebar lists "Operating Systems" with "Windows" selected. The main content area has three sections: "Binary download" (AMD64 and ARM64), "Windows" (386 and AMD64), and "Linux". Each section shows a "Download" button next to the respective binary file.

Platform	Architecture	Version	Download Link
Binary download	AMD64	1.9.4	Download
	ARM64	1.9.4	Download
Windows	386	1.9.4	Download
	AMD64	1.9.4	Download
Linux			
Package manager			



2. Add the path to the environment variables



3. Check if installation and setup is done correctly.

```
Microsoft Windows [Version 10.0.22631.3880]
(c) Microsoft Corporation. All rights reserved.

C:\Users\student.VESIT505-17.000>terraform
Usage: terraform [global options] <subcommand> [args]

The available commands for execution are listed below.
The primary workflow commands are given first, followed by
less common or more advanced commands.

Main commands:
  init      Prepare your working directory for other commands
  validate   Check whether the configuration is valid
  plan       Show changes required by the current configuration
  apply      Create or update infrastructure
  destroy    Destroy previously-created infrastructure

All other commands:
  console    Try Terraform expressions at an interactive command prompt
  fmt        Reformat your configuration in the standard style
  force-unlock Release a stuck lock on the current workspace
  get        Install or upgrade remote Terraform modules
  graph      Generate a Graphviz graph of the steps in an operation
  import     Associate existing infrastructure with a Terraform resource
  login      Obtain and save credentials for a remote host
  logout     Remove locally-stored credentials for a remote host
  metadata   Metadata related commands
  output     Show output values from your root module
  providers  Show the providers required for this configuration
  refresh   Update the state to match remote systems
```

4. Check the version

```
C:\Users\student.VESIT505-17.000>terraform -v
Terraform v1.9.4
on windows_386
```

Experiment 6

Aim : Creating docker images using terraform

1. Install docker

```
PS C:\Users\siddi> docker

Usage: docker [OPTIONS] COMMAND
A self-sufficient runtime for containers

Common Commands:
  run          Create and run a new container from an image
  exec         Execute a command in a running container
  ps           List containers
  build        Build an image from a Dockerfile
  pull         Download an image from a registry
  push         Upload an image to a registry
  images       List images
  login        Log in to a registry
  logout       Log out from a registry
  search       Search Docker Hub for images
  version      Show the Docker version information
  info         Display system-wide information

Management Commands:
  builder      Manage builds
  buildx*      Docker Buildx
  checkpoint   Manage checkpoints
  compose*     Docker Compose
  container    Manage containers
  context      Manage contexts
  debug*       Get a shell into any image or container
  desktop*     Docker Desktop commands (Alpha)
  dev*         Docker Dev Environments
  extension*   Manages Docker extensions
  feedback*    Provide feedback, right in your terminal!
  image        Manage images
  init*        Creates Docker-related starter files for your project
  manifest     Manage Docker image manifests and manifest lists
  network      Manage networks
```

```
PS C:\Users\siddi> docker --version
Docker version 27.0.3, build 7d4bcd8
PS C:\Users\siddi> |
```

2. Create a new folder Docker, inside it, create a file docker.tf

```
docker.tf  X
docker.tf > ...
1  terraform {
2    required_providers {
3      docker = {
4        source  = "kreuzwerker/docker"
5        version = "2.21.0"
6      }
7    }
8  }
9
10 provider "docker" {
11   host = "npipe:///./pipe/docker_engine"
12 }
13
14 # Pull the Docker image
15 resource "docker_image" "ubuntu" {
16   name = "ubuntu:latest"
17 }
18
19 # Create a Docker container
20 resource "docker_container" "foo" {
21   image = docker_image.ubuntu.image_id
22   name  = "foo"
23 }
24 }
```

3. Terraform init

```
C:\Users\siddi\OneDrive\Desktop\lab-works\terraform_scripts>cd Docker  
C:\Users\siddi\OneDrive\Desktop\lab-works\terraform_scripts\ Docker>terraform init  
Initializing the backend...  
Initializing provider plugins...  
- Finding kreuzwerker/docker versions matching "2.21.0"...  
- Installing kreuzwerker/docker v2.21.0...  
- Installed kreuzwerker/docker v2.21.0 (self-signed, key ID BD080C4571C6104C)  
Partner and community providers are signed by their developers.  
If you'd like to know more about provider signing, you can read about it here:  
https://www.terraform.io/docs/cli/plugins/signing.html  
Terraform has created a lock file .terraform.lock.hcl to record the provider  
selections it made above. Include this file in your version control repository  
so that Terraform can guarantee to make the same selections by default when  
you run "terraform init" in the future.  
  
Terraform has been successfully initialized!  
  
You may now begin working with Terraform. Try running "terraform plan" to see  
any changes that are required for your infrastructure. All Terraform commands  
should now work.  
  
If you ever set or change modules or backend configuration for Terraform,  
rerun this command to reinitialize your working directory. If you forget, other  
commands will detect it and remind you to do so if necessary.
```

4. Terraform plan

```
C:\Users\siddi\OneDrive\Desktop\lab-works\terraform_scripts\ Docker>terraform plan  
Terraform used the selected providers to generate the following execution plan. Resource actions are indicated with  
following symbols:  
+ create  
  
Terraform will perform the following actions:  
  
# docker_container.foo will be created  
+ resource "docker_container" "foo" {  
    + attach          = false  
    + bridge          = (known after apply)  
    + command         = (known after apply)  
    + container_logs = (known after apply)  
    + entrypoint      = (known after apply)  
    + env             = (known after apply)  
    + exit_code       = (known after apply)  
    + gateway         = (known after apply)  
    + hostname        = (known after apply)  
    + id              = (known after apply)  
    + image           = (known after apply)  
    + init            = (known after apply)  
    + ip_address      = (known after apply)  
    + ip_prefix_length = (known after apply)  
    + ipc_mode        = (known after apply)  
    + log_driver      = (known after apply)
```

```

+ start          = true
+ stdin_open     = false
+ stop_signal    = (known after apply)
+ stop_timeout   = (known after apply)
+ tty            = false

+ healthcheck   = (known after apply)
+ labels         = (known after apply)
}

# docker_image.ubuntu will be created
+ resource "docker_image" "ubuntu" {
  + id           = (known after apply)
  + image_id     = (known after apply)
  + latest       = (known after apply)
  + name         = "ubuntu:latest"
  + output       = (known after apply)
  + repo_digest  = (known after apply)
}

Plan: 2 to add, 0 to change, 0 to destroy.

Note: You didn't use the -out option to save this plan, so Terraform can't guarantee to take exactly these actions if you run "terraform apply" now.

```

5. Check docker images before applying

```

C:\Users\siddi\OneDrive\Desktop\lab-works\terraform_scripts\Docker>docker images
REPOSITORY      TAG      IMAGE ID      CREATED      SIZE
react-img      latest   619c9b7a9ac5  2 weeks ago  320MB

C:\Users\siddi\OneDrive\Desktop\lab-works\terraform_scripts\Docker>

```

6. Terraform apply

```

C:\Users\siddi\OneDrive\Desktop\lab-works\terraform_scripts\Docker>terraform apply
docker_image.ubuntu: Refreshing state... [id=sha256:edbfe74c41f8a3501ce542e137cf28ea04dd03e6df8c9d66519b6ad761c2598aubuntu:latest]

Terraform used the selected providers to generate the following execution plan. Resource actions are indicated with the following symbols:
+ create

Terraform will perform the following actions:

# docker_container.foo will be created
+ resource "docker_container" "foo" {
  + attach          = false
  + bridge          = (known after apply)
  + command         = [
      + "-tail",
      + "-f",
      + "/dev/null",
    ]
  + container_logs = (known after apply)
  + entrypoint      = (known after apply)
}

```

```

+ logs          = false
+ must_run     = true
+ name          = "foo"
+ network_data  = (known after apply)
+ read_only     = false
+ remove_volumes = true
+ restart       = "no"
+ rm            = false
+ runtime        = (known after apply)
+ security_opts = (known after apply)
+ shm_size       = (known after apply)
+ start          = true
+ stdin_open     = false
+ stop_signal    = (known after apply)
+ stop_timeout   = (known after apply)
+ tty            = false

+ healthcheck (known after apply)
+ labels (known after apply)
}

Plan: 1 to add, 0 to change, 0 to destroy.

Do you want to perform these actions?
Terraform will perform the actions described above.
Only 'yes' will be accepted to approve.

Enter a value: yes

docker_container.foo: Creating...
docker_container.foo: Creation complete after 1s [id=af0512641b95dfece26fa5f29deaf8a8d56bd8b9878a246f46bd694e961e5b5]

Apply complete! Resources: 1 added, 0 changed, 0 destroyed.

C:\Users\siddi\OneDrive\Desktop\lab-works\terraform_scripts\Docker>

```

7. Docker images after apply

```

C:\Users\siddi\OneDrive\Desktop\lab-works\terraform_scripts\Docker>docker images
REPOSITORY      TAG      IMAGE ID      CREATED      SIZE
react-img      latest    619c9b7a9ac5  2 weeks ago  320MB
ubuntu          latest    edbfe74c41f8  3 weeks ago  78.1MB

```

8. Terraform destroy

```
C:\Users\siddi\OneDrive\Desktop\lab-works\terraform_scripts\Docker>terraform destroy
docker_image.ubuntu: Refreshing state... [id=sha256:edbfe74c41f8a3501ce542e137cf28ea04dd03e6df8c9d66519b6ad761c2598aubuntu:latest]
docker_container.foo: Refreshing state... [id=af0512641b95dfece26fa5f29deafb8a8d56bd8b9878a246f46bd694e961e5b5]

Terraform used the selected providers to generate the following execution plan. Resource actions are indicated with the following symbols:
- destroy

Terraform will perform the following actions:

# docker_container.foo will be destroyed
- resource "docker_container" "foo" {
  - attach = false -> null
  - command = [
    - "tail",
    - "-f",
    - "/dev/null",
  ] -> null
  - cpu_shares = 0 -> null
  - dns = [] -> null
  - dns_opts = [] -> null
  - dns_search = [] -> null
  - entrypoint = [] -> null
  - env = [] -> null
  - gateway = "172.17.0.1" -> null
  - group_add = [] -> null
  - hostname = "af0512641b95" -> null
  - id = "af0512641b95dfece26fa5f29deafb8a8d56bd8b9878a246f46bd694e961e5b5" -> null
  - image = "sha256:edbfe74c41f8a3501ce542e137cf28ea04dd03e6df8c9d66519b6ad761c2598a" -> null
  - init = false -> null
  - ip_address = "172.17.0.2" -> null
  - ip_prefix_length = 16 -> null
  - ipc_mode = "private" -> null
  - links = [] -> null
  - log_driver = "json-file" -> null
}
```

```
# docker_image.ubuntu will be destroyed
- resource "docker_image" "ubuntu" {
  - id = "sha256:edbfe74c41f8a3501ce542e137cf28ea04dd03e6df8c9d66519b6ad761c2598aubuntu:latest" -> null
  - image_id = "sha256:edbfe74c41f8a3501ce542e137cf28ea04dd03e6df8c9d66519b6ad761c2598a" -> null
  - latest = "sha256:edbfe74c41f8a3501ce542e137cf28ea04dd03e6df8c9d66519b6ad761c2598a" -> null
  - name = "ubuntu:latest" -> null
  - repo_digest = "ubuntu@sha256:8a37d68f4f73ebf3d4efafbcf66379bf3728902a8038616808f04e34a9ab63ee" -> null
}

Plan: 0 to add, 0 to change, 2 to destroy.

Do you really want to destroy all resources?
Terraform will destroy all your managed infrastructure, as shown above.
There is no undo. Only 'yes' will be accepted to confirm.

Enter a value: yes

docker_container.foo: Destroying... [id=af0512641b95dfece26fa5f29deafb8a8d56bd8b9878a246f46bd694e961e5b5]
docker_container.foo: Destruction complete after 1s
docker_image.ubuntu: Destroying... [id=sha256:edbfe74c41f8a3501ce542e137cf28ea04dd03e6df8c9d66519b6ad761c2598aubuntu:latest]
docker_image.ubuntu: Destruction complete after 0s

Destroy complete! Resources: 2 destroyed.

C:\Users\siddi\OneDrive\Desktop\lab-works\terraform_scripts\Docker>
```

9. Docker images after apply

```
C:\Users\siddi\OneDrive\Desktop\lab-works\terraform_scripts\Docker>docker images
REPOSITORY      TAG      IMAGE ID      CREATED      SIZE
react-img      latest      619c9b7a9ac5      2 weeks ago      320MB

C:\Users\siddi\OneDrive\Desktop\lab-works\terraform_scripts\Docker>
```

Experiment 7

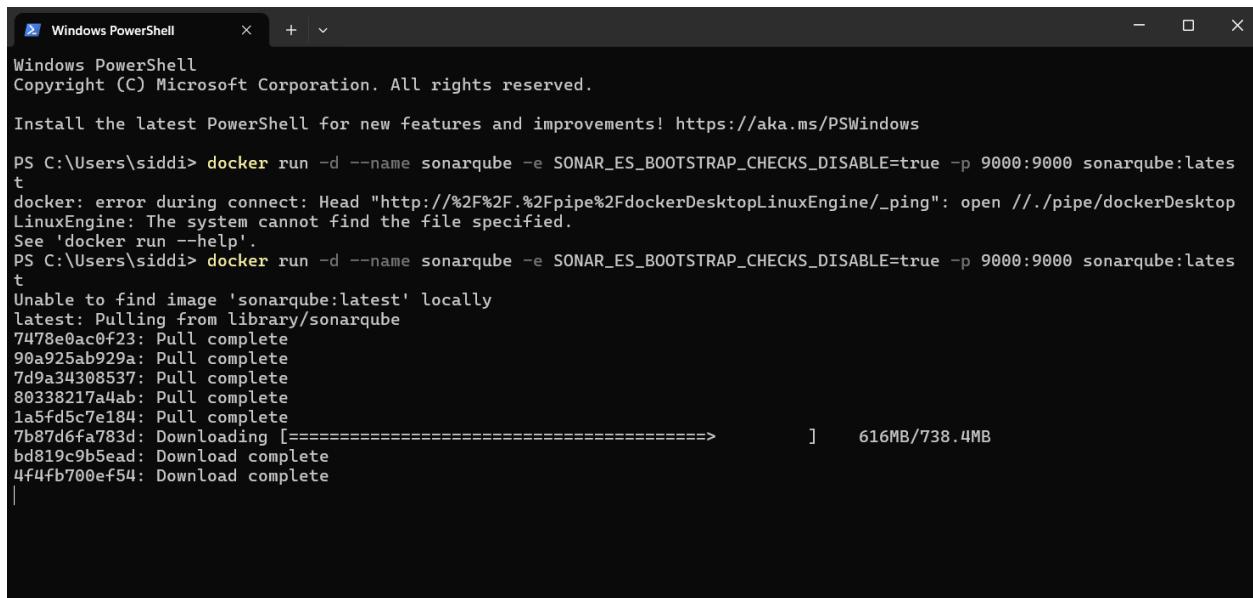
Aim: To understand Static Analysis SAST process and learn to integrate Jenkins SAST to SonarQube/GitLab. Step-1: Open up Jenkins Dashboard on localhost, port 8080 or whichever port it is at for you.

Step 1:

First start docker desktop

Then run the command in windows powershell -

```
docker run -d --name sonarqube -e SONAR_ES_BOOTSTRAP_CHECKS_DISABLE=true -p 9000:9000 sonarqube:latest
```

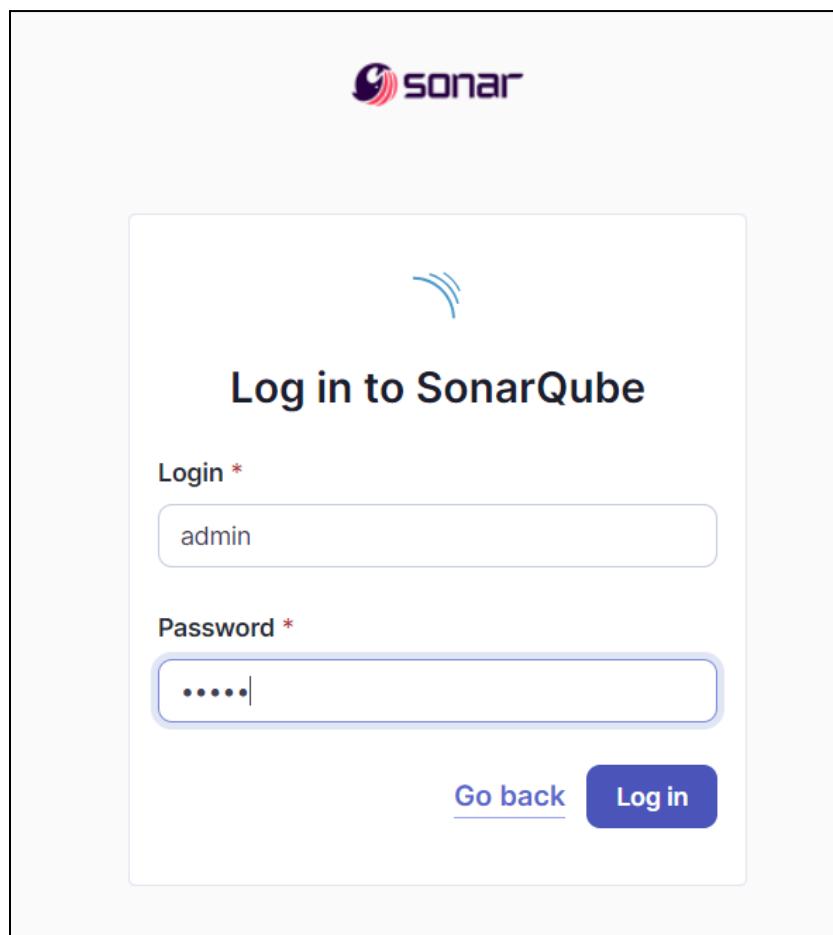
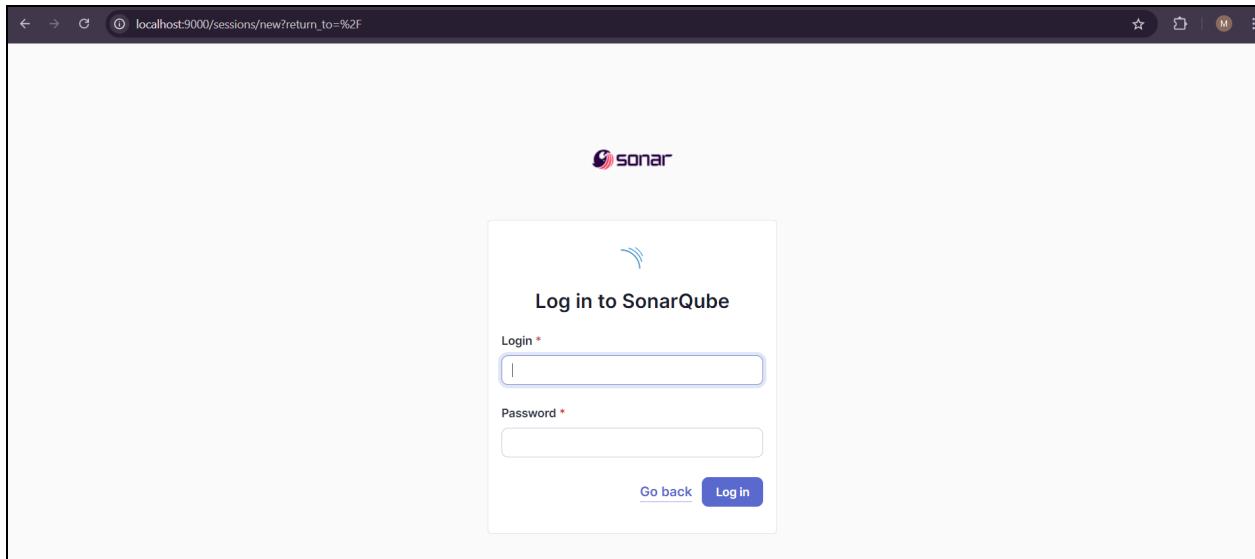
A screenshot of a Windows PowerShell window titled "Windows PowerShell". The window shows the command "docker run -d --name sonarqube -e SONAR_ES_BOOTSTRAP_CHECKS_DISABLE=true -p 9000:9000 sonarqube:latest" being run. The output indicates that Docker is trying to pull the image from the library, listing several intermediate image IDs as they are downloaded. A progress bar at the bottom right shows the download of "616MB/738.4MB".

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\siddi> docker run -d --name sonarqube -e SONAR_ES_BOOTSTRAP_CHECKS_DISABLE=true -p 9000:9000 sonarqube:latest
docker: error during connect: Head "http://%2F%2F.%2Fpipe%2FdockerDesktopLinuxEngine/_ping": open //./pipe/dockerDesktopLinuxEngine: The system cannot find the file specified.
See 'docker run --help'.
PS C:\Users\siddi> docker run -d --name sonarqube -e SONAR_ES_BOOTSTRAP_CHECKS_DISABLE=true -p 9000:9000 sonarqube:latest
Unable to find image 'sonarqube:latest' locally
latest: Pulling from library/sonarqube
7478e0ac0f23: Pull complete
90a925ab929a: Pull complete
7d9a34308537: Pull complete
80338217a4ab: Pull complete
1a5fd5c7e184: Pull complete
7b87d6fa783d: Downloading [=====>] 616MB/738.4MB
bd819c9b5ead: Download complete
4f4fb700ef54: Download complete
|
```

Go to localhost:9000/ in your browser



Go to local project and create new

sonarqube

Projects Issues Rules Quality Profiles Quality Gates Administration More Q

1 of 2

Create a local project

Project display name *

 ✓

Project key *

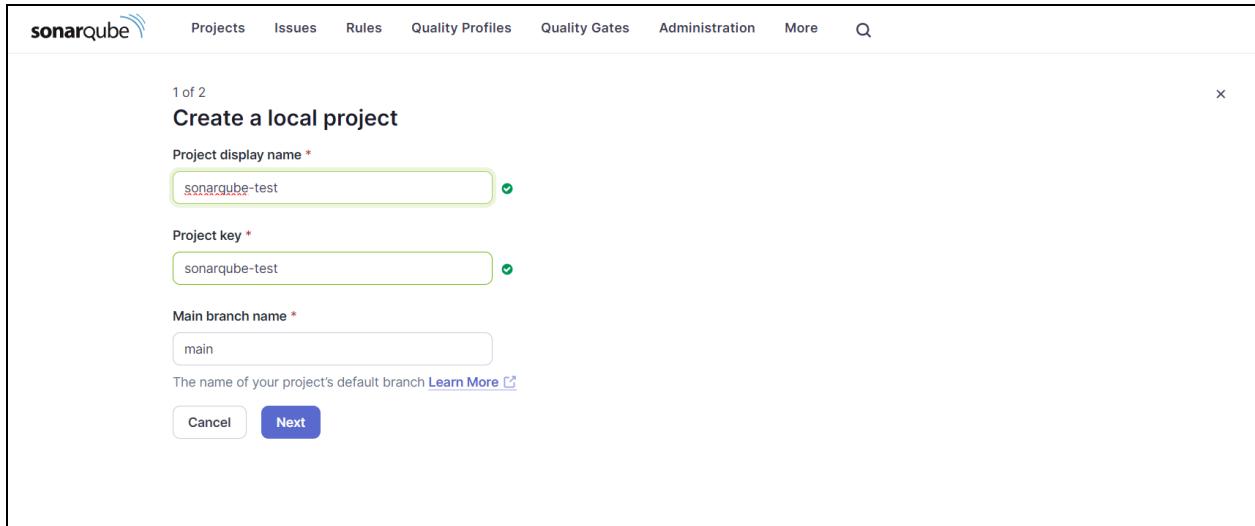
 ✓

Main branch name *

The name of your project's default branch [Learn More](#)

[Cancel](#) [Next](#)

X



Jenkins

Dashboard > Manage Jenkins > Plugins

Search (CTRL+K) ? 🔍 1 ⚡ Mahvish Siddiqui ⚡ Log out

Plugins

Updates 18 Available plugins Installed plugins Advanced settings Download progress

Download progress

Preparation

- Checking internet connectivity
- Checking update center connectivity
- Success

SonarQube Scanner

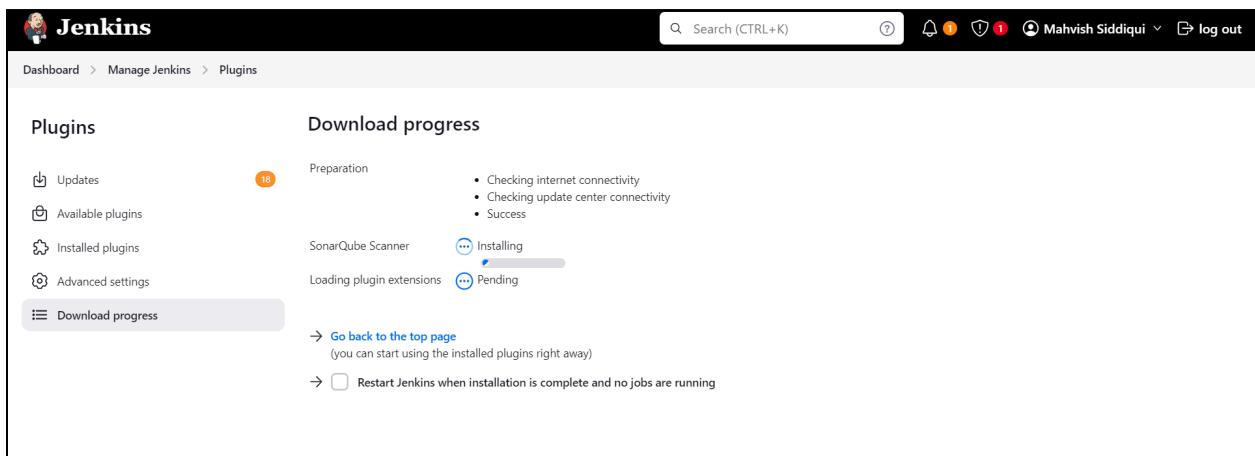
Installing

Loading plugin extensions

Pending

→ [Go back to the top page](#)
(you can start using the installed plugins right away)

→ Restart Jenkins when installation is complete and no jobs are running



Go to jenkins and then manage jenkins, scroll down

Dashboard > Manage Jenkins > System >

SonarQube servers

If checked, job administrators will be able to inject a SonarQube server configuration as environment variables in the build.

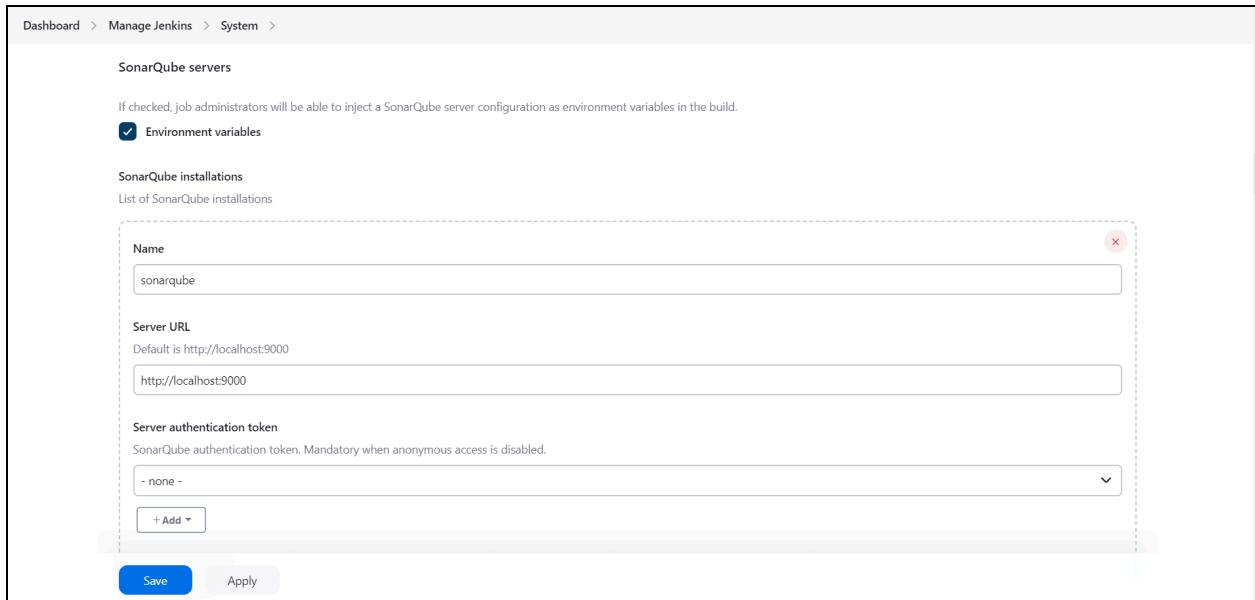
Environment variables

SonarQube installations

List of SonarQube installations

Name	sonarqube	X
Server URL	Default is http://localhost:9000 http://localhost:9000	
Server authentication token	SonarQube authentication token. Mandatory when anonymous access is disabled. - none - + Add ▾	

Save **Apply**



Go to jenkins and then tools

Dashboard > Manage Jenkins > Tools

SonarQube Scanner installations ^ **Edited**

Add SonarQube Scanner

SonarQube Scanner

Name

sonarqube

Install automatically ?

Install from Maven Central

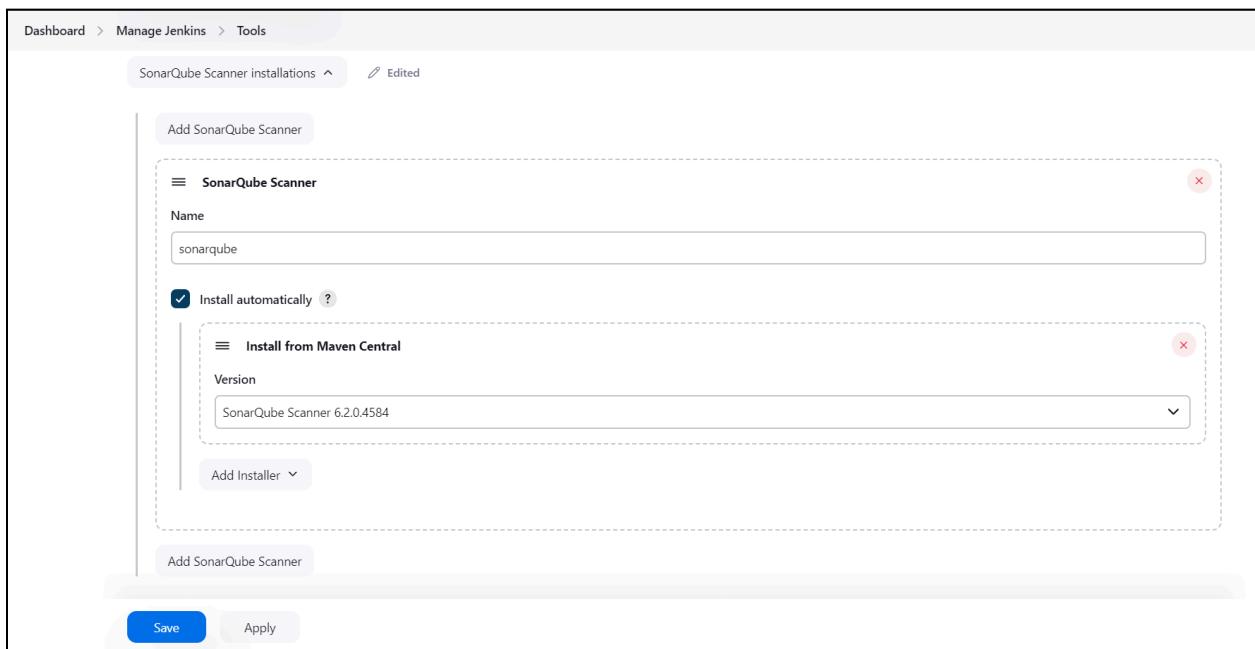
Version

SonarQube Scanner 6.2.0.4584

Add Installer ▾

Add SonarQube Scanner

Save **Apply**



Create a new Freestyle project

The screenshot shows the Jenkins 'New Item' creation interface. At the top, there's a search bar with 'Search (CTRL+K)' and user Mahvish Siddiqui. Below it, the breadcrumb navigation shows 'Dashboard > All > New Item'. The main section is titled 'New Item' and has a sub-section 'Enter an item name' with the value 'SonarQube'. A 'Select an item type' dropdown is open, showing four options: 'Freestyle project' (selected), 'Maven project', 'Pipeline', and 'Multi-configuration project'. Each option has a brief description. At the bottom of this section is a blue 'OK' button.

The screenshot shows the Jenkins 'Git' configuration page for the 'SonarQube' project. It includes fields for 'Repository URL' (set to 'https://github.com/shazforiot/MSBuild_firstproject.git'), 'Credentials' (set to '- none -'), and 'Branches to build' (set to '*/master'). There are 'Save' and 'Apply' buttons at the bottom.

Go to 'add build steps' and select SonarQube Scanner

Build Steps

Execute SonarQube Scanner

JDK ?
JDK to be used for this SonarQube analysis
(Inherit From Job)

Path to project properties ?
[Empty input field]

Analysis properties ?

```
sonar.projectKey=sonarqube-test
sonar.login=admin
sonar.password=Mahvish
sonar.sources=.
sonar.host.url=http://localhost:9000
```

Additional arguments ?
[Empty input field]

Save **Apply**

Jenkins

Dashboard > SonarQube >

SonarQube

Status Changes Workspace Build Now Configure Delete Project SonarQube Rename

Add description

Permalinks

Go to <http://localhost:9000/admin/permissions>

The screenshot shows the SonarQube Administration interface with the Security tab selected. It lists four entries: 'sonar-administrators' (System administrators), 'sonar-users' (Every authenticated user automatically belongs to this group), 'Administrator admin' (with a blue A icon), and 'Anyone DEPRECATED' (Anybody who browses the application belongs to this group). Each entry has checkboxes for 'Administer System', 'Administer', 'Execute Analysis', and 'Create'. Under 'sonar-administrators', 'Administrator' and 'Create' are checked. Under 'sonar-users', 'Administer' and 'Create' are checked. Under 'Administrator admin', 'Administer' and 'Create' are checked. Under 'Anyone DEPRECATED', none are checked.

The screenshot shows the SonarQube Permalinks page. At the top, there is a green circle with a white checkmark and the text 'SonarQube'. Below it is the SonarQube logo. The main section is titled 'Permalinks' and contains a bulleted list of build links:

- [Last build \(#4\), 2 min 30 sec ago](#)
- [Last stable build \(#4\), 2 min 30 sec ago](#)
- [Last successful build \(#4\), 2 min 30 sec ago](#)
- [Last failed build \(#3\), 7 min 35 sec ago](#)
- [Last unsuccessful build \(#3\), 7 min 35 sec ago](#)
- [Last completed build \(#4\), 2 min 30 sec ago](#)

✓ **Console Output**

Download
Copy
View as plain text

```

Started by user Mahvish Siddiqui
Running as SYSTEM
Building on the built-in node in workspace C:\ProgramData\Jenkins\.jenkins\workspace\SonarQube
The recommended git tool is: NONE
No credentials specified
> git.exe rev-parse --resolve-git-dir C:\ProgramData\Jenkins\.jenkins\workspace\SonarQube\.git # timeout=10
Fetching changes from the remote Git repository
> git.exe config remote.origin.url https://github.com/shazforiot/MSBuild_firstproject # timeout=10
Fetching upstream changes from https://github.com/shazforiot/MSBuild_firstproject
> git.exe --version # timeout=10
> git --version # "git version 2.45.2.windows.1"
> git.exe fetch --tags --force --progress -- https://github.com/shazforiot/MSBuild_firstproject +refs/heads/*:refs/remotes/origin/* # timeout=10
> git.exe rev-parse "refs/remotes/origin/master^{commit}" # timeout=10
Checking out Revision f2bc042c04c6e72427c380bcae6d6fee7b49adf (refs/remotes/origin/master)
> git.exe config core.sparsecheckout # timeout=10
> git.exe checkout -f f2bc042c04c6e72427c380bcae6d6fee7b49adf # timeout=10
Commit message: "updated"
> git.exe rev-list --no-walk f2bc042c04c6e72427c380bcae6d6fee7b49adf # timeout=10
[SonarQube] $ C:\ProgramData\Jenkins\.jenkins\tools\hudson.plugins.sonar.SonarRunnerInstallation\sonarqube\bin\sonar-scanner.bat -
-Dsonar.host.url=http://localhost:9000 -Dsonar.projectKey=sonarqube-test -Dsonar.login=admin -Dsonar.host.url=http://localhost:9000 -Dsonar.sources=-
-Dsonar.password=Mahvish -Dsonar.projectBaseDir=C:\ProgramData\Jenkins\.jenkins\workspace\SonarQube
19:47:24.708 WARN Property 'sonar.host.url' with value 'http://localhost:9000' is overridden with value 'http://localhost:9000'
19:47:24.729 INFO Scanner configuration file:

```



```

19:48:07.341 INFO ANALYSIS SUCCESSFUL, you can find the results at: http://localhost:9000/dashboard?id=sonarqube-test
19:48:07.342 INFO Note that you will be able to access the updated dashboard once the server has processed the submitted analysis report
19:48:07.342 INFO More about the report processing at http://localhost:9000/api/ce/task?id=237871a0-9f43-4276-91c8-726bb25e780f
19:48:07.360 INFO Analysis total time: 27.979 s
19:48:07.361 INFO SonarScanner Engine completed successfully
19:48:07.448 INFO EXECUTION SUCCESS
19:48:07.450 INFO Total time: 42.725s
Finished: SUCCESS

```

Visit the following URL to see the result -

<http://localhost:9000/dashboard?id=sonarqubetest&codeScope=overall>

The screenshot shows the SonarQube interface for the 'main' project. The top navigation bar includes links for Projects, Issues, Rules, Quality Profiles, Quality Gates, Administration, and More. The search bar is empty. The main content area displays the following information:

- Quality Gate**: Passed (green checkmark icon)
- New Code** and **Overall Code** sections are present.
- Security**: 0 Open issues (0 H, 0 M, 0 L).
- Reliability**: 0 Open issues (0 H, 0 M, 0 L).
- Maintainability**: 0 Open issues (0 H, 0 M, 0 L).
- Accepted Issues**: 0 (Valid issues that were not fixed).
- Coverage**: On 0 lines to cover.
- Duplications**: 0.0% (On 86 lines).
- Security Hotspots**: 0 (A green question mark icon).

The bottom right corner of the dashboard shows the text "Last analysis 10 minutes ago".

Experiment 8

Aim: Create a Jenkins CICD Pipeline with SonarQube / GitLab Integration to perform a static analysis of the code to detect bugs, code smells, and security vulnerabilities on a sample Web / Java / Python application.

Step 1: Log in to sonarqube portal and create a local project.

The screenshot shows the 'Create a local project' form. It has fields for 'Project display name' (sonarqube-pipeline), 'Project key' (sonarqube-pipeline), and 'Main branch name' (main). A note below says 'The name of your project's default branch'. There are 'Cancel' and 'Next' buttons at the bottom.

The screenshot shows the 'Set up project for Clean as You Code' step. It explains the new code definition and provides options for choosing a baseline. The 'Use the global setting' option is selected. Other options include 'Previous version' and 'Define a specific setting for this project'.

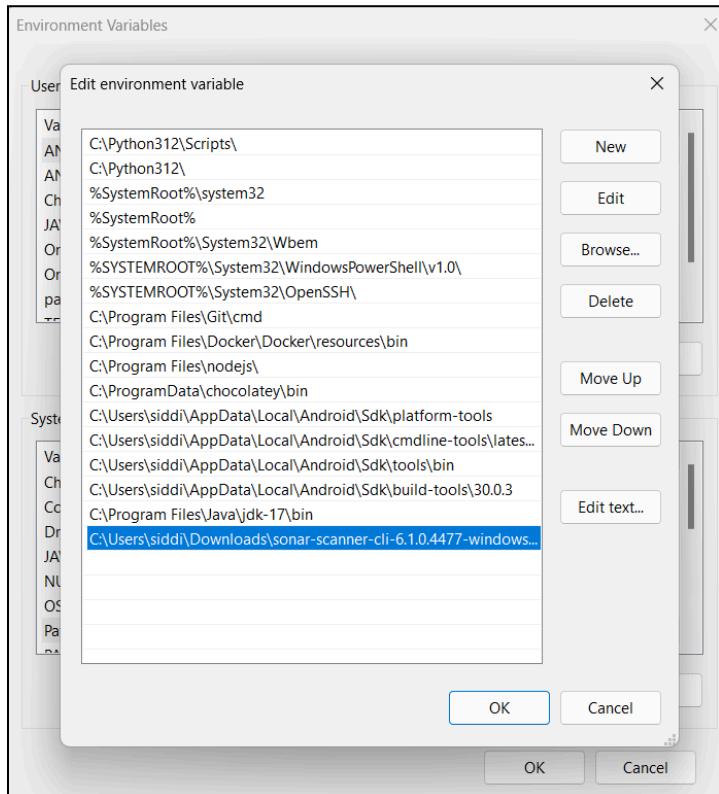
Step 2: Go to [download_sonarscanner](#) to download sonar scanner

The screenshot shows the SonarScanner CLI documentation page. On the left, there's a sidebar with navigation links like 'Homepage', 'Try out SonarQube', 'Server installation and setup', 'Analyzing source code', 'Scanners', and 'Analysis parameters'. The main content area has tabs for 'SonarScanner' and 'Issue Tracker'. It lists three releases:

- 6.2** (2024-09-17): Support PKCS12 truststore generated with OpenSSL. Download scanner for: Linux x64, Linux AArch64, Windows x64, macOS x64, macOS AArch64, Docker Any (Requires a pre-installed JVM). Release notes.
- 6.1** (2024-06-27): macOS and Linux AArch64 distributions. Download scanner for: Linux x64, Linux AArch64, Windows x64, macOS x64, macOS AArch64, Docker Any (Requires a pre-installed JVM). Release notes.
- 6.0** (2024-06-04): New bootstrapping mechanism and JRE provisioning with SonarQube 10.6+ and SonarCloud. Download scanner for: Linux x64, Windows x64, macOS x64, Docker, Any (Requires a pre-installed JVM).

A red box highlights the 'Windows x64' link under the 6.1 release notes.

After the download is complete, extract the file and copy the path to bin folder
 Go to environment variables, system variables and click on path
 Add a new path, paste the path copied earlier.



Step 3: Create a New Item in Jenkins, choose Pipeline.

Dashboard > All > New Item

New Item

Enter an item name
sonarqube-pipeline

Select an item type

- Freestyle project**
Classic, general-purpose job type that checks out from up to one SCM, executes build steps serially, followed by post-build steps like archiving artifacts and sending email notifications.
- Maven project**
Build a maven project. Jenkins takes advantage of your POM files and drastically reduces the configuration.
- Pipeline**
Orchestrates long-running activities that can span multiple build agents. Suitable for building pipelines (formerly known as workflows) and/or organizing complex activities that do not easily fit in free-style job type.
- Multi-configuration project**
Suitable for projects that need a large number of different configurations, such as testing on multiple environments, platform-specific builds, etc.
- Folder**
Creates a container that stores nested items in it. Useful for grouping things together. Unlike view, which is just a filter, a folder creates a separate namespace, so you can have multiple things of the same name as long as they are in different folders.

OK

Dashboard > sonarqube-pipeline > Configuration

Configure

General Advanced Project Options Pipeline

Pipeline

Definition

Pipeline script

Script ?

```
1 * node {
2     stage('Cloning the GitHub Repo') {
3         git 'https://github.com/shazforiot/GOL.git'
4     }
5     stage('SonarQube analysis') {
6         withSonarQubeEnv('sonarqube') {
7             bat """
8                 C:\Users\siddhi\Downloads\sonar-scanner-cli-6.1.0.4477-windows-x64\sonar-scanner-6.1.0.4477-windows-x64\bin\sonar-scanner
9                 -Dsonar.login=admin ^
10                 -Dsonar.password=Mahviish ^
11                 -Dsonar.projectKey=sonarqube-pipeline ^
12                 -Dsonar.exclusions=vendor/**,resources/**,*/*.java ^
13                 -Dsonar.host.url=http://localhost:9000/
14             """
15         }
16     }
17 }
```

Use Groovy Sandbox ?

Pipeline Syntax

Save Apply

Step 4: Save the pipeline and build it.

The screenshot shows the SonarQube Pipeline interface. On the left, there's a sidebar with various options like Status, Changes, Build Now, Configure, Delete Pipeline, Full Stage View, SonarQube, Stages, Rename, and Pipeline Syntax. Below that is a 'Build History' section with a dropdown set to 'trend'. It lists two builds: #2 (Sep 26, 2024, 8:42 PM) and #1 (Sep 26, 2024, 8:24 PM). The main area is titled 'Stage View' and displays a grid of stages. The first stage, 'Cloning the GitHub Repo', took 9s. The second stage, 'SonarQube analysis', took 3min 53s. The third stage, 'SonarQube analysis', failed after 1s. A tooltip indicates an average stage time of 7min 49s.

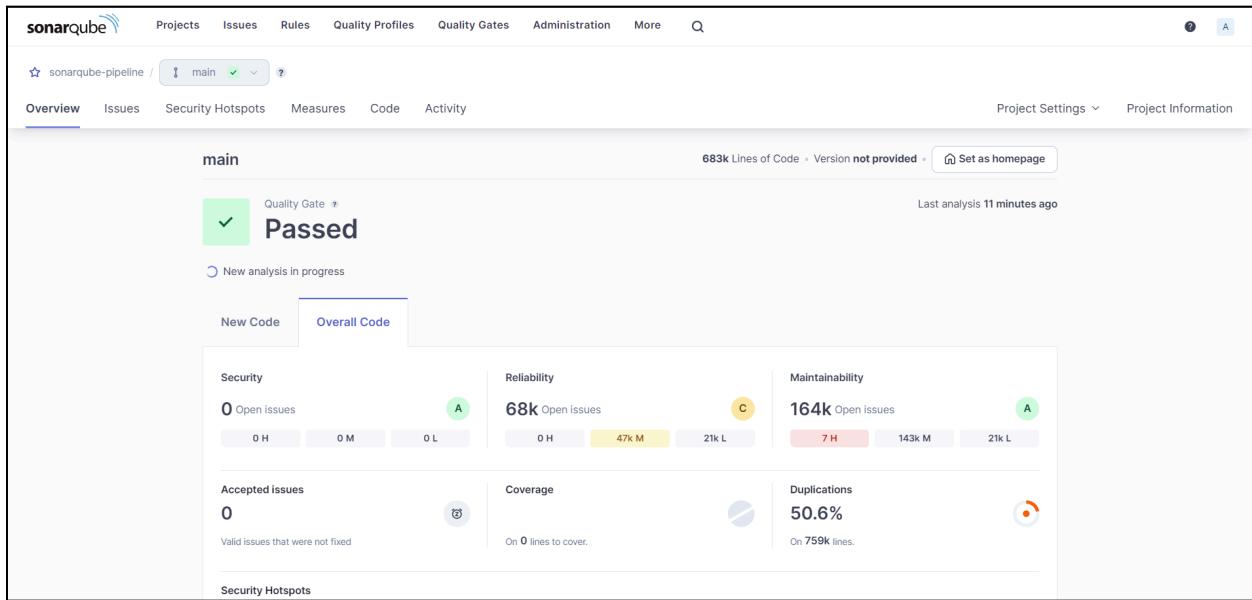
Console output:

The screenshot shows the 'Console Output' page for build #2. The sidebar on the left includes options like Status, Changes, Console Output (which is selected), Edit Build Information, Delete build '#2', Timings, Git Build Data, Pipeline Overview, Pipeline Console (which is selected), Replay, Pipeline Steps, Workspaces, and Previous Build. At the top right are buttons for Download, Copy, and View as plain text. The main content area shows a log of warnings from the build process. The log starts with 'Skipping 4,248 KB... Full Log' and then lists numerous 'WARN' messages related to duplicate references in files like 'gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/gui/GuiPackage.html' at various line numbers.

```
Skipping 4,248 KB... Full Log
20:49:35.711 WARN Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/gui/GuiPackage.html for block at line 40. Keep only the first 100 references.
20:49:35.712 WARN Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/gui/GuiPackage.html for block at line 65. Keep only the first 100 references.
20:49:35.712 WARN Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/gui/GuiPackage.html for block at line 41. Keep only the first 100 references.
20:49:35.712 WARN Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/gui/GuiPackage.html for block at line 17. Keep only the first 100 references.
20:49:35.712 WARN Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/gui/GuiPackage.html for block at line 1487. Keep only the first 100 references.
20:49:35.812 WARN Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/functions/LongSum.html for block at line 226. Keep only the first 100 references.
20:49:35.812 WARN Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/functions/LongSum.html for block at line 229. Keep only the first 100 references.
20:49:35.812 WARN Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/functions/LongSum.html for block at line 225. Keep only the first 100 references.
20:49:35.812 WARN Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/functions/LongSum.html for block at line 226. Keep only the first 100 references.
20:49:35.812 WARN Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/functions/LongSum.html for block at line 424. Keep only the first 100 references.
20:49:35.812 WARN Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/functions/LongSum.html for block at line 17. Keep only the first 100 references.
20:49:35.812 WARN Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/functions/LongSum.html for block at line 17. Keep only the first 100 references.
20:49:35.812 WARN Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/functions/LongSum.html for block at line 17. Keep only the first 100 references.
20:49:35.812 WARN Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/functions/LongSum.html for block at line 17. Keep only the first 100 references.
```

```
20:50:01.832 INFO ANALYSIS SUCCESSFUL, you can find the results at: http://localhost:9000/dashboard?id=sonarqube-pipeline
20:50:01.832 INFO Note that you will be able to access the updated dashboard once the server has processed the submitted analysis report
20:50:01.832 INFO More about the report processing at http://localhost:9000/api/ce/task?id=159a9d05-1f5f-4e17-bd27-3643a32a836a
20:50:12.108 INFO Analysis total time: 7:37.235 s
20:50:12.110 INFO SonarScanner Engine completed successfully
20:50:12.849 INFO EXECUTION SUCCESS
20:50:12.851 INFO Total time: 7:44.878s
[Pipeline] }
[Pipeline] // withSonarQubeEnv
[Pipeline] }
[Pipeline] // stage
[Pipeline] }
[Pipeline] // node
[Pipeline] End of Pipeline
Finished: SUCCESS
```

Step 5: After that, check the project in SonarQube



Under different tabs, check all different issues with the code.

SonarQube Project Overview - sonarqube-pipeline / main

Measures

- Reliability
- Maintainability
- Security Review
- Duplications
- Size
- Complexity

Issues

Overall Code

- Open Issues: 210,549
- Confirmed Issues: 0
- Accepted Issues: 0
- False Positive Issues: 0

Project Settings

Project Information

sonarqube-pipeline

View as: Tree | Select files | Navigate | 6 files

Open Issues: 210,549 See history

- gameoflife-acceptance-tests: 4
- gameoflife-build: 0
- gameoflife-core: 603
- gameoflife-deploy: 0
- gameoflife-web: 209,940
- pom.xml: 2

6 of 6 shown

This screenshot shows the SonarQube project overview for 'sonarqube-pipeline' under the 'main' branch. The left sidebar has tabs for Overview, Issues, Security Hotspots, Measures, Code, and Activity. The 'Measures' tab is selected, displaying metrics like Reliability, Maintainability, and Security Review. Below that is the 'Issues' section, which includes an overall code summary and a detailed list of open issues by component. On the right, there's a detailed view of the 'gameoflife-web' component with its specific issue count (209,940) and a file-level breakdown.

SonarQube Project Issues - sonarqube-pipeline / main

Issues

My Issues | All

Filters

Clear All Filters

Issues in new code

Clean Code Attribute

- Consistency: 197k
- Intentionality: 14k
- Adaptability: 0
- Responsibility: 0

Add to selection **Ctrl + click**

Software Quality

- Security: 0
- Reliability: 54k
- Maintainability: 164k

Bulk Change

Select issues | Navigate to issue | 196,662 issues | 3075d effort

gameoflife-core/build/reports/tests/all-tests.html

- Insert a <!DOCTYPE> declaration to before this <html> tag. (Reliability) Consistency user-experience
- Remove this deprecated "width" attribute. (Maintainability) HTML5 obsolete
- Remove this deprecated "align" attribute. (Maintainability) HTML5 obsolete
- Remove this deprecated "align" attribute. (Maintainability) HTML5 obsolete

This screenshot shows the SonarQube issues page for the same project. The left sidebar has tabs for Overview, Issues, Security Hotspots, Measures, Code, and Activity. The 'Issues' tab is selected, showing a list of issues categorized by severity and type. On the right, there's a 'Bulk Change' interface where users can select multiple issues to apply changes to. Below that is a specific report for 'gameoflife-core/build/reports/tests/all-tests.html' containing several code quality rules with checkboxes for applying them.

SonarQube Issues page for project sonarqube-pipeline / main

Filters: My Issues, All

Issues in new code

Introducing Clean Code Attributes

gameoflife-acceptance-tests/Dockerfile

1 of 5

Next

Use a specific version tag for the image.

Maintainability

Open Not assigned

Surround this variable with double quotes; otherwise, it can lead to unexpected behavior.

Maintainability

Open Not assigned

Surround this variable with double quotes; otherwise, it can lead to unexpected behavior.

Maintainability

Open Not assigned

Surround this variable with double quotes; otherwise, it can lead to unexpected behavior.

Maintainability

Open Not assigned

Project Settings Project Information

SonarQube Issues page for project sonarqube-pipeline / main

Filters: My Issues, All

Issues in new code

Introducing Clean Code Attributes

gameoflife-core/build/reports/tests/all-tests.html

1 of 5

Next

Add "lang" and/or "xml:lang" attributes to this "<html>" element

Reliability

Intentionality accessibility wcag2-a

Add "<th>" headers to this "<table>"

Reliability

Intentionality accessibility wcag2-a

gameoflife-core/build/reports/tests/allclasses-frame.html

1 of 5

Next

Add "lang" and/or "xml:lang" attributes to this "<html>" element

Reliability

Intentionality accessibility wcag2-a

Add "<th>" headers to this "<table>"

Intentionality

Project Settings Project Information

SonarQube Issues Overview

Project: sonarqube-pipeline / Branch: main

Issues: 15 | Project Settings

Filters: My Issues, All

Issues in new code:

- ✓ Clean Code Attribute (1)
- Consistency: 164k
- Intentionality: 15 (selected)
- Adaptability: 0
- Responsibility: 0

Add to selection Ctrl + click

- ✓ Software Quality (1)
- Security: 0
- Reliability: 14k
- Maintainability: 15 (selected)

Add to selection Ctrl + click

Bulk Change

Select issues | Navigate to issue | 15 issues | 44min effort

gameoflife-acceptance-tests/Dockerfile

Intentionality

- Use a specific version tag for the image. (Maintainability)
- Surround this variable with double quotes; otherwise, it can lead to unexpected behavior. (Maintainability)
- Surround this variable with double quotes; otherwise, it can lead to unexpected behavior. (Maintainability)
- Surround this variable with double quotes; otherwise, it can lead to unexpected behavior. (Maintainability)

No tags

L1 - 5min effort - 4 years ago - ⚡ Code Smell - ⚡ Major

L12 - 5min effort - 4 years ago - ⚡ Code Smell - ⚡ Major

L12 - 5min effort - 4 years ago - ⚡ Code Smell - ⚡ Major

L12 - 5min effort - 4 years ago - ⚡ Code Smell - ⚡ Major

SonarQube Issues Overview

Project: sonarqube-pipeline / Branch: main

Issues: 15 | Project Settings

Filters: My Issues, All

Software Quality:

- Security: 0
- Reliability: 253
- Maintainability: 15 (selected)

Add to selection Ctrl + click

Severity: ?

Type:

- Bug: 0
- Vulnerability: 0
- Code Smell: 15 (selected)

Scope: ?

Status: ?

Security Category: ?

Creation Date: ?

Bulk Change

Select issues | Navigate to issue | 15 issues | 44min effort

gameoflife-acceptance-tests/Dockerfile

Intentionality

- Use a specific version tag for the image. (Maintainability)
- Surround this variable with double quotes; otherwise, it can lead to unexpected behavior. (Maintainability)
- Surround this variable with double quotes; otherwise, it can lead to unexpected behavior. (Maintainability)
- Surround this variable with double quotes; otherwise, it can lead to unexpected behavior. (Maintainability)

No tags

L1 - 5min effort - 4 years ago - ⚡ Code Smell - ⚡ Major

L12 - 5min effort - 4 years ago - ⚡ Code Smell - ⚡ Major

L12 - 5min effort - 4 years ago - ⚡ Code Smell - ⚡ Major

L12 - 5min effort - 4 years ago - ⚡ Code Smell - ⚡ Major

SonarQube Project: sonarqube-pipeline / main

Overview Issues Security Hotspots Measures Code Activity Project Settings Project Information

0.0% Security Hotspots Reviewed

3 Security Hotspots

Review priority: Medium

Permission: The tomcat image runs with root as the default user. Make sure it is safe here.

Review priority: Low

Encryption of Sensitive Data: gameoflife-web/Dockerfile

Others: gameoflife-web/Dockerfile

The tomcat image runs with root as the default user. Make sure it is safe here.

FROM tomcat:8-jre8
RUN rm -rf /usr/local/tomcat/webapps/*
COPY target/gameoflife.war /usr/local/tomcat/webapps/ROOT.war
EXPOSE 8080
CMD ["catalina.sh", "run"]

SonarQube Project: sonarqube-pipeline / main

Overview Issues Security Hotspots **Measures** Code Activity Project Settings Project Information

Duplications

Reliability

Maintainability

Security Review

Overall Code

Density: 50.6%

Duplicated Lines: 384,007

Duplicated Blocks: 42,808

Duplicated Files: 979

Size

sonarqube-pipeline View as Tree Select files Navigate 6 files

Duplicated Lines (%) 50.6% See history

	Duplicated Lines (%)	Duplicated Lines
gameoflife-acceptance-tests	0.0%	0
gameoflife-build	0.0%	0
gameoflife-core	9.6%	374
gameoflife-deploy	0.0%	0
gameoflife-web	50.9%	383,633
pom.xml	0.0%	0

The screenshot shows the SonarQube interface for the project `sonarqube-pipeline`. The main navigation bar includes `Projects`, `Issues`, `Rules`, `Quality Profiles`, `Quality Gates`, `Administration`, and `More`. A search bar is at the top right.

The left sidebar has tabs for `Overview`, `Issues`, `Security Hotspots`, `Measures` (which is selected), `Code`, and `Activity`. It displays metrics such as Density (50.6%), Duplicated Lines (384,007), Duplicated Blocks (42,808), and Duplicated Files (979).

The right panel shows the code analysis results for `sonarqube-pipeline`. It lists 6 files with their cyclomatic complexity counts:

- `gameoflife-acceptance-tests`: 1,112
- `gameoflife-build`: 18
- `gameoflife-core`: 18
- `gameoflife-deploy`: 1,094
- `gameoflife-web`: 1,094
- `pom.xml`: 6 of 6 shown

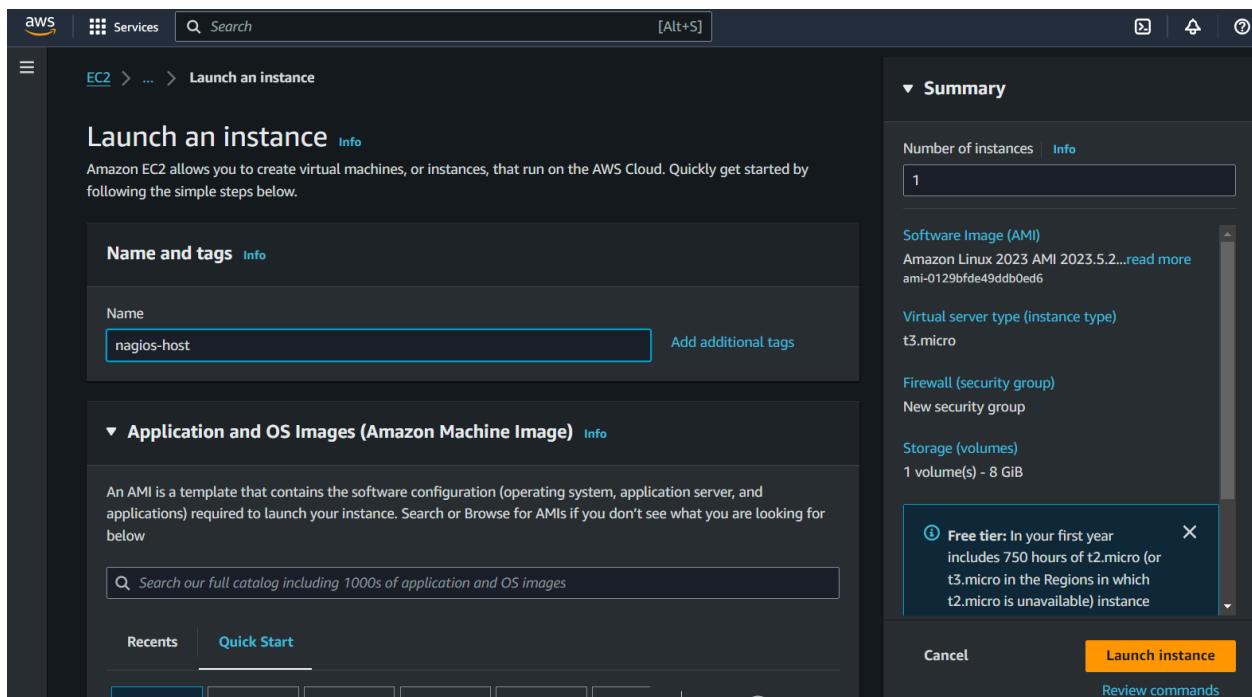
At the bottom of the right panel, there are buttons for `View as Tree`, `Select files`, and `Navigate`.

Advance DevOps Lab 9

Aim: To Understand Continuous monitoring and Installation and configuration of Nagios Core, Nagios Plugins and NRPE (Nagios Remote Plugin Executor) on Linux Machine.

1. Create an Amazon Linux EC2 Instance

- Name it nagios-host.



2. Configure Security Group

- Ensure HTTP, HTTPS, SSH, and ICMP are open from everywhere.
- Edit the inbound rules of the specified Security Group

The screenshot shows the AWS Quick Start interface. At the top, there are tabs for 'Recents' and 'Quick Start'. Below these are icons for various AMIs: Amazon Linux (selected), macOS, Ubuntu, Windows, Red Hat, and SUSE Linux. To the right is a search icon and a link to 'Browse more AMIs'. A callout box highlights the 'Amazon Linux 2023 AMI' entry, which includes its AMI ID (ami-0129bfde49ddb0ed6), boot mode (uefi-preferred), and other details like Virtualization: hvm, ENA enabled: true, and Root device type: ebs. It also indicates it is 'Free tier eligible'. Below this, there is a 'Description' section for Amazon Linux 2023, followed by a table with columns for Architecture, Boot mode, AMI ID, and Username. The architecture is set to 64-bit (x86). The boot mode is uefi-preferred. The AMI ID is ami-0129bfde49ddb0ed6, and the username is ec2-user. A green button labeled 'Verified provider' is visible. At the bottom, there is a navigation bar with links for EC2, Launch an instance, and a success message indicating the instance was successfully launched (i-02d506ceb2532ffba). There is also a 'Launch log' link.

Select the instance and under security, open security groups

Security Groups (1/1) [Info](#)

[Actions](#) | [Export security groups to CSV](#) | [Create security group](#)

Find resources by attribute or tag

Security group name = launch-wizard-3 [X](#) | [Clear filters](#)

<input checked="" type="checkbox"/>	Name	Security group ID	Security group name	VPC ID	Description
<input checked="" type="checkbox"/>	-	sg-06d67ab13e0550eef	launch-wizard-3	vpc-08e88c85fcc263608	launch-wizard-3

sg-06d67ab13e0550eef - launch-wizard-3

[Details](#) | **Inbound rules** | [Outbound rules](#) | [Tags](#)

Inbound rules (1)

[Edit inbound rules](#)

Search

<input type="checkbox"/>	Name	Security group rule...	IP version	Type	Protocol	Port range
<input type="checkbox"/>	-	sgr-03df802fc1cda26b	IPv4	SSH	TCP	22

Inbound rules [Info](#)

Security group rule ID	Type Info	Protocol Info	Port range Info	Source Info	Description - optional Info
sgr-03df802fc1cda26b	HTTPS	TCP	443	Anywhere... ▾	<input type="text"/> 0.0.0.0/0 Delete
-	All ICMP - IPv6	IPv6 ICMP	All	Anywhere... ▾	<input type="text"/> ::/0 Delete
-	HTTPS	TCP	443	Anywhere... ▾	<input type="text"/> 0.0.0.0/0 Delete
-	All traffic	All	All	Anywhere... ▾	<input type="text"/> 0.0.0.0/0 Delete
-	SSH	TCP	22	Anywhere... ▾	<input type="text"/> 0.0.0.0/0 Delete
-	Custom TCP	TCP	5666	Anywhere... ▾	<input type="text"/> 0.0.0.0/0 Delete
-	All ICMP - IPv4	ICMP	All	Anywhere... ▾	<input type="text"/> 0.0.0.0/0 Delete

3. Connect to Your EC2 Instance

- SSH into your EC2 instance or use EC2 Instance Connect from the browser

Connect to instance Info

Connect to your instance i-02d506ceb2532ffba (nagios-host) using any of these options

EC2 Instance Connect **Session Manager** **SSH client** **EC2 serial console**

⚠ All ports are open to all IPv4 addresses in your security group

All ports are currently open to all IPv4 addresses, indicated by **All** and **0.0.0.0/0** in the inbound rule in [your security group](#). For increased security, consider restricting access to only the EC2 Instance Connect service IP addresses for your Region: 13.48.4.200/30. [Learn more](#).

Instance ID
 i-02d506ceb2532ffba (nagios-host)

Connection Type

Connect using EC2 Instance Connect
Connect using the EC2 Instance Connect browser-based client, with a public IPv4 or IPv6 address.

Connect using EC2 Instance Connect Endpoint
Connect using the EC2 Instance Connect browser-based client, with a private IPv4 address and a VPC endpoint.

Public IPv4 address
 13.48.193.109

IPv6 address
–

Username
Enter the username defined in the AMI used to launch the instance. If you didn't define a custom username, use the default username, ec2-user.

```
'#  
~\##  
~~\###\ Amazon Linux 2023  
~~\##|  
~~\#/ https://aws.amazon.com/linux/amazon-linux-2023  
~~V~'-->  
~~~/  
~~.~/  
~/m/ [ec2-user@ip-172-31-38-129 ~]$ sudo yum update
```

4. Update Package Indices and Install Required Packages

Commands -

```
sudo yum update
```

```
sudo yum install httpd php
```

```
sudo yum install gcc glibc glibc-common
```

```
sudo yum install gd gd-devel
```

```
[ec2-user@ip-172-31-38-129 ~]$ sudo yum install httpd php
Last metadata expiration check: 0:16:40 ago on Tue Oct 1 04:26:43 2024.
Dependencies resolved.

=====
| Package           | Architecture | Version      | Repository | $|
=====
Installing:
| httpd            | x86_64       | 2.4.62-1.amzn2023 | amazonlinux | 48 |
| php8_3           | x86_64       | 8.3.10-1.amzn2023.0.1 | amazonlinux | 10 |

Installing dependencies:
| apr              | x86_64       | 1.7.2-2.amzn2023.0.2 | amazonlinux | 129 |
| apr-util          | x86_64       | 1.6.3-1.amzn2023.0.1 | amazonlinux | 98  |
| generic-logos-httd | noarch       | 18.0.0-1.amzn2023.0.3 | amazonlinux | 19   |
| httpd-core        | x86_64       | 2.4.62-1.amzn2023 | amazonlinux | 1.4  |
| httpd-filesystem | noarch       | 2.4.62-1.amzn2023 | amazonlinux | 14   |
| httpd-tools       | x86_64       | 2.4.62-1.amzn2023 | amazonlinux | 81   |
| libbrotli         | x86_64       | 1.0.9-4.amzn2023.0.2 | amazonlinux | 315  |
| libpsodium         | x86_64       | 1.0.19-4.amzn2023 | amazonlinux | 176  |
| libxslt           | x86_64       | 1.1.34-5.amzn2023.0.2 | amazonlinux | 241  |
| mailcap           | noarch       | 2.1.49-3.amzn2023.0.3 | amazonlinux | 33   |
| nginx-filesystem | noarch       | 1.1.24.0-1.amzn2023.0.4 | amazonlinux | 9.8  |
| php8_3-cli        | x86_64       | 8.3.10-1.amzn2023.0.1 | amazonlinux | 3.7  |
| php8_3-common     | x86_64       | 8.3.10-1.amzn2023.0.1 | amazonlinux | 737  |
| php8_3-process    | x86_64       | 8.3.10-1.amzn2023.0.1 | amazonlinux | 45   |
| php8_3-xmnl       | x86_64       | 8.3.10-1.amzn2023.0.1 | amazonlinux | 154  |

Installing weak dependencies:
| apr-util          | x86_64       | 1.6.3-1.amzn2023.0.1.x86_64 | amazonlinux | 64 |
| httpd             | x86_64       | 2.4.62-1.amzn2023.x86_64 | amazonlinux | 64 |
| httpd-tools       | x86_64       | 2.4.62-1.amzn2023.x86_64 | amazonlinux | 64 |
| libbrotli         | x86_64       | 1.0.9-4.amzn2023.0.2.x86_64 | amazonlinux | 64 |
| libpsodium         | x86_64       | 1.0.19-4.amzn2023.0.3.noarch | amazonlinux | 64 |
| mailcap           | x86_64       | 2.1.49-3.amzn2023.0.3.noarch | amazonlinux | 64 |
| nginx-filesystem | x86_64       | 1.1.24.0-1.amzn2023.0.4.noarch | amazonlinux | 64 |
| php8_3-common     | x86_64       | 8.3.10-1.amzn2023.0.1.x86_64 | amazonlinux | 64 |
| php8_3-process    | x86_64       | 8.3.10-1.amzn2023.0.1.x86_64 | amazonlinux | 64 |
| php8_3-xmnl       | x86_64       | 8.3.10-1.amzn2023.0.1.x86_64 | amazonlinux | 64 |
```

```
Installed:
| apr-1.7.2-2.amzn2023.0.2.x86_64 | generic-logos-httd-18.0.0-12.amzn2023.0.3.noarch | httpd-filesystem-2.4.62-1.amzn2023.noarch | libpsodium-1.0.19-4.amzn2023.x86_64 | mod_http2-2.0.27-1.amzn2023.0.3.x86_64 | php8_3-3.8.3.10-1.amzn2023.0.1.x86_64 | php8_3-fpm-8.3.10-1.amzn2023.0.1.x86_64 | php8_3-pdo-8.3.10-1.amzn2023.0.1.x86_64 | php8_3-xml-8.3.10-1.amzn2023.0.1.x86_64 |
```

Package	Architecture	Version	Repository	\$
apr-util-openssl-1.6.3-1.amzn2023.0.1.x86_64	x86_64	1.6.3-1.amzn2023.0.1.x86_64	amazonlinux	64
httpd-core-2.4.62-1.amzn2023.x86_64	x86_64	2.4.62-1.amzn2023.x86_64	amazonlinux	64
libbrotli-1.0.9-4.amzn2023.0.2.x86_64	x86_64	1.0.9-4.amzn2023.0.2.x86_64	amazonlinux	64
mailcap-2.1.49-3.amzn2023.0.3.noarch	x86_64	2.1.49-3.amzn2023.0.3.noarch	amazonlinux	64
nginx-filesystem-1.1.24.0-1.amzn2023.0.4.noarch	x86_64	1.1.24.0-1.amzn2023.0.4.noarch	amazonlinux	64
php8_3-common-8.3.10-1.amzn2023.0.1.x86_64	x86_64	8.3.10-1.amzn2023.0.1.x86_64	amazonlinux	64
php8_3-opcache-8.3.10-1.amzn2023.0.1.x86_64	x86_64	8.3.10-1.amzn2023.0.1.x86_64	amazonlinux	64
php8_3-sodium-8.3.10-1.amzn2023.0.1.x86_64	x86_64	8.3.10-1.amzn2023.0.1.x86_64	amazonlinux	64

```
Complete!
[ec2-user@ip-172-31-38-129 ~]$ sudo yum install gcc glibc glibc-common -
```

```
[ec2-user@ip-172-31-38-129 ~]$ sudo yum install gcc glibc glibc-common
Last metadata expiration check: 0:20:07 ago on Tue Oct 1 04:26:43 2024.
Package glibc-2.34-52.amzn2023.0.1.x86_64 is already installed.
Package glibc-common-2.34-52.amzn2023.0.1.x86_64 is already installed.
Dependencies resolved.

=====
| Package           | Architecture | Version      | Repository | Size |
=====
```

Package	Architecture	Version	Repository	Size													
gcc x86_64 11.4.1-2.amzn2023.0.2 amazonlinux 32 M <tr> <td>Installing:</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>annobin-docs noarch 10.93-1.amzn2023.0.1 amazonlinux 92 k <tr> <td>annobin-plugin-gcc x86_64 10.93-1.amzn2023.0.1 amazonlinux 887 k <tr> <td>cpp x86_64 11.4.1-2.amzn2023.0.2 amazonlinux 10 M <tr> <td>gc x86_64 8.0.4-5.amzn2023.0.2 amazonlinux 105 k <tr> <td>glibc-devel noarch 2.34-52.amzn2023.0.11 amazonlinux 27 k <tr> <td>glibc-headers-x86 noarch 2.34-52.amzn2023.0.11 amazonlinux 427 k <tr> <td>guile22 x86_64 2.2.7-2.amzn2023.0.3 amazonlinux 6.4 M <tr> <td>kernel-headers x86_64 6.1.109-116.189.amzn2023 amazonlinux 1.4 M <tr> <td>libmpc x86_64 1.2.1-2.amzn2023.0.2 amazonlinux 62 k <tr> <td>libtcltool-ltdl x86_64 2.4.7-1.amzn2023.0.3 amazonlinux 38 k <tr> <td>libcrypt-devel x86_64 4.4.33-7.amzn2023 amazonlinux 32 k <tr> <td>make x86_64 1:4.3-5.amzn2023.0.2 amazonlinux 534 k </td> </tr> 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Installed:
  annobin-docs-10.93-1.amzn2023.0.1.noarch
  gc-0.0.4-5.amzn2023.0.2.x86_64
  glibc-headers-x86-2.34-52.amzn2023.0.11.noarch
  libmpc-1.2.1-2.amzn2023.0.2.x86_64
  make-1:4.3-5.amzn2023.0.2.x86_64

Complete!
[ec2-user@ip-172-31-38-129 ~]$ 

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```

libXext-1.3.4-6.amzn2023.0.2.x86_64
libXpm-devel-3.5.15-2.amzn2023.0.3.x86_64
libXt-1.2.0-4.amzn2023.0.2.x86_64
libffl-devel-3.4.4-1.amzn2023.0.1.x86_64
libfcu-devel-67.1-7.amzn2023.0.3.x86_64
libjpeg-turbo-devel-2.1.4-2.amzn2023.0.5.x86_64
libpng-2:1.6.37-10.amzn2023.0.6.x86_64
libselinux-devel-3.4-5.amzn2023.0.2.x86_64
libtiff-4.4.0-4.amzn2023.0.18.x86_64
libwepp-1.2.4-1.amzn2023.0.6.x86_64
libxcb-1.13.1-7.amzn2023.0.7.x86_64
libxml2-devel-2.10.4-1.amzn2023.0.6.x86_64
pcre2-utf16-10.40-1.amzn2023.0.3.x86_64
pixman-0.40.0-3.amzn2023.0.3.x86_64
xml-common-0.6.3-56.amzn2023.0.2.noarch
xz-devel-5.2.5-9.amzn2023.0.2.x86_64

libXpm-3.5.15-2.amzn2023.0.3.x86_64
libXrender-0.9.10-14.amzn2023.0.2.x86_64
libblkid-devel-2.37.4-1.amzn2023.0.4.x86_64
libicu-67.1-7.amzn2023.0.3.x86_64
libjpeg-turbo-2.1.4-2.amzn2023.0.5.x86_64
libmount-devel-2.37.4-1.amzn2023.0.4.x86_64
libpng-devel-2:1.6.37-10.amzn2023.0.6.x86_64
libsepol-devel-3.4-3.amzn2023.0.3.x86_64
libtiff-devel-4.4.0-4.amzn2023.0.19.x86_64
libwepp-devel-1.2.4-1.amzn2023.0.6.x86_64
libxcb-devel-1.13.1-7.amzn2023.0.2.x86_64
pcre2-devel-10.40-1.amzn2023.0.3.x86_64
pcre2-utf32-10.40-1.amzn2023.0.3.x86_64
sysprof-capture-devel-3.40.1-2.amzn2023.0.2.x86_64
xorg-x11proto-devel-2021.4-1.amzn2023.0.2.noarch
zlib-devel-1.2.11-33.amzn2023.0.5.x86_64

Complete!
[ec2-user@ip-172-31-38-129 ~]$ 

```

5. Create a New Nagios User

Commands -

```
sudo adduser -m nagios
```

```
sudo passwd nagios
```

```

[ec2-user@ip-172-31-38-129 ~]$ sudo adduser -m nagios
[ec2-user@ip-172-31-38-129 ~]$ sudo passwd nagios
Changing password for user nagios.
New password:
BAD PASSWORD: The password is shorter than 8 characters
Retype new password:
Sorry, passwords do not match.
New password:
Retype new password:
passwd: all authentication tokens updated successfully.
[ec2-user@ip-172-31-38-129 ~]$ sudo groupadd nagcmd
[ec2-user@ip-172-31-38-129 ~]$ 

```

8. Create a Directory for Nagios Downloads

Commands -

```
mkdir ~/downloads
```

```
cd ~/downloads
```

9. Download Nagios and Plugins Source Files

Commands -

```
Wget https://assets.nagios.com/downloads/nagioscore/releases/nagios-4.4.6.tar.gz
```

```
wget https://nagios-plugins.org/download/nagios-plugins-2.3.3.tar.gz
```

```
[ec2-user@ip-172-31-38-129 downloads]$ wget http://prdownloads.sourceforge.net/sourceforge/nagios/nagios-4.0.8.tar.gz
--2024-10-01 04:54:41-- http://prdownloads.sourceforge.net/sourceforge/nagios/nagios-4.0.8.tar.gz
Resolving prdownloads.sourceforge.net (prdownloads.sourceforge.net)... 204.68.111.105
Connecting to prdownloads.sourceforge.net (prdownloads.sourceforge.net)|204.68.111.105|:80... connected.
HTTP request sent, awaiting response... 301 Moved Permanently
Location: http://downloads.sourceforge.net/project/nagios/nagios-4.x/nagios-4.0.8/nagios-4.0.8.tar.gz [following]
--2024-10-01 04:54:41-- http://downloads.sourceforge.net/project/nagios/nagios-4.x/nagios-4.0.8/nagios-4.0.8.tar.gz
Resolving downloads.sourceforge.net (downloads.sourceforge.net)... 204.68.111.105
Reusing existing connection to prdownloads.sourceforge.net:80.
HTTP request sent, awaiting response... 302 Found
Location: http://altushost-swe.dl.sourceforge.net/project/nagios/nagios-4.x/nagios-4.0.8/nagios-4.0.8.tar.gz?viafs=1 [following]
--2024-10-01 04:54:41-- http://altushost-swe.dl.sourceforge.net/project/nagios/nagios-4.x/nagios-4.0.8/nagios-4.0.8.tar.gz?viafs=1
Resolving altushost-swe.dl.sourceforge.net (altushost-swe.dl.sourceforge.net)... 79.142.76.130
Connecting to altushost-swe.dl.sourceforge.net (altushost-swe.dl.sourceforge.net)|79.142.76.130|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 1805059 (1.7M) [application/x-gzip]
Saving to: 'nagios-4.0.8.tar.gz'

nagios-4.0.8.tar.gz      0%[=====]   0  --.-KB/s    nagios-4
.nagios-4.0.8.tar.gz    100%[=====]  1.72M  --.-KB/s  in 0.03s

2024-10-01 04:54:42 (52.6 MB/s) - 'nagios-4.0.8.tar.gz' saved [1805059/1805059]
[ec2-user@ip-172-31-38-129 downloads]$
```

```
[ec2-user@ip-172-31-38-129 downloads]$ wget http://nagios-plugins.org/download/nagios-plugins-2.0.3.tar.gz
--2024-10-01 04:55:25-- http://nagios-plugins.org/download/nagios-plugins-2.0.3.tar.gz
Resolving nagios-plugins.org (nagios-plugins.org)... 45.56.123.251
Connecting to nagios-plugins.org (nagios-plugins.org)|45.56.123.251|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 2659772 (2.5M) [application/x-gzip]
Saving to: 'nagios-plugins-2.0.3.tar.gz'

nagios-plugins-2.0.3.tar.gz      0%[=====]   0  --.-KB/s    nagios-p
.plugins-2.0.3.tar.gz    1%[>          ] 50.11K  200KB/s    nagios-plugins-2
.0.3.tar.gz     7%[=====>        ] 192.00K  383KB/s    nagios-plugins-2.0.3.tar
.gz    30%[=====>        ] 796.74K  1.03MB/s    nagios-plugins-2.0.3.tar.gz
100%[=====]  2.54M  2.88MB/s  in 0.9s

2024-10-01 04:55:26 (2.88 MB/s) - 'nagios-plugins-2.0.3.tar.gz' saved [2659772/2659772]
[ec2-user@ip-172-31-38-129 downloads]$
```

10. Extract the Nagios Source File

Commands -

```
tar zxvf nagios-4.4.6.tar.gz
```

```
cd nagios-4.4.6
```

11. Run the Configuration Script

Commands -

```
./configure --with-command-group=nagcmd
```

```
[ec2-user@ip-172-31-38-129 downloads]$ ls
nagios-4.0.8 nagios-4.0.8.tar.gz nagios-plugins-2.0.3.tar.gz
[ec2-user@ip-172-31-38-129 downloads]$ cd nagios-4.0.8
[ec2-user@ip-172-31-38-129 nagios-4.0.8]$ ./configure --with-command-group=nagios ./configure --with-command-group=nagcmd
checking for a BSD-compatible install... /usr/bin/install -c
checking build system type... x86_64-unknown-linux-gnu
checking host system type... x86_64-unknown-linux-gnu
checking for gcc... gcc
checking for C compiler default output file name... a.out
checking whether the C compiler works... yes
checking whether we are cross compiling... no
checking for suffix of executables...
checking for suffix of object files... o
checking whether we are using the GNU C compiler... yes
checking whether gcc accepts -g... yes
checking for gcc option to accept ISO C89... none needed
checking whether make sets ${MAKE}... yes
checking for strip... /usr/bin/strip
checking how to run the C preprocessor... gcc -E
checking for grep that handles long lines and -e... /usr/bin/grep
checking for egrep... /usr/bin/grep -E
checking for ANSI C header files... yes
checking whether time.h and sys/time.h may both be included... yes
checking for sys/wait.h that is POSIX.1 compatible... yes
checking for sys/types.h... yes
checking for sys/stat.h... yes
```

12. Compile the Source Code

```
*** Configuration summary for nagios 4.0.8 08-12-2014 ***:

General Options:
-----
    Nagios executable: nagios
    Nagios user/group: nagios,nagios
    Command user/group: nagios,nagcmd
        Event Broker: yes
    Install ${prefix}: /usr/local/nagios
    Install ${includedir}: /usr/local/nagios/include/nagios
        Lock file: ${prefix}/var/nagios.lock
    Check result directory: ${prefix}/var/spool/checkresults
        Init directory: /etc/rc.d/init.d
    Apache conf.d directory: /etc/httpd/conf.d
        Mail program: /bin/mail
        Host OS: linux-gnu
    IOBroker Method: epoll

Web Interface Options:
-----
        HTML URL: http://localhost/nagios/
        CGI URL: http://localhost/nagios/cgi-bin/
    Traceroute (used by WAP): /usr/bin/traceroute
```

Review the options above for accuracy. If they look okay,
type 'make all' to compile the main program and CGIs.

```
[ec2-user@ip-172-31-38-129 nagios-4.0.8]$ █
```

13. Install Binaries, Init Script, and Sample Config Files

Commands -

```
./sudo make install
```

```
sudo make install-init
```

```
sudo make install-config
```

```
sudo make install-commandmode
```

```
*** Init script installed ***
[ec2-user@ip-172-31-38-129 nagios-4.0.8]$ sudo make install-config
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/etc
/usr/bin/install -c -b -m 775 -o nagios -g nagios -d /usr/local/nagios/etc/objects
/usr/bin/install -c -b -m 664 -o nagios -g nagios sample-config/nagios.cfg /usr/local/nagios/etc/nagios.cfg
/usr/bin/install -c -b -m 664 -o nagios -g nagios sample-config/cgi.cgi /usr/local/nagios/etc/cgi.cgi
/usr/bin/install -c -b -m 664 -o nagios -g nagios sample-config/resource.cfg /usr/local/nagios/etc/resource.cfg
/usr/bin/install -c -b -m 664 -o nagios -g nagios sample-config/template-object/templates.cfg /usr/local/nagios/etc/objects/templates.cfg
/usr/bin/install -c -b -m 664 -o nagios -g nagios sample-config/template-object/commands.cfg /usr/local/nagios/etc/objects/commands.cfg
/usr/bin/install -c -b -m 664 -o nagios -g nagios sample-config/template-object/contacts.cfg /usr/local/nagios/etc/objects/contacts.cfg
/usr/bin/install -c -b -m 664 -o nagios -g nagios sample-config/template-object/timeperiods.cfg /usr/local/nagios/etc/objects/timeperiods.cfg
/usr/bin/install -c -b -m 664 -o nagios -g nagios sample-config/template-object/localhost.cfg /usr/local/nagios/etc/objects/localhost.cfg
/usr/bin/install -c -b -m 664 -o nagios -g nagios sample-config/template-object/windows.cfg /usr/local/nagios/etc/objects/windows.cfg
/usr/bin/install -c -b -m 664 -o nagios -g nagios sample-config/template-object/printer.cfg /usr/local/nagios/etc/objects/printer.cfg
/usr/bin/install -c -b -m 664 -o nagios -g nagios sample-config/template-object/switch.cfg /usr/local/nagios/etc/objects/switch.cfg

*** Config files installed ***
Remember, these are *SAMPLE* config files. You'll need to read
the documentation for more information on how to actually define
services, hosts, etc. to fit your particular needs.

[ec2-user@ip-172-31-38-129 nagios-4.0.8]$ sudo make install-commandmode
/usr/bin/install -c -m 775 -o nagios -g nagcmd -d /usr/local/nagios/var/rw
chmod g+s /usr/local/nagios/var/rw

*** External command directory configured ***

[ec2-user@ip-172-31-38-129 nagios-4.0.8]$
```

14. Edit the Config File to Change the Email Address

Commands - sudo nano /usr/local/nagios/etc/objects/contacts.cfg

```
GNU nano 5.8                               /usr/local/nagios/etc/objects/contacts.cfg                                Modified
# Just one contact defined by default - the Nagios admin (that's you)
# This contact definition inherits a lot of default values from the 'generic-contact'
# template which is defined elsewhere.

define contact{
    contact_name          nagiosadmin           ; Short name of user
    use                   generic-contact        ; Inherit default values from generic-contact template (defined above)
    alias                Nagios Admin          ; Full name of user
    email                mahvishsiddiqui169@gmail.com; ; <<***** CHANGE THIS TO YOUR EMAIL ADDRESS *****

#####
#
# CONTACT GROUPS
#
#####

# We only have one contact in this simple configuration file, so there is
# no need to create more than one contact group.

^G Help      ^O Write Out   ^W Where Is   ^R Cut       ^T Execute   ^C Location   M-U Undo      M-A Set Mark  M-[ To Bracket M-Q Previous
^X Exit      ^R Read File   ^\ Replace    ^U Paste     ^J Justify   ^Y Go To Line M-E Redo      M-B Copy     ^Q Where Was   M-W Next
```

15. Configure the Web Interface

Commands - sudo make install-webconf

```
*** Config files installed ***
```

```
Remember, these are *SAMPLE* config files. You'll need to read  
the documentation for more information on how to actually define  
services, hosts, etc. to fit your particular needs.
```

```
[ec2-user@ip-172-31-38-129 nagios-4.0.8]$ sudo make install-commandmode  
/usr/bin/install -c -m 775 -o nagios -g nagcmd -d /usr/local/nagios/var/rw  
chmod g+s /usr/local/nagios/var/rw
```

```
*** External command directory configured ***
```

```
[ec2-user@ip-172-31-38-129 nagios-4.0.8]$ sudo nano /usr/local/nagios/etc/obj  
ects/contacts.cfg  
[ec2-user@ip-172-31-38-129 nagios-4.0.8]$ sudo nano /usr/local/nagios/etc/obj  
ects/contacts.cfg  
[ec2-user@ip-172-31-38-129 nagios-4.0.8]$ sudo make install-webconf  
/usr/bin/install -c -m 644 sample-config/httpd.conf /etc/httpd/conf.d/nagios.  
conf
```

```
*** Nagios/Apache conf file installed ***
```

```
[ec2-user@ip-172-31-38-129 nagios-4.0.8]$ █
```

16. Create a Nagios Admin Account

```
sudo htpasswd -c /usr/local/nagios/etc/htpasswd.users nagiosadmin
```

```
[ec2-user@ip-172-31-38-129 nagios-4.0.8]$ sudo htpasswd -c /usr/local/nagios/  
etc/htpasswd.users nagiosadmin  
[ec2-user@ip-172-31-38-129 nagios-4.0.8]$ sudo htpasswd -c /usr/local/nagios/  
etc/htpasswd.users nagiosadmin  
New password:  
Re-type new password:  
Adding password for user nagiosadmin  
[ec2-user@ip-172-31-38-129 nagios-4.0.8]$ sudo service httpd restart  
Redirecting to /bin/systemctl restart httpd.service  
[ec2-user@ip-172-31-38-129 nagios-4.0.8]$ cd ~/downloads  
[ec2-user@ip-172-31-38-129 downloads]$ █
```

ERROR:

```
[ec2-user@ip-172-31-38-129 nagios-plugins-2.0.3]$ sudo chkconfig --add nagios
[ec2-user@ip-172-31-38-129 nagios-plugins-2.0.3]$ sudo chkconfig nagios on
[ec2-user@ip-172-31-38-129 nagios-plugins-2.0.3]$ sudo /usr/local/nagios/bin/nagios -v /usr/local/nagios/etc/nagios.cfg
[sudo /usr/local/nagios/bin/nagios -v /usr/local/nagios/etc/nagios.cfg]

Nagios Core 4.0.8
Copyright (c) 2009-present Nagios Core Development Team and Community Contributors
Copyright (c) 1999-2009 Ethan Galstad
Last Modified: 08-12-2014
License: GPL

Website: http://www.nagios.org
Reading configuration data...
Error in configuration file '/usr/local/nagios/etc/nagios.cfg' - Line 452 (Check result path '/usr/local/nagios/var/spool/checkresults' is not a valid directory)
  Error processing main config file!
```

To resolve this issue, run these commands

```
[ec2-user@ip-172-31-38-129 nagios-plugins-2.0.3]$ sudo mkdir -p /usr/local/nagios/var/spool/checkresults
[sudo mkdir -p /usr/local/nagios/var/spool/checkresults]
[ec2-user@ip-172-31-38-129 nagios-plugins-2.0.3]$ sudo chown -R nagios:nagcmd /usr/local/nagios/var
[sudo chown -R nagios:nagcmd /usr/local/nagios/var]
[ec2-user@ip-172-31-38-129 nagios-plugins-2.0.3]$ sudo /usr/local/nagios/bin/nagios -v /usr/local/nagios/etc/nagios.cfg
[sudo /usr/local/nagios/bin/nagios -v /usr/local/nagios/etc/nagios.cfg]

Nagios Core 4.0.8
Copyright (c) 2009-present Nagios Core Development Team and Community Contributors
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Last Modified: 08-12-2014
License: GPL

Website: http://www.nagios.org
Reading configuration data...
  Read main config file okay...
  Read object config files okay...

Running pre-flight check on configuration data...

Checking objects...
  Checked 8 services.
  Checked 1 hosts.
  Checked 1 host groups.
  Checked 0 service groups.
  Checked 1 contacts.
  Checked 1 contact groups.
  Checked 24 commands.
  Checked 5 time periods.
  Checked 0 host escalations.
  Checked 0 service escalations.
Checking for circular paths...
  Checked 1 hosts
  Checked 0 service dependencies
```

17. cd ~/downloads

```
tar zxvf nagios-plugins-2.0.3.tar.gz
```

```
cd nagios-plugins-2.0.3
```

```
[ec2-user@ip-172-31-38-129 nagios-plugins-2.0.3]$ sudo service nagios start
Reloading systemd: [ OK ]
Starting nagios (via systemctl): [ OK ]
[ec2-user@ip-172-31-38-129 nagios-plugins-2.0.3]$
```

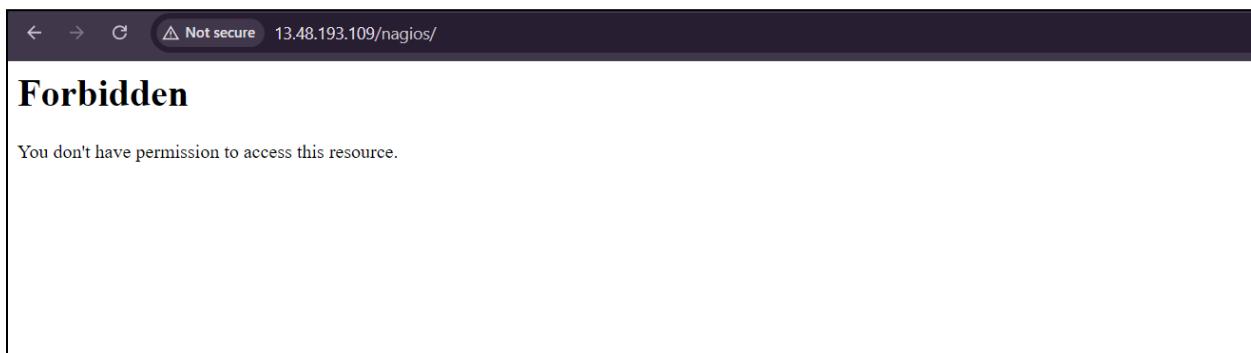
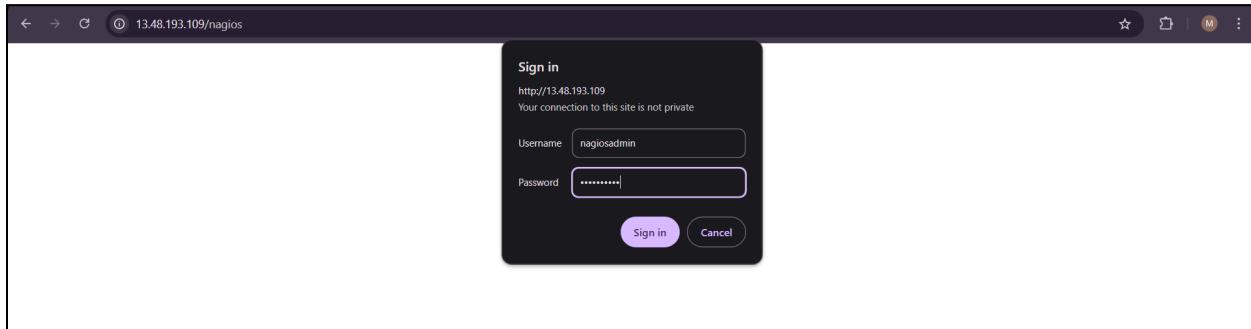
18. sudo systemctl status nagios

```
[ec2-user@ip-172-31-38-129 nagios-plugins-2.0.3]$ sudo systemctl status nagios
● nagios.service - LSB: Starts and stops the Nagios monitoring server
  Loaded: loaded (/etc/rc.d/init.d/nagios; generated)
  Loaded: loaded (/etc/systemd/system/nagios.service)
  Active: active (running) since Tue 2024-10-01 05:25:28 UTC; 49s ago
    Docs: man:systemd-sysv-generator(8)
  Process: 67388 ExecStart=/etc/rc.d/init.d/nagios start (code=exited, status=0/SUCCESS)
  Tasks: 6 (limit: 1059)
  Memory: 2.1M
    CPU: 76ms
   CGroup: /system.slice/nagios.service
           ├─67426 /usr/local/nagios/bin/nagios -d /usr/local/nagios/etc/nagios.cfg
           ├─67430 /usr/local/nagios/bin/nagios --worker /usr/local/nagios/var/rw/nagios.gh
           ├─67431 /usr/local/nagios/bin/nagios --worker /usr/local/nagios/var/rw/nagios.gh
           ├─67432 /usr/local/nagios/bin/nagios --worker /usr/local/nagios/var/rw/nagios.gh
           ├─67433 /usr/local/nagios/bin/nagios --worker /usr/local/nagios/var/rw/nagios.gh
           └─67474 /usr/local/nagios/bin/nagios -d /usr/local/nagios/etc/nagios.cfg

Oct 01 05:25:28 ip-172-31-38-129.eu-north-1.compute.internal nagios[67426]: nerd: Channel hostchecks registered successfully
Oct 01 05:25:28 ip-172-31-38-129.eu-north-1.compute.internal nagios[67426]: nerd: Channel servicechecks registered successfully
Oct 01 05:25:28 ip-172-31-38-129.eu-north-1.compute.internal nagios[67426]: nerd: Channel opatchchecks registered successfully
Oct 01 05:25:28 ip-172-31-38-129.eu-north-1.compute.internal nagios[67426]: nerd: Fully initialized and ready to rock!
Oct 01 05:25:28 ip-172-31-38-129.eu-north-1.compute.internal nagios[67426]: wproc: Successfully registered manager as @wproc with query handler
Oct 01 05:25:28 ip-172-31-38-129.eu-north-1.compute.internal nagios[67426]: wproc: Registry request: name=Core Worker 67432;pid=67432
Oct 01 05:25:28 ip-172-31-38-129.eu-north-1.compute.internal nagios[67426]: wproc: Registry request: name=Core Worker 67431;pid=67431
Oct 01 05:25:28 ip-172-31-38-129.eu-north-1.compute.internal nagios[67426]: wproc: Registry request: name=Core Worker 67430;pid=67430
Oct 01 05:25:28 ip-172-31-38-129.eu-north-1.compute.internal nagios[67426]: wproc: Registry request: name=Core Worker 67433;pid=67433
Oct 01 05:25:28 ip-172-31-38-129.eu-north-1.compute.internal nagios[67426]: Successfully launched command file worker with pid 67474
[ec2-user@ip-172-31-38-129 nagios-plugins-2.0.3]$
```

Access Nagios Web Interface

- Copy the Public IP address of your EC2 instance.
- Open your browser and navigate to `http://<your_public_ip_address>/nagios`.
- Enter the username `nagiosadmin` and the password you set earlier



To resolve this issue, run these commands

```
cd /home/ec2-user/downloads/nagios-4.4.8 # Adjust the path if necessary
sudo yum install openssl-devel -y
sudo yum install httpd gcc glibc glibc-common perl php gcc-c++ make wget -y
sudo yum install php-mysqlnd -y
```

```
Complete!
[ec2-user@ip-172-31-38-129 nagios-4.0.8]$ sudo yum install php-mysqlnd -y
Last metadata expiration check: 1:20:57 ago on Tue Oct  1 04:26:43 2024.
Package php8.3-mysqlnd-8.3.10-1.amzn2023.0.1.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[ec2-user@ip-172-31-38-129 nagios-4.0.8]$
```

```
./configure
```

```
make all  
sudo make install  
sudo make install-init  
sudo make install-config  
sudo make install-commandmode
```

Again run:

```
sudo chkconfig --add nagios  
sudo chkconfig nagios on  
sudo /usr/local/nagios/bin/nagios -v /usr/local/nagios/etc/nagios.cfg  
sudo systemctl start nagios
```

```
sudo systemctl status nagios
```

```
[ec2-user@ip-172-31-38-129 nagios-plugins-2.3.3]$ sudo systemctl status nagios
● nagios.service - Nagios Core 4.4.6
   Loaded: loaded (/usr/lib/systemd/system/nagios.service; enabled; preset: disabled)
     Active: active (running) since Tue 2024-10-01 07:20:13 UTC; 19min ago
       Docs: https://www.nagios.org/documentation
       Tasks: 6 (limit: 1059)
      Memory: 4.0M
        CPU: 383ms
      CGroup: /system.slice/nagios.service
              └─1628 /usr/local/nagios/bin/nagios -d /usr/local/nagios/etc/nagios.cfg
                  ├─1633 /usr/local/nagios/bin/nagios --worker /usr/local/nagios/var/rw/nagios.qh
                  ├─1634 /usr/local/nagios/bin/nagios --worker /usr/local/nagios/var/rw/nagios.qh
                  ├─1635 /usr/local/nagios/bin/nagios --worker /usr/local/nagios/var/rw/nagios.qh
                  ├─1636 /usr/local/nagios/bin/nagios --worker /usr/local/nagios/var/rw/nagios.qh
                  └─1637 /usr/local/nagios/bin/nagios -d /usr/local/nagios/etc/nagios.cfg

Oct 01 07:20:13 ip-172-31-38-129.eu-north-1.compute.internal nagios[1628]: wproc: Registry request: name=Core Worker 1635;pid=1635
Oct 01 07:20:13 ip-172-31-38-129.eu-north-1.compute.internal nagios[1628]: Successfully launched command file worker with pid 1637
Oct 01 07:22:05 ip-172-31-38-129.eu-north-1.compute.internal nagios[1628]: SERVICE ALERT: localhost;HTTP;CRITICAL;HARD;4;connect to address 127.0.0.1 and port 80>
Oct 01 07:24:35 ip-172-31-38-129.eu-north-1.compute.internal nagios[1628]: SERVICE ALERT: nagiosadmin;localhost;Swap Usage;CRITICAL;notify-service-by-email
Oct 01 07:24:35 ip-172-31-38-129.eu-north-1.compute.internal nagios[1628]: wproc: NOTIFY job 2 from worker Core Worker 1633 is a non-check helper but exited with>
Oct 01 07:24:35 ip-172-31-38-129.eu-north-1.compute.internal nagios[1628]: wproc: host=localhost; service=Swap Usage; contact=nagiosadmin
Oct 01 07:24:35 ip-172-31-38-129.eu-north-1.compute.internal nagios[1628]: wproc: early timeout=0; exited ok=1; wait_status=32512; error code=0;
Oct 01 07:24:35 ip-172-31-38-129.eu-north-1.compute.internal nagios[1628]: wproc: stderr line 01: /bin/mail: No such file or directory
Oct 01 07:24:35 ip-172-31-38-129.eu-north-1.compute.internal nagios[1628]: wproc: stderr line 02: /usr/bin/printf: write error: Broken pipe
Oct 01 07:37:05 ip-172-31-38-129.eu-north-1.compute.internal nagios[1628]: SERVICE ALERT: localhost;HTTP;WARNING;HARD;4;HTTP WARNING: HTTP/1.1 403 Forbidden - 31>
lines 1-25/25 (END)
```

Nagios®



✓ Daemon running with PID 1628

[General](#)

- [Home](#)
- [Documentation](#)

Current Status

- [Tactical Overview](#)
- [Map \(Legacy\)](#)
- [Hosts](#)
- [Services](#)
- [Host Groups](#)
 - [Summary](#)
 - [Grid](#)
- [Service Groups](#)
 - [Summary](#)
 - [Grid](#)
- [Problems](#)
 - [Services \(Unhandled\)](#)
 - [Hosts \(Unhandled\)](#)
 - [Network Outages](#)

Reports

- [Availability](#)
- [Trends \(Legacy\)](#)
- [Alerts](#)
 - [History](#)
 - [Summary](#)
 - [Histogram \(Legacy\)](#)
- [Notifications](#)
- [Event Log](#)

System

- [Comments](#)
- [Downtime](#)
- [Process Info](#)
- [Performance Info](#)
- [Scheduling Queue](#)
- [Configuration](#)

Nagios® Core™
Version 4.4.6

April 28, 2020

[Check for updates](#)

A new version of Nagios Core is available!

Visit [nagios.org](#) to download Nagios 4.5.5.

Get Started

- Start monitoring your infrastructure
- Change the look and feel of Nagios
- Extend Nagios with hundreds of addons
- Get support
- Get training
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- Nagios Support (tech support)
- Nagios.com (company)
- Nagios.org (project)

Latest News

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[Page Tour](#)

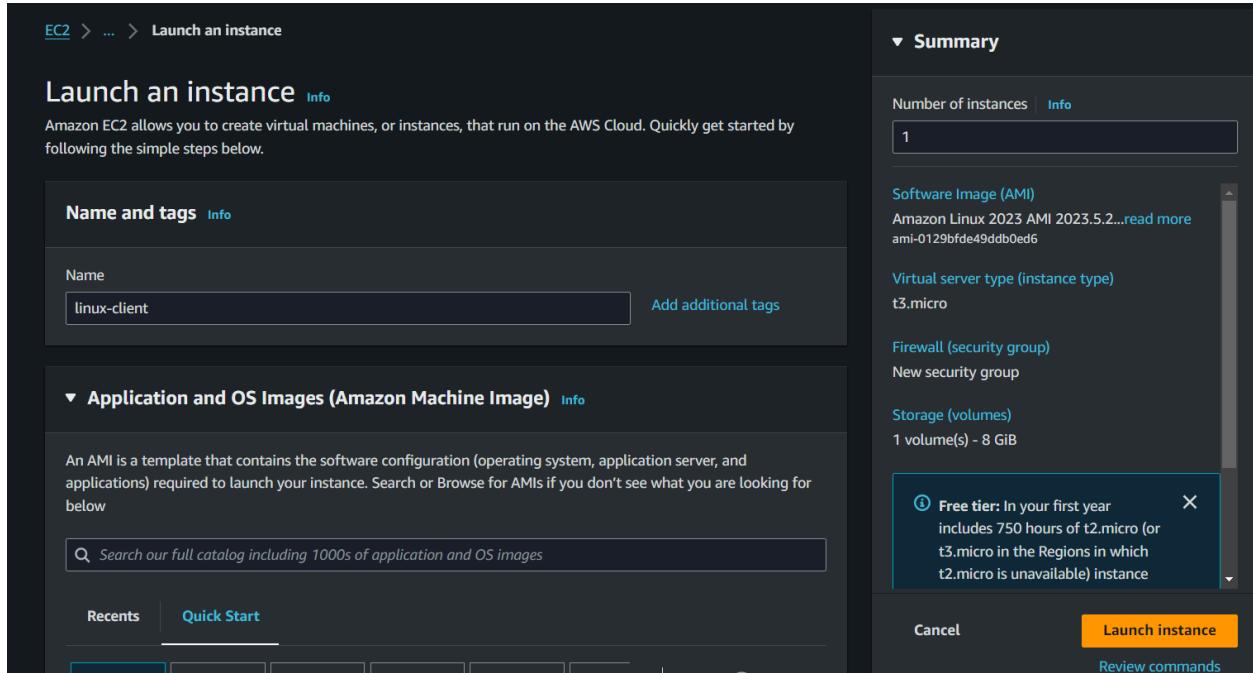
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Experiment 10

Aim: To perform Port, Service monitoring, Windows/Linux server monitoring using Nagios.

Prerequisites: AWS Free Tier, Nagios Server running on Amazon Linux Machine.

Step 1: Create a new ec2 instance called linux-client and choose Ubuntu as operating system.



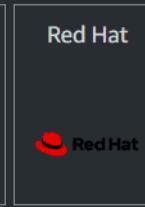
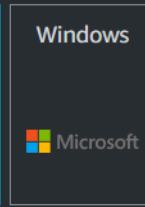
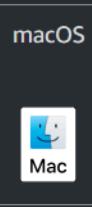
▼ Application and OS Images (Amazon Machine Image) Info

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below

 *Search our full catalog including 1000s of application and OS images*

Recents

Quick Start



[Browse more AMIs](#)

Including AMIs from AWS, Marketplace and the Community

Amazon Machine Image (AMI)

Ubuntu Server 24.04 LTS (HVM), SSD Volume Type

ami-04cdc91e49cb06165 (64-bit (x86)) / ami-02b7539372433cf6b (64-bit (Arm))

Virtualization: hvm ENA enabled: true Root device type: ebs

Free tier eligible



[EC2](#) > ... > [Launch an instance](#)



Success

Successfully initiated launch of instance (i-0f2dd6bd87339d15e)

▶ [Launch log](#)

Step 2: Change the settings for security groups

Security group rule ID	Type	Protocol	Port range	Source	Description - optional
sgr-05b14265c0dfc96e8	SSH	TCP	22	Custom	Q 0.0.0.0/0 X
-	All ICMP - IPv6	IPv6 ICMP	All	Anyw...	Q ::/0 X
-	All ICMP - IPv4	ICMP	All	Anyw...	Q 0.0.0.0/0 X
-	HTTP	TCP	80	Anyw...	Q 0.0.0.0/0 X
-	HTTPS	TCP	443	Anyw...	Q 0.0.0.0/0 X
-	All traffic	All	All	Anyw...	Q 0.0.0.0/0 X
-	Custom TCP	TCP	5666	Anyw...	Q 0.0.0.0/0 Delete

On server, check if server is running then, ps -ef | grep nagios

```
[ec2-user@ip-172-31-38-129 ~]$ ps -ef | grep nagios
nagios   1628      1  0 07:20 ?        00:00:00 /usr/local/nagios/bin/nagios -d /usr/local/nagios/etc/nagios.cfg
nagios   1633    1628  0 07:20 ?        00:00:00 /usr/local/nagios/bin/nagios --worker /usr/local/nagios/var/rw/nagios.qh
nagios   1634    1628  0 07:20 ?        00:00:00 /usr/local/nagios/bin/nagios --worker /usr/local/nagios/var/rw/nagios.qh
nagios   1635    1628  0 07:20 ?        00:00:00 /usr/local/nagios/bin/nagios --worker /usr/local/nagios/var/rw/nagios.qh
nagios   1636    1628  0 07:20 ?        00:00:00 /usr/local/nagios/bin/nagios --worker /usr/local/nagios/var/rw/nagios.qh
nagios   1637    1628  0 07:20 ?        00:00:00 /usr/local/nagios/bin/nagios -d /usr/local/nagios/etc/nagios.cfg
ec2-user  34154  33992  0 09:19 pts/0    00:00:00 grep --color=auto nagios
[ec2-user@ip-172-31-38-129 ~]$
```

Step 3: Copy Sample Configuration File

```
cp /usr/local/nagios/etc/objects/localhost.cfg
/usr/local/nagios/etc/objects/monitorhosts/linuxhosts/linuxserver.cfg
```

Step 4: Edit the Configuration File

```
sudo nano /usr/local/nagios/etc/objects/monitorhosts/linuxhosts/linuxserver.cfg
```

- Change hostname to linuxserver everywhere in the file.
- Change address to the public IP address of your linux-client.

```
#####
#
# HOST DEFINITION
#
#####

# Define a host for the local machine

define host {

    use          linux-server      ; Name of host template to use
                ; This host definition will inherit all variables that are defined
                ; in (or inherited by) the linux-server host template definition.

    host_name    linuxserver
    alias        linuxserver
    address      19.60.19.89
}

#####

^G Help      ^O Write Out   ^W Where Is   ^K Cut        ^T Execute      ^C Location     M-U Undo      M-A Set Mark   M-J To Bracket M-Q Previous
^X Exit      ^R Read File   ^V Replace    ^U Paste       ^J Justify     ^Y Go To Line   M-E Redo      M-C Copy      ^Q Where Was   M-W Next
```

```
GNU nano 5.8                               /usr/local/nagios/etc/objects/monitorhosts/linuxhosts/linuxserver.cfg
#
# HOST GROUP DEFINITION
#
#####

# Define an optional hostgroup for Linux machines

define hostgroup {

    hostgroup_name  linux-servers      ; The name of the hostgroup
    alias           Linux Servers      ; Long name of the group
    members         linuxserver        ; Comma separated list of hosts that belong to this group
}

#####

#
# SERVICE DEFINITIONS
#
#####

# Define a service to "ping" the local machine

define service {

^G Help      ^O Write Out   ^W Where Is   ^K Cut        ^T Execute      ^C Location     M-U Undo      M-A Set Mark   M-J To Bracket M-Q Previous
^X Exit      ^R Read File   ^V Replace    ^U Paste       ^J Justify     ^Y Go To Line   M-E Redo      M-C Copy      ^Q Where Was   M-W Next
```

Step 5: Update Nagios Configuration

```
sudo nano /usr/local/nagios/etc/nagios.cfg
```

- Add the following line:

```
cfg_dir=/usr/local/nagios/etc/objects/monitorhosts/
```

```
GNU nano 5.8                                         /usr/local/nagios/etc/nagios.cfg

# Definitions for monitoring a Windows machine
#cfg_file=/usr/local/nagios/etc/objects/windows.cfg

# Definitions for monitoring a router/switch
#cfg_file=/usr/local/nagios/etc/objects/switch.cfg

# Definitions for monitoring a network printer
#cfg_file=/usr/local/nagios/etc/objects/printer.cfg

# You can also tell Nagios to process all config files (with a .cfg
# extension) in a particular directory by using the cfg_dir
# directive as shown below:

#cfg_dir=/usr/local/nagios/etc/servers
#cfg_dir=/usr/local/nagios/etc/printers
#cfg_dir=/usr/local/nagios/etc/switches
#cfg_dir=/usr/local/nagios/etc/routers
cfg_dir=/usr/local/nagios/etc/objects/monitorhosts/
[REDACTED]

# OBJECT CACHE FILE
```

Step 6: Verify Configuration Files

```
sudo /usr/local/nagios/bin/nagios -v /usr/local/nagios/etc/nagios.cfg
```

```
[root@ip-172-31-38-129 ec2-user]# nano /usr/local/nagios/etc/nagios.cfg
[root@ip-172-31-38-129 ec2-user]# sudo /usr/local/nagios/bin/nagios -v /usr/local/nagios/etc/nagios.cfg

Nagios Core 4.4.6
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Last Modified: 2020-04-28
License: GPL

Website: https://www.nagios.org
Reading configuration data...
  Read main config file okay...
  Read object config files okay...

Running pre-flight check on configuration data...

Checking objects...
  Checked 16 services.
  Checked 2 hosts.
  Checked 2 host groups.
  Checked 0 service groups.
  Checked 1 contacts.
  Checked 1 contact groups.
  Checked 24 commands.
  Checked 5 time periods.
  Checked 0 host escalations.
```

In client side:

Step 9: Update Package Index and Install Required Packages

```
sudo apt update -y  
sudo apt install gcc -y  
sudo apt install -y nagios-nrpe-server nagios-plugins
```

Step 10: Edit NRPE Configuration File

```
sudo nano /etc/nagios/nrpe.cfg
```

- Add your Nagios host IP address under allowed_hosts:
allowed_hosts=<Nagios_Host_IP>

```
# ALLOWED HOST ADDRESSES  
# This is an optional comma-delimited list of IP address or hostnames  
# that are allowed to talk to the NRPE daemon. Network addresses with a bit mask  
# (i.e. 192.168.1.0/24) are also supported. Hostname wildcards are not currently  
# supported.  
#  
# Note: The daemon only does rudimentary checking of the client's IP  
# address. I would highly recommend adding entries in your /etc/hosts.allow  
# file to allow only the specified host to connect to the port  
# you are running this daemon on.  
#  
# NOTE: This option is ignored if NRPE is running under either inetd or xinetd  
  
allowed_hosts=127.0.0.1,::1,16.171.175.50  
  
# COMMAND ARGUMENT PROCESSING  
# This option determines whether or not the NRPE daemon will allow clients  
# to specify arguments to commands that are executed. This option only works  
# if the daemon was configured with the --enable-command-args configure script
```

Step 11: Restart NRPE Server

```
sudo systemctl restart nagios-nrpe-server
```

```
Restarting services...

Service restarts being deferred:
/etc/needrestart/restart.d/dbus.service
systemctl restart getty@tty1.service
systemctl restart networkd-dispatcher.service
systemctl restart serial-getty@ttyS0.service
systemctl restart systemd-logind.service
systemctl restart unattended-upgrades.service

No containers need to be restarted.

User sessions running outdated binaries:
ubuntu @ session #2: sshd[1046,1498]
ubuntu @ user manager service: systemd[1393]

No VM guests are running outdated hypervisor (qemu) binaries on this host.
ubuntu@ip-172-31-46-222:~$ sudo nano /etc/nagios/nrpe.cfg
ubuntu@ip-172-31-46-222:~$ sudo systemctl restart nagios-nrpe-server
ubuntu@ip-172-31-46-222:~$
```

Step 12: Check Nagios Dashboard

- Open your browser and navigate to http://<Nagios_Host_IP>/nagios.
- Log in with nagiosadmin and the password you set earlier.
- You should see the new host linuxserver added.
- Click on Hosts to see the host details.
- Click on Services to see all services and ports being monitored

Current Network Status
Last Updated: Tue Oct 1 09:51:00 UTC 2024
Updated every 90 seconds
Nagios® Core™ 4.4.6 - www.nagios.org
Logged in as nagiosadmin

Host Status Totals

Up	Down	Unreachable	Pending
2	0	0	0
All Problems	All Types		
0	2		

Service Status Totals

Ok	Warning	Unknown	Critical	Pending
12	1	0	3	0
All Problems	All Types			
4	16			

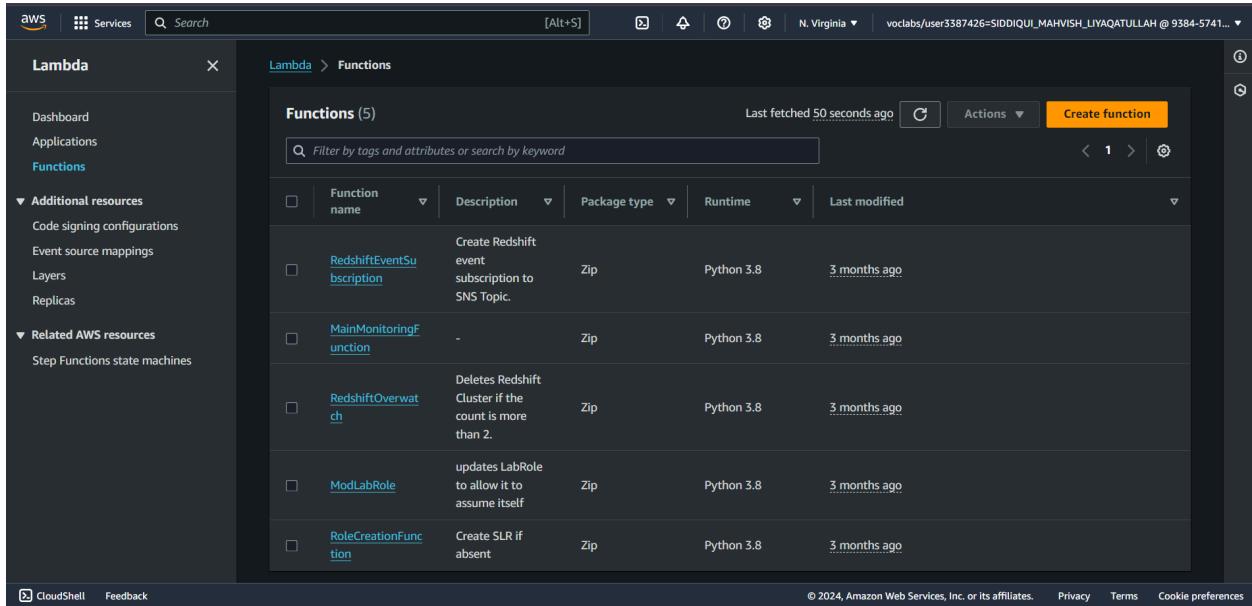
Host Status Details For All Host Groups

Host	Status	Last Check	Duration	Status Information
linuxserver	UP	10-01-2024 09:46:20	0d 0h 9m 2s	PING OK - Packet loss = 0%, RTA = 0.26 ms
localhost	UP	10-01-2024 09:49:39	0d 4h 24m 55s	PING OK - Packet loss = 0%, RTA = 0.06 ms

Results 1 - 2 of 2 Matching Hosts

Experiment 11

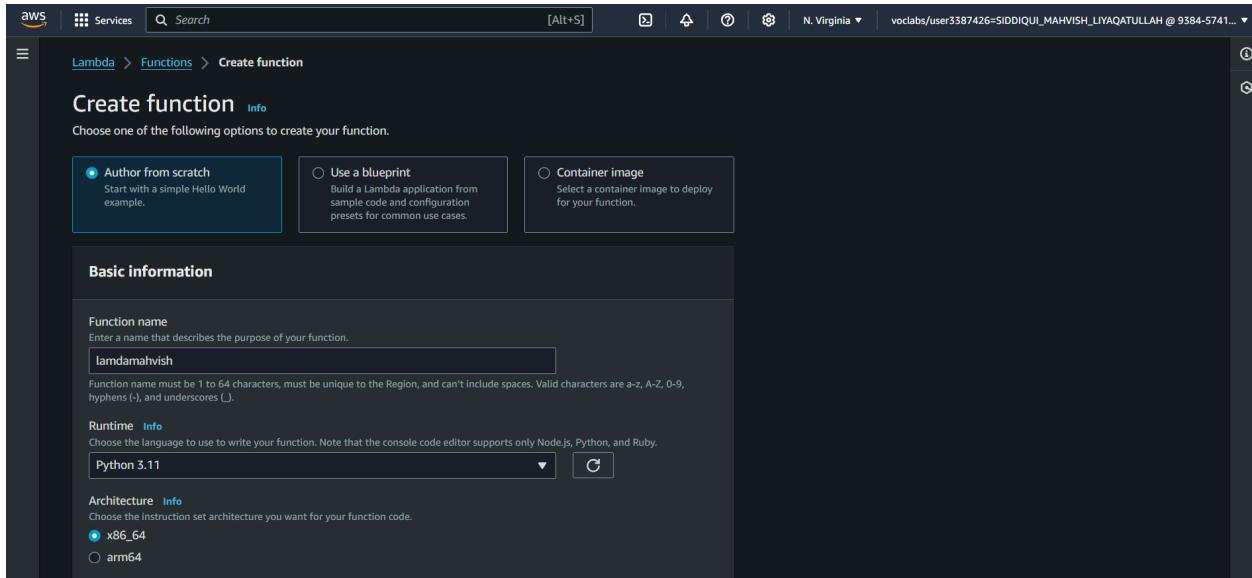
1. Go to your AWS account and search for Lamda



The screenshot shows the AWS Lambda console interface. On the left, there's a sidebar with options like Dashboard, Applications, Functions, Additional resources, and Related AWS resources. The main area is titled 'Functions (5)' and lists five Lambda functions:

Function name	Description	Package type	Runtime	Last modified
RedshiftEventSubscription	Create Redshift event subscription to SNS Topic.	Zip	Python 3.8	3 months ago
MainMonitoringFunction	-	Zip	Python 3.8	3 months ago
RedshiftOverwatch	Deletes Redshift Cluster if the count is more than 2.	Zip	Python 3.8	3 months ago
ModLabRole	updates LabRole to allow it to assume itself	Zip	Python 3.8	3 months ago
RoleCreationFunction	Create SLR if absent	Zip	Python 3.8	3 months ago

2. Create a new Lambda function



The screenshot shows the 'Create function' wizard. It starts with a choice of three methods to create the 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.

Then, it moves to the 'Basic information' step:

Function name: lamdamahvish
Enter a name that describes the purpose of your function.

Runtime: Python 3.11

Architecture: x86_64

Use Labrole as user role.

AWS Lambda configuration screen showing the creation of a new function.

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.

LabRole [View the LabRole 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.

[Enable Code signing](#) [Info](#)
Use code signing configurations to ensure that the code has been signed by an approved source and has not been altered since signing.

[Enable function URL](#) [Info](#)
Use function URLs to assign HTTP(S) endpoints to your Lambda function.

[Enable tags](#) [Info](#)

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AWS Lambda function details screen for "lamdamahvish".

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

Lambda > Functions > lamdamahvish

Function overview [Info](#)

[Diagram](#) [Template](#)

lamdamahvish

Layers (0)

[+ Add trigger](#) [+ Add destination](#)

[Export to Application Composer](#) [Download](#)

Description -

Last modified **9 seconds ago**

Function ARN [arn:aws:lambda:us-east-1:938457417220:function:lamdamahvish](#)

Function URL [Info](#) -

Code Test Monitor Configuration Aliases Versions

The screenshot shows the AWS Lambda function editor. At the top, a green banner says "Successfully created the function lamdamahvish. You can now change its code and configuration. To invoke your function with a test event, choose 'Test'." Below the banner, the "Code source" tab is selected. The interface includes a toolbar with File, Edit, Find, View, Go, Tools, Window, Test, Deploy, and an "Upload from" button. On the left, there's a sidebar for "Environment" with a "lambda_function - /" folder containing "lambda_function.py". The main area displays the Python code:

```
1 import json
2
3 def lambda_handler(event, context):
4     # TODO implement
5     return {
6         'statusCode': 200,
7         'body': json.dumps('Hello from Lambda!')
8     }
9
```

3. Create a new test event and save it.

The screenshot shows the AWS Lambda function configuration page. The "Test" tab is selected. The interface includes tabs for Code, Test, Monitor, Configuration, Aliases, and Versions. At the top, there are "Save" and "Test" buttons. The "Test event" section contains instructions: "To invoke your function without saving an event, configure the JSON event, then choose Test." It has two options: "Create new event" (selected) and "Edit saved event". Below this, there are fields for "Event name" (set to "mahvishevent") and "Event sharing settings" (set to "Private"). A note says "This event is only available in the Lambda console and to the event creator. You can configure a total of 10." There's also a "Shareable" option with a note about IAM users. At the bottom, there's a "Template - optional" field containing "hello-world".

AWS Services Search [Alt+S] N. Virginia v vocabs/user3387426=SIDDQUI_MAHVISH_LIYAQATULLAH @ 9384-5741... ▾

Event sharing settings

Private
This event is only available in the Lambda console and to the event creator. You can configure a total of 10. [Learn more](#)

Shareable
This event is available to IAM users within the same account who have permissions to access and use shareable events. [Learn more](#)

Template - optional

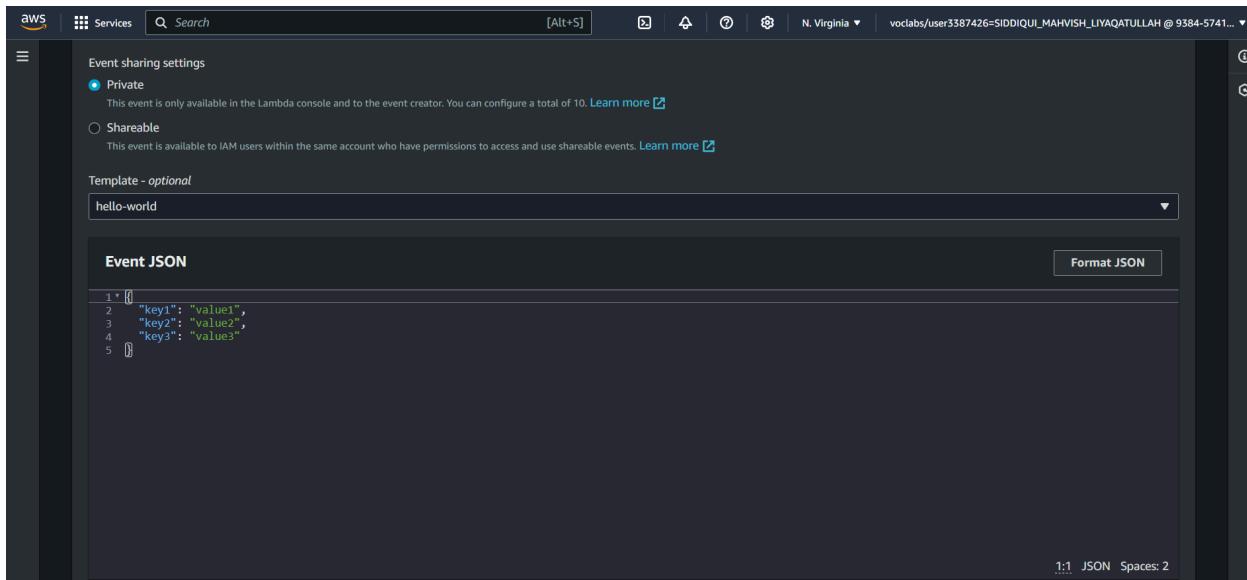
hello-world

Event JSON

Format JSON

```
1 * []
2   "Key1": "value1",
3   "Key2": "value2",
4   "Key3": "value3"
5 []
```

1:1 JSON Spaces: 2



AWS Services Search [Alt+S] N. Virginia v vocabs/user3387426=SIDDQUI_MAHVISH_LIYAQATULLAH @ 9384-5741... ▾

The test event mahvishevent was successfully saved.

Code Test Monitor Configuration Aliases Versions

General configuration Info Edit

Description	Memory	Ephemeral storage
-	128 MB	512 MB

Triggers

Permissions

Destinations

Function URL

Environment variables

Tags

VPC

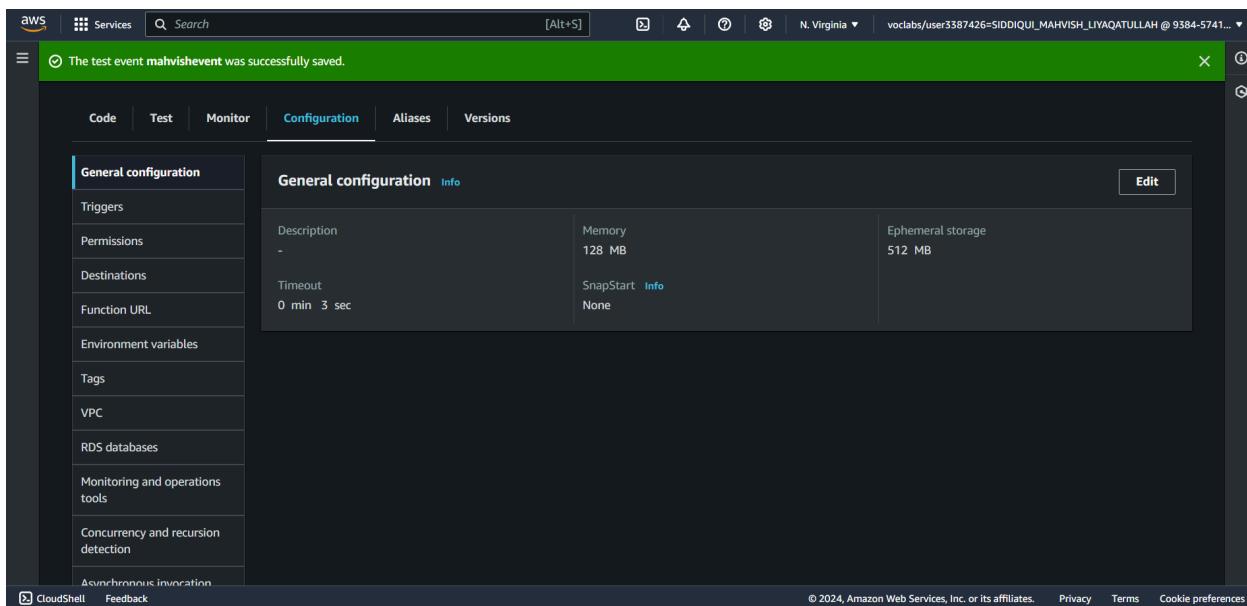
RDS databases

Monitoring and operations tools

Concurrency and recursion detection

Asynchronous invocation

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4. Change the basic settings

The screenshot shows the 'Edit basic settings' page for a Lambda function named 'lamdamahvish'. The 'Basic settings' tab is selected. Key configuration options visible include:

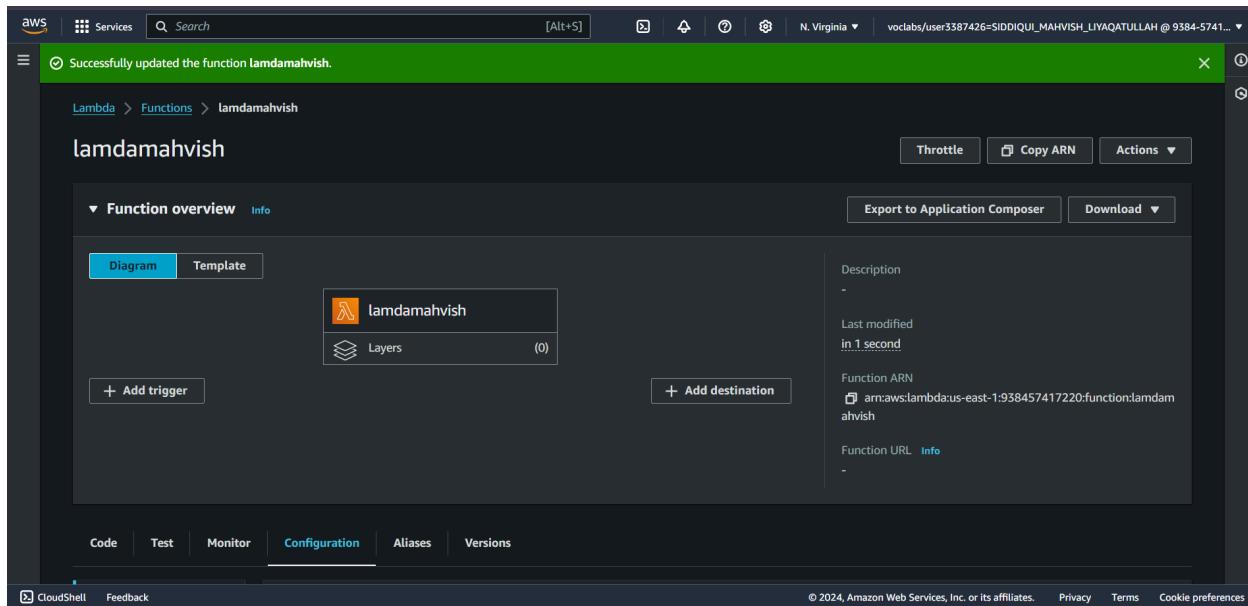
- Description - optional:** A text input field.
- Memory:** Set to 128 MB. Info: Your function is allocated CPU proportional to the memory configured.
- Ephemeral storage:** Set to 512 MB. Info: You can configure up to 10 GB of ephemeral storage (/tmp) for your function. View pricing.
- SnapStart:** Set to None. Info: Reduce startup time by having Lambda cache a snapshot of your function after the function has initialized. To evaluate whether your function code is resilient to snapshot operations, review the [SnapStart compatibility considerations](#).
- Timeout:** Set to 0 min 1 sec.

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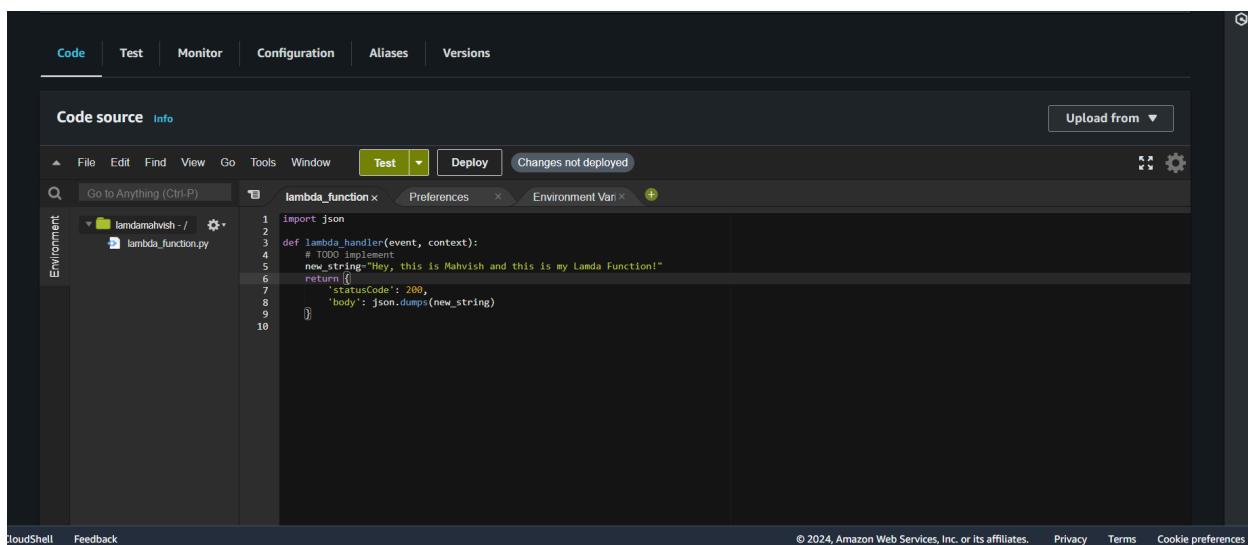
This screenshot shows the continuation of the 'Edit basic settings' page. The configuration includes:

- Ephemeral storage:** Set to 512 MB. Info: You can configure up to 10 GB of ephemeral storage (/tmp) for your function. View pricing.
- SnapStart:** Set to None. Info: Reduce startup time by having Lambda cache a snapshot of your function after the function has initialized. To evaluate whether your function code is resilient to snapshot operations, review the [SnapStart compatibility considerations](#).
- Timeout:** Set to 0 min 1 sec.
- Execution role:** Set to 'Use an existing role'. Options: Use an existing role (selected), Create a new role from AWS policy templates.
- Existing role:** Choose an existing role to be used with this Lambda function. The role must have permission to upload logs to Amazon CloudWatch Logs. A dropdown menu shows the role 'c127334a3201310l7161527t1w93845741722-LambdaSLRRole-aGRBkIASAOxp' with a 'View' link.

At the bottom right, there are 'Cancel' and 'Save' buttons, and a footer with copyright information: © 2024, Amazon Web Services, Inc. or its affiliates. Privacy Terms Cookie preferences.



5. Edit the code as required and **ctrl+ s** to save it. Click on Deploy



6. Create a new test and click on Test

The screenshot shows the AWS Lambda Test event configuration page. At the top, a green success message box displays: "Successfully updated the function lamdamahvish." Below this, the "Test event" section is visible. It includes fields for "Event name" (set to "mytestevent") and "Event sharing settings" (set to "Private"). A "Save" button and a yellow "Test" button are located at the top right of the configuration area.

The screenshot shows the AWS Lambda Test event configuration page. At the top, a green success message box displays: "Executing function: succeeded (logs [?])". Below this, the "Test event" section is visible, identical to the previous screenshot. It includes fields for "Event name" (set to "mytestevent") and "Event sharing settings" (set to "Private"). A "Save" button and a yellow "Test" button are located at the top right of the configuration area.

7. After this, the result can be seen

The screenshot shows the AWS Lambda function execution details page. At the top, a green banner indicates "Successfully updated the function lamdamahvish." Below the banner, a message says "Executing function: succeeded (logs)" with a link to logs. A "Details" section is expanded, showing the execution log content:

```
{ "statusCode": 200, "body": "\"Hey, this is Mahvish and this is my Lambda Function!\""} 
```

The "Summary" section provides performance metrics:

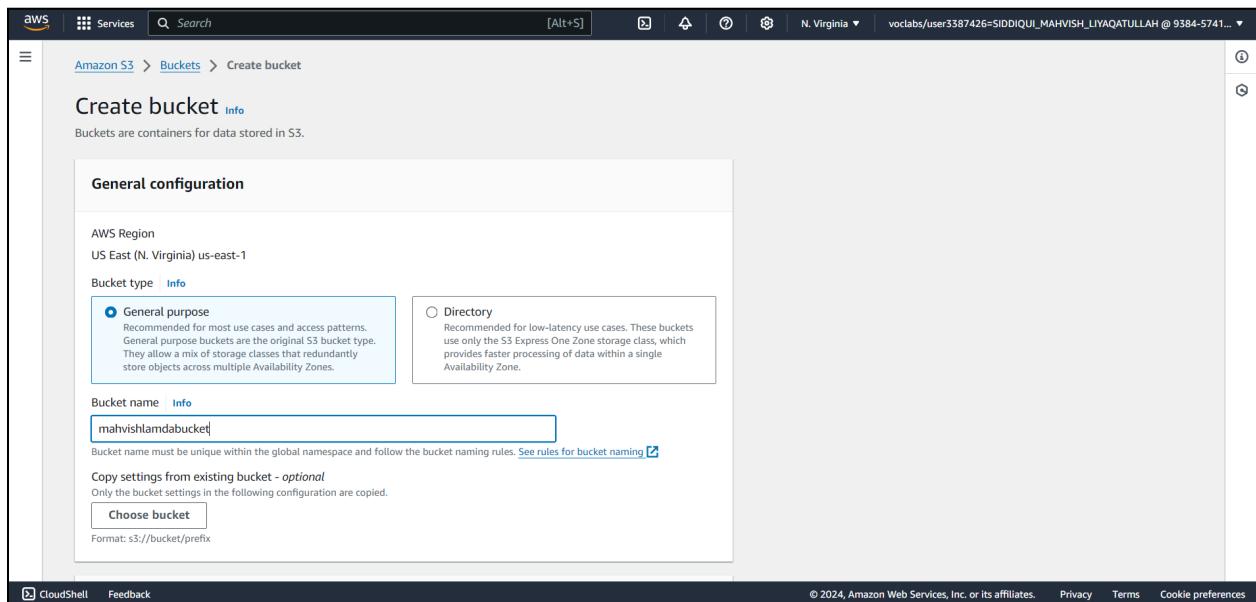
Value	Description
Code SHA-256 7JKNRZrVQQlg0wLbQuZ2DZzI3up0H1ou06cZVt6aKzc=	SHA-256 hash of the code
Request ID 4cf60215-7acb-4add-87a1-56f9f5a259ca	Unique identifier for the request
Init duration 116.08 ms	Time taken to initialize the function
Billed duration 17 ms	Time taken to process the request
Max memory used 33 MB	Maximum memory allocated during execution
Execution time 31 seconds ago	Time since the function was last executed
Function version \$LATEST	Version of the function
Duration 16.71 ms	Total duration of the execution
Resources configured 128 MB	Allocated memory size

The "Log output" section shows the CloudWatch log group URL: [Click here](#).

```
START RequestId: 4cf60215-7acb-4add-87a1-56f9f5a259ca Version: $LATEST
END RequestId: 4cf60215-7acb-4add-87a1-56f9f5a259ca
REPORT RequestId: 4cf60215-7acb-4add-87a1-56f9f5a259ca Duration: 16.71 ms Billed Duration: 17 ms Memory Size: 128 MB Max Memory Used: 33 MB Init Duration: 116.08 ms 
```

Experiment No 12

Aim: To create a Lambda function which will log “An Image has been added” once you add an object to a specific bucket in S3



1. Create an AWS S3 bucket and save it.

The screenshot shows the 'Buckets' page in the AWS Management Console. A green banner at the top indicates that a bucket named 'mahvishlamdabucket' was successfully created. The page lists four buckets under the 'General purpose buckets' tab. The buckets are:

Name	AWS Region	IAM Access Analyzer	Creation date
demo-bucket-676tyr4571dst	US East (N. Virginia) us-east-1	View analyzer for us-east-1	August 24, 2024, 14:22:45 (UTC+05:30)
elasticbeanstalk-us-east-1-938457417220	US East (N. Virginia) us-east-1	View analyzer for us-east-1	August 13, 2024, 14:23:15 (UTC+05:30)
mahvishlamdabucket	US East (N. Virginia) us-east-1	View analyzer for us-east-1	October 7, 2024, 20:03:23 (UTC+05:30)
test-mahvish	US East (N. Virginia) us-east-1	View analyzer for us-east-1	August 12, 2024, 20:04:18 (UTC+05:30)

2. Create an AWS Lambda Function, use python 3.11

The screenshot shows the 'Create function' wizard in the AWS Lambda console. It offers three deployment paths: 'Author from scratch' (selected), 'Use a blueprint', and 'Container image'. The 'Basic information' section includes fields for 'Function name' (set to 'mahvishimageloader'), 'Runtime' (set to 'Python 3.11'), and 'Architecture' (set to 'x86_64'). The bottom navigation bar includes 'CloudShell', 'Feedback', and links to '© 2024, Amazon Web Services, Inc. or its affiliates.', 'Privacy', 'Terms', and 'Cookie preferences'.

The screenshot shows the 'Function overview' page for the 'mahvishimageloader' function. The main area displays the function's name ('mahvishimageloader') and a 'Layers' section indicating '(0)'. Below this are buttons for '+ Add trigger' and '+ Add destination'. To the right, there are sections for 'Description' (empty), 'Last modified' (10 seconds ago), 'Function ARN' (arn:aws:lambda:us-east-1:938457417220:function:mahvishimageloader), and 'Function URL' (empty). The bottom navigation bar includes tabs for 'Code', 'Test', 'Monitor', 'Configuration', 'Aliases', and 'Versions'.

3. Change the code such that it prints “An image has been added to the bucket” when triggered.

The screenshot shows the AWS Lambda code editor interface. The code editor window is open with the file `lambda_function.py`. The code is as follows:

```
1 import json
2
3 def lambda_handler(event, context):
4     # TODO implement
5     bucket_name = event['Records'][0]['s3']['bucket']['name']
6     object_key = event['Records'][0]['s3']['object']['key']
7
8     print(f"An image has been added to the bucket {bucket_name}: {object_key}")
9
10    return {
11        'statusCode': 200,
12        'body': json.dumps('Log Entry Created Successfully!')
13    }
14
```

4. Add S3 bucket in your triggers and select the name of your S3 bucket.

The screenshot shows the AWS Lambda trigger configuration page. The user is adding a new trigger for the function. The configuration is set to trigger on S3 events from a specific bucket:

- Trigger configuration:** S3
- Bucket:** s3/mahvishlambdabucket
- Event types:** All object create events
- Prefix - optional:** e.g. images/

The screenshot shows the AWS Lambda console. In the top navigation bar, 'Lambda' is selected under 'Services'. The main title is 'mahvishimageloader'. Below the title, a message states: 'The trigger mahvishlamdbucket was successfully added to function mahvishimageloader. The function is now receiving events from the trigger.' Under the 'Function overview' section, there are tabs for 'Diagram' (selected) and 'Template'. The diagram shows a single function box labeled 'mahvishimageloader' with a 'Layers' icon next to it. Below the function box is an 'S3' box, which is connected to the function box by a line. There are buttons for '+ Add destination' and '+ Add trigger'. To the right of the diagram, there are sections for 'Description', 'Last modified' (8 minutes ago), 'Function ARN' (arn:aws:lambda:us-east-1:938457417220:function:mahvishimageloader), and 'Function URL' (Info). At the bottom of the overview section, there are tabs for 'Code', 'Test', 'Monitor', 'Configuration' (selected), 'Aliases', and 'Versions'.

5. Go to your S3 bucket

The screenshot shows the AWS Lambda Configuration page for a role named 'LabRole'. The left sidebar lists various configuration options: General configuration, Triggers, Permissions (selected), Destinations, Function URL, Environment variables, Tags, VPC, RDS databases, Monitoring and operations tools, Concurrency and recursion detection, Asynchronous invocation, Code signing, File systems, and State machines. The main area is titled 'Execution role' and shows the role name 'LabRole'. A 'Resource summary' section contains a warning message: 'User: arn:sts::938457417220:assumed-role:voclabs/user3387426=SIDDQUI_MAHVISH_LIYAQATULLAH is not authorized to perform: iam:GetPolicy on resource: policy arn:aws:iam::938457417220:policy/c127334a3201310l7161527t1w938457417220-VoCoLabPolicy2-CB5NVd5H8mVY with an explicit deny in an identity-based policy'. Below this is a 'Resource-based policy statements' section. It shows a table with one row:

Statement ID	Principal	PrincipalOrgID	Conditions	Action
lambda-74f7d821-9da4-...	s3.amazonaws.com	-	StringEquals, ArnLike	lambda:InvokeFunction

6. Upload an image inside the s3 bucket

The screenshot shows the AWS S3 'Upload' interface. At the top, the navigation bar includes 'Services', a search bar, and the region 'N. Virginia'. Below the navigation is the breadcrumb path: 'Amazon S3 > Buckets > mahvishlamdabucket > Upload'. The main area is titled 'Upload' with an 'Info' link. A note at the top says: 'Add the files and folders you want to upload to S3. To upload a file larger than 160GB, use the AWS CLI, AWS SDK or Amazon S3 REST API. Learn more'.

In the center, there's a large dashed blue box for dragging and dropping files. Below it, a table lists 'Files and folders (1 Total, 48.3 KB)'. The table has columns for Name, Folder, and Type. One item, 'vision.png', is listed with a status of 'image/png'. Buttons for 'Remove', 'Add files', and 'Add folder' are available above the table.

On the right, a sidebar titled 'Destination' shows the destination as 's3://mahvishlamdabucket'. It includes a 'Destination details' section with a note about bucket settings. At the bottom of the sidebar are 'Permissions', 'CloudShell', and 'Feedback' links.

At the very bottom, there are links for 'Privacy', 'Terms', and 'Cookie preferences'.

The screenshot shows the 'Upload: status' page. At the top, a green banner displays a success message: 'Upload succeeded' with a circular icon and 'View details below.' A 'Close' button is in the top right corner.

The main content area is titled 'Upload: status' with a 'Close' button. A note at the top says: 'The information below will no longer be available after you navigate away from this page.'

A 'Summary' section shows the destination 's3://mahvishlamdabucket' and upload results: 'Succeeded' (1 file, 48.3 KB (100.00%)) and 'Failed' (0 files, 0 B (0%)).

Below the summary is a table titled 'Files and folders (1 Total, 48.3 KB)'. The table has columns for Name, Folder, Type, Size, Status, and Error. The single entry, 'vision.png', is shown with a status of 'Succeeded'.

At the bottom, there are tabs for 'Files and folders' (which is selected) and 'Configuration'.

7. Go back to your Lambda function and under monitor select 'open cloudwatch logs'
Here you can see the message: An image has been added to the bucket.

The screenshot shows the AWS CloudWatch Log Groups interface. The left sidebar navigation includes 'CloudWatch' (selected), 'Services' (dropdown), 'Search' (input field), and a 'Log groups' section with various sub-options like 'Log Anomalies', 'Live Tail', 'Logs Insights', 'Contributor Insights', 'Metrics', 'X-Ray traces', 'Events', 'Application Signals', 'Network monitoring', and 'Insights'. Under 'Log groups', there's a 'Log events' section with a search bar, time range buttons (Clear, 1m, 30m, 1h, 12h, Custom, UTC timezone), and a 'Display' dropdown. The main content area shows log entries for the '/aws/lambda/mahvishimagedloader' log group. The first five entries are:

Timestamp	Message
2024-10-07T15:19:51.565Z	INIT_START Runtime Version: python:3.11.v4 Runtime Version ARN: arn:aws:lambda:us-east-1::runtime:b1c790bce6ec3c3a14a715f55..
2024-10-07T15:19:51.651Z	START RequestId: c20b73bc-ac9f-4470-a491-b493bd7563b6 Version: \$LATEST
2024-10-07T15:19:51.654Z	An image has been added to the bucket mahvishlamdabucket: vision.png
2024-10-07T15:19:51.656Z	END RequestId: c20b73bc-ac9f-4470-a491-b493bd7563b6
2024-10-07T15:19:51.656Z	REPORT RequestId: c20b73bc-ac9f-4470-a491-b493bd7563b6 Duration: 4.81 ms Billed Duration: 5 ms Memory Size: 128 MB Max Memor..

The last entry is a placeholder message: "No newer events at this moment. Auto retry paused. [Resume](#)".