



Vivekanand Education Society's Institute of Technology

(An Autonomous Institute Affiliated to University of Mumbai)

Department of Information Technology

A.Y. 24-25

Advance DevOps Lab

Experiment No.	01
Experiment Title.	To understand the benefits of Cloud Infrastructure and Setup AWS Cloud9 IDE, Launch AWS Cloud9 IDE and Perform Collaboration Demonstration.
Roll No.	53
Name	Arnav S. Sawant
Class	D15 A
Subject	Advance DevOps
Lab Outcome	LO1: To understand the fundamentals of Cloud Computing and be fully proficient with Cloud based DevOps solution deployment options to meet your business requirements
Signature:	
Grade:	

Advance-DevOps - Experiment 1A

Aim:- To host static and dynamic website on Pg-2 Amazon S3 and Ec2.

Theory:- An S3 bucket is a scalable storage container provided by AWS for storing objects such as files, images, and backups. It operates in Amazon's Simple Storage Service (S3) and allows users to store and retrieve any amount of data from anywhere on the web. S3 buckets are highly durable and secure, supporting features like versioning, encryption and access control. They are widely used for variety of applications including data archiving, static website hosting and big-data analytics offering seamless integration with other AWS services and a pay-as-you-go model.

Amazon Ec2(Elastic Compute cloud) is web service provided by Amazon Web Services that offer resizable virtual servers known as instances in cloud. It allows users to run applications on a Scalable and secure infrastructure without need of physical hardware. With Ec2 users can select different instance types based on their computational needs from general-purpose to compute-optimized or memory-optimized instances.

Conclusion:- I was not knowing about S3 & Ec2 so i had learn a bit about them, then i referred to one of the youtube videos, then i got to know, and then i executed it.

Advance - DevOps - Experiment - 1B

Aim:- To understand the benefits of cloud9 infrastructure and setup AWS cloud9 IDE, Launch AWS cloud9 IDE and perform collaboration demonstration.

Theory:- AWS cloud9 is a cloud based integrated development environment(IDE) that lets you write, run and debug your code with just a browser, it includes a code editor, debugger and terminal. Cloud9 comes prepackaged with essential tools for popular programming languages, including JavaScript, Python, PHP and more so you don't need to install files or new projects.

Configure your development machine to start

Since your cloud9 IDE is cloud-based you can work on your projects from your office home or anywhere else using internet connected machine. Cloud9 also provides a ~~seamless~~ experience for developing serverless applications enabling you to easily define resources, debug and switch between local and remote execution of serverless application with cloud9, you can quickly share your development environment with your team, enabling you to pair program and track each others inputs in real time.

Conclusion:- I learned about cloud9 from internet and watching a yt-video and then ~~was~~ implementing it.

AP - 11

EC2 Dashboard X | Resources EC2 Global View C Account attributes C

You are using the following Amazon EC2 resources in the US East (N. Virginia) Region:

Instances (running)	0	Auto Scaling Groups	0
Dedicated Hosts	0	Elastic IPs	0
Instances	0	Key pairs	1
Load balancers	0	Placement groups	0
Security groups	1	Snapshots	0
Volumes	0		

Instances

- Instances
- Instance Types
- Launch Templates
- Spot Requests
- Savings Plans
- Reserved Instances
- Dedicated Hosts
- Capacity Reservations

Images

- AMIs
- AMI Catalog

Elastic Block Store

Launch instance

Service health AWS Health Dashboard C

Save up to 90% on EC2 with Spot Instances Optimize price-performance by combining EC2 purchase options in a single EC2 ASG. Learn more C

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Boot usage: 0%

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

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

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-172-31-6-126:~\$

i-03472a028ec313b14 (Arnav's server)
PublicIPs: 3.238.81.165 PrivateIPs: 172.31.6.126

```
ubuntu@ip-172-31-6-126:~$ mkdir arnav
ubuntu@ip-172-31-6-126:~$ cd arnav
ubuntu@ip-172-31-6-126:~/arnav$ cd ..
ubuntu@ip-172-31-6-126:~$ cd arnav
ubuntu@ip-172-31-6-126:~/arnav$ mkdir appl
ubuntu@ip-172-31-6-126:~/arnav$ cd appl
ubuntu@ip-172-31-6-126:~/arnav/appl$
```



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Advance DevOps Lab

Experiment No.	02
Experiment Title.	To Build Your Application using AWS CodeBuild and Deploy on S3 / SEBS using AWS CodePipeline, deploy Sample Application on EC2 instance using AWS CodeDeploy.
Roll No.	53
Name	Arnav S. Sawant
Class	D15 A
Subject	Advance DevOps
Lab Outcome	LO1:To understand the fundamentals of Cloud Computing and be fully proficient with Cloud based DevOps solution deployment options to meet your business requirements
Signature:	
Grade:	

Advance - DevOps (A) Experiment 2

Aim:- To build application using AWS codebuild & Deploy on S3 using SFBS AWS Codepipeline, deploy Sample Application on EC2 instance using AWS CodeDeploy.

Theory:-

- 1) AWS Elastic Beanstalk:- It is a managed service that simplifies the deployment, scaling and management of web applications. It abstracts the underlying infrastructure, allowing developers to focus on coding.
- 2) AWS Codepipeline:- It is CI/CD service that automates the build, test & deployment stages of the software release process. It integrates with various AWS services including Elastic Beanstalk.

Conclusion:-

- Integrating AWS codepipeline along with Elastic Beanstalk on the internet also I learned about it on youtube.

xp-2

Sales Services Search [Alt+S] N. Virginia Environment tier

Configure service access Step 4

Step 5 - optional Set up networking, database, and tags

Step 6 - optional Configure instance traffic and scaling

Step 7 - optional Configure updates, monitoring, and logging

Step 8 Review

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 servers 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 Maximum length of 100 characters

Application tags (optional)

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Developer Tools > CodePipeline > Pipelines

① Introducing the new V2 pipeline type with improved release safety, pipeline triggers, parameterized pipelines, and a new billing model. [Learn more \[?\]](#) X

Pipelines Info



Notify ▾

View history

Release change

Delete pipeline

Create pipeline



< 1 > ⌂

Name

Latest execution status

Latest source revisions

Latest execution started

Most recent executions

No results

There are no results to display.

Congratulations!

You have successfully created a pipeline that retrieved this source application from an Amazon S3 bucket and deployed it to three Amazon EC2 instances using AWS CodeDeploy.

For next steps, read the AWS CodePipeline Documentation, Ingest 2020

Exp-1



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Advance DevOps Lab

Experiment No.	03
Experiment Title.	To understand the Kubernetes Cluster Architecture, install and Spin Up a Kubernetes Cluster on Linux Machines/Cloud Platforms
Roll No.	53
Name	Arnav S. Sawant
Class	D15 A
Subject	Advance DevOps
Lab Outcome	LO2: To deploy single and multiple container applications and manage application deployments with rollouts in Kubernetes
Signature:	
Grade:	

Advance-DevOps - Experiment - 3

Aim:- To understand the Kubernetes cluster Architecture install and spin up a Kubernetes cluster on Linux Machines / cloud Platforms.

Theory:- Kubernetes is a powerful open-source platform for managing containerized application across multiple hosts. It provides an abstraction layer for deploying and scaling applications ensuring high availability and fault tolerance. The Kubernetes cluster architecture consist of several key component divided into 2 major categories

- 1) Master Node
- 2) Worker Node.

• Master Node Component :- The master node is responsible for managing entire Kubernetes cluster. It acts as brain of cluster, orchestrating container deployment, scaling and communication between nodes.

API server :- acts as frontend for Kubernetes control panel.

Scheduler = responsible for distributing workload across cluster

Controller Manager :- Ensures desired state of cluster matches actual state.

Cloud control manager :- Integrates cloud specific API into Kubernetes.

• Worker Node component :- The worker node are where your applications run. Each worker node communicates with master node and executes commands given.

~Exp 3 part 2

kubelet - Primary agent that runs on each worker node.

kube-proxy - Manage networking for worker node

Container-Runtime - Responsible for pulling container image and running the container.

Pods - Smallest deployable unit in Kubernetes.

Conclusion :- It was quite a challenge for me to add security groups to the "master" i was a bit confused in that so i referred to one of my friend's doc and then i solved that error.

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XP - 3

AWS Services Search (Alt+S) N. Virginia v user3307492+SAWANT_ARHAN_SANTOSH@8389-5087-9662

EC2 Dashboard Instances Info Last updated less than a minute ago Connect Instance state Actions Launch Instances

EC2 Global View Events Console-to-Code Preview

Instances Instances Instance Types Launch Templates Spot Requests Savings Plans Reserved Instances Dedicated Hosts Capacity Reservations New

Images

Find instance by attribute or tag (case-sensitive)

Instance state: running X Clear Filters

Name Instance ID Instance state Instance type Status check Alarm status

No matching instances found

Select an instance

AWS Services Search (Alt+S) N. Virginia v user3307492+SAWANT_ARHAN_SANTOSH@8389-5087-9662

EC2 Dashboard Instances (1/2) Info Last updated less than a minute ago Connect Instance state Actions Launch Instances

EC2 Global View Events Console-to-Code Preview

Instances Instances Instance Types Launch Templates Spot Requests Savings Plans Reserved Instances Dedicated Hosts Capacity Reservations New

Images

Find instance by attribute or tag (case-sensitive)

All states

Name Instance ID Instance state Instance type Status check Alarm status

master i-0d166e5cfc193593 Running Q Q t2 medium Initializing View alarms +

worker i-05058f0ca205d5dee Running Q Q t2 medium Initializing View alarms +

i-05058f0ca205d5dee (worker)

Details Status and alarms Monitoring Security Networking Storage Tags

Instance summary info

Instance ID: i-05058f0ca205d5dee (worker) Public IPv4 address: 44.204.85.129 [open address] Private IPv4 addresses: 172.31.85.234

IPv6 address Instance state: Running Public IPv4 DNS:

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```
ubuntu@ip-172-31-86-195:~$ kubectl get nodes
NAME           STATUS    ROLES      AGE     VERSION
ip-172-31-86-195   Ready    control-plane   13m    v1.29.0
ip-172-31-90-68     Ready    <none>        42s    v1.29.0
```



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Advance DevOps Lab

Experiment No.	04
Experiment Title.	To install Kubectl and execute Kubectl commands to manage the Kubernetes cluster and deploy Your First Kubernetes Application.
Roll No.	53
Name	Arnav 'S. Sawant
Class	D15 A
Subject	Advance DevOps
Lab Outcome	LO2: To deploy single and multiple container applications and manage application deployments with rollouts in Kubernetes
Signature:	
Grade:	

Advance-DevOps - Experiment 4

①

Aim :- To install kubectl and execute kubectl command to manage the kubernetes cluster and deploy your first kubernetes application.

Theory :- kubectl is a command line interface to interact with a kubernetes cluster. It allows users to manage cluster resources, deploy applications, inspect and manage cluster components. Using kubectl you can communicate with kubernetes API Server to issue command and queries.

Kubernetes objects:-

- 1) Pods :- The smallest deployable unit in kubernetes. A pod encapsulates one or more containers ^{that share same} network namespace and storage.
- 2) Deployments :- A kubernetes resource that defines how to create and manage pods. It ensures the specified numbers of pods replicas are running at any given time and handles updates and roll backs.
- 3) Services :- An abstraction that defines how to access the pods. A service allows you to expose your pods to internal or external client.
- 4) Replicsets :- Ensures that a specified number of pods replicas are running at all times. It is managed by deployment but can also be used independently.

Conclusion :- 1) While using nano nginx-deployment & service.yaml, my indentation was not proper so i had to fix that indentation by referring to the docs and then i was good to go.

Exp-4

```
ubuntu@ip-172-31-86-195:~$ sudo apt-get update
Hit:1 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:3 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-backports InRelease
Hit:4 http://security.ubuntu.com/ubuntu noble-security InRelease
Hit:5 https://prod-cdn.packages.k8s.io/repositories/isv:/kubernetes:/addons:/cri-o:/prerelease:/main/deb InRelease
Hit:6 https://prod-cdn.packages.k8s.io/repositories/isv:/kubernetes:/core:/stable:/v1.29/deb InRelease
Reading package lists... Done
ubuntu@ip-172-31-86-195:~$ sudo apt-get install -y apt-transport-https ca-certificates curl
Building dependency tree... Done
Reading state information... Done
apt-transport-https is already the newest version (2.7.14build2).
ca-certificates is already the newest version (20240203).
curl is already the newest version (8.5.0-2ubuntu10.4).
curl set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 139 not upgraded.
```

```
ubuntu@ip-172-31-86-195:~$ kubectl get deployments
```

NAME	READY	UP-TO-DATE	AVAILABLE	AGE
nginx-deployment	3/3	3	3	3m34s

```
ubuntu@ip-172-31-86-195:~$ kubectl get pods
```

NAME	READY	STATUS	RESTARTS	AGE
nginx-deployment-86dcfdf4c6-9j7cb	1/1	Running	0	3m53s
nginx-deployment-86dcfdf4c6-fg8zb	1/1	Running	0	3m53s
nginx-deployment-86dcfdf4c6-p8m74	1/1	Running	0	3m53s

```
ubuntu@ip-172-31-86-195:~$ kubectl get services
```

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
kubernetes	ClusterIP	10.96.0.1	<none>	443/TCP	58m
nginx-service	LoadBalancer	10.101.174.44	<pending>	80:31187/TCP	67s

Welcome to nginx!

If you see this page, the nginx web server is successfully installed and working. Further configuration is required.

For online documentation and support please refer to nginx.org.
Commercial support is available at nginx.com.

Thank you for using nginx.



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Advance DevOps Lab

Experiment No.	05
Experiment Title.	To understand terraform lifecycle, core concepts/terminologies and install it on a Linux Machine.
Roll No.	53
Name	Annav S. Sawant
Class	D15 A
Subject	Advance DevOps
Lab Outcome	LO3: To apply best practices for managing infrastructure as code environments and use terraform to define and deploy cloud infrastructure.
Signature:	
Grade:	

Advance DevOps Experiment - 5

(1)

(16)

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

Theory:- Terraform is an open source infrastructure code tool developed by HashiCorp. It allows users to define and provision infrastructure using a high level configuration language (HCL) or JSON. Terraform supports a wide range of cloud providers such as AWS, Azure, Google Cloud, enabling users to manage infrastructure across multiple environments consistently.

1. Providers :- They are plugins that allow Terraform to interact with various API of cloud providers.

Each require configuration & manage resources for specific service.

2. State :- Terraform maintains a state file that keeps track of infrastructure managed by Terraform.

3. Variables :- They are used to make configuration dynamic & reusable.

4. Outputs :- They are used to extract information from Terraform-managed infrastructure and display it after the execution of Terraform plan or apply.

Conclusion :- 1) Understanding about Terraform, and learning about its commands from internet.

2) Overall it was just like downloading a software, there were almost no errors during execution.

Exp-5

```
Microsoft Windows [Version 10.0.22631.3958]
(c) Microsoft Corporation. All rights reserved.
```

```
C:\Users\██████████>terraform --version
Terraform v1.9.4
on windows_amd64
```

Your version of Terraform is out of date! The latest version
is 1.9.5. You can update by downloading from <https://www.terraform.io/downloads.html>

```
PS C:\Terraform> docker --version
Docker version 27.0.3, build 7d4bcd8
PS C:\Terraform>
```

```
PS C:\Terraform> 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
show	Show the current state or a saved plan
state	Advanced state management
taint	Mark a resource instance as not fully functional



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A.Y. 24-25

Advance DevOps Lab

Experiment No.	06
Experiment Title.	To Build, change, and destroy AWS / GCP /Microsoft Azure/ DigitalOcean infrastructure Using Terraform.
Roll No.	53
Name	Arnav S. Sawant
Class	D15 A
Subject	AdvanceDevOps
Lab Outcome	LO3: To apply best practices for managing infrastructure as code environments and use terraform to define and deploy cloud infrastructure.
Signature:	
Grade:	(A1)

Advanced DevOps - Experiment - 6

— Arnav .S. Sawant
DI 5A
Roll-no: 53
19

Aim:- To Build, Change, and destroy AWS infrastructure using Terraform.

Theory:- Terraform is an open source tool that enables developers and operation team to define, provision and manage cloud infrastructure through code. When you build infrastructure using Terraform you define desired state of your infrastructure in configuration files. Terraform reads these configuration files and using specified cloud provider it provisions necessary resource to mark desired state.

As need evolve you need to modify the existing infrastructure. Terraform makes it easy to implement changes by updating the configuration files to reflect new desired state. When certain resources are no longer needed, Terraform allows you to destroy them in a controlled manner. This might involve deleting an S3 bucket or terminating an EC2 instance running date. Destroying infrastructure with terraform is beneficial because it helps avoid unnecessary cost associated with unused resources.

- Conclusion:-
- 1) I had to refer to various documents and i learned about those commands, there was slight error while learning about those commands.
 - 2) I did "terraform init" 2 times which gave me errors and then i solved those problems.

Microsoft Windows [Version 10.0.22631.3958]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Santosh Sawant>docker --version
Docker version 27.0.3, build 7d4bcd8

C:\Users\Santosh Sawant>

PS C:\Terraform scripts\ Docker> docker images

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
nginx	latest	5ef79149e0ec	10 days ago	188MB
ubuntu	latest	edbfe74c41f8	3 weeks ago	78.1MB

* PS C:\Terraform scripts\ Docker> docker container list

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
96d9ca3b6b6b	5ef79149e0ec	"/docker-entrypoint..."	6 minutes ago	Up 6 minutes	0.0.0.0:8000->80/tcp	tutorial

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Advance DevOps Lab

Experiment No.	07
Experiment Title.	To understand Static Analysis SAST process and learn to integrate Jenkins SAST to SonarQube/GitLab.
Roll No.	53
Name	Arnav S. Sawant
Class	D15 A
Subject	Advance DevOps
Lab Outcome	LO4: To identify and remediate application vulnerabilities earlier and help integrate security in the development process using SAST Techniques
Signature:	
Grade:	

Advanced DevOps - Experiment No. 7

22 ①

Aim :- To understand Static analysis SAST process and learn to integrate Jenkins SAST to SonarQube (gitlab).

Theory :- Static Application Security Testing (SAST), or static analysis, is a testing methodology that analyzes source code to find security vulnerabilities that make your organization's applications susceptible to attack. SAST scans an application before the code is compiled.

It is also known as white box testing.

SonarQube → It is an open-source platform used for continuous inspection of code quality. It helps in identifying bugs, vulnerabilities, code smells and security hotspots in software projects.

SonarQube supports multiple programming languages and integrates with various build systems and CI/CD pipelines, making it a powerful tool for improving code quality.

Conclusion :- 1) In the build steps, i selected "Execute SonarQube Scanner" but i didn't knew what to do in Analysis Properties, so i referred to chatbot. for the same.

- 2) Again In the analysis properties, i put wrong "sonar.projectKey" i was not knowing that i had to put the one project that i was working on in sonarqube.
- 3) Also i was not knowing that i have to generate token for the sonar login but then i learnt about it.

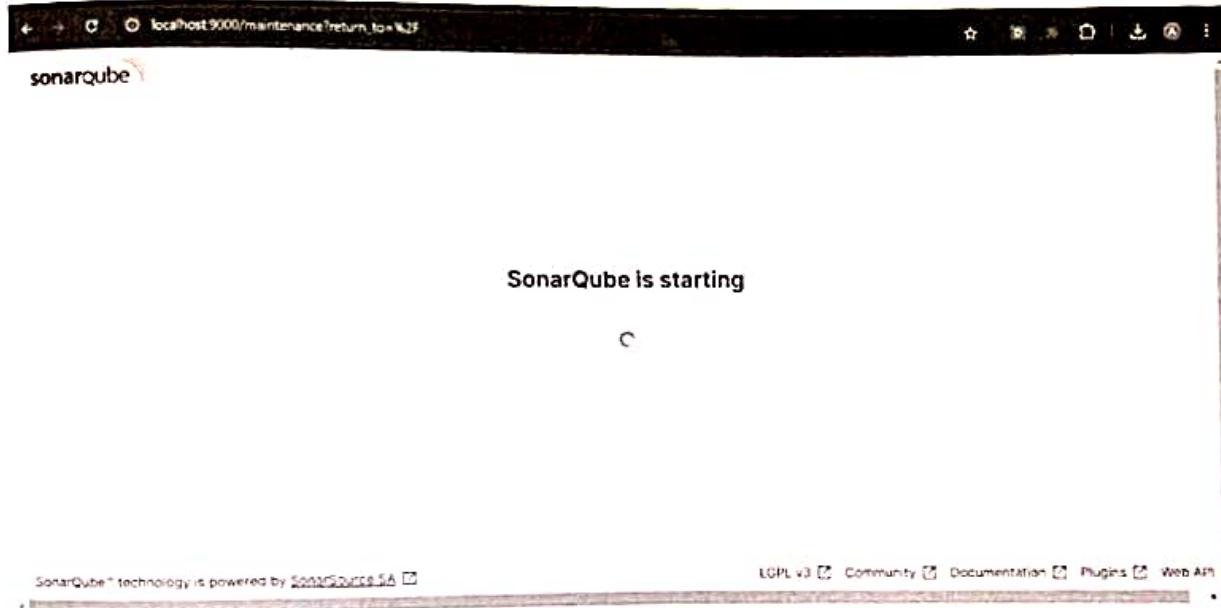
23

Exp 7 -

```
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\Santosh.Sawant> docker run sonarqube SONAR_ES_BOOTSTRAP_CHECKS_DISABLE=true 9000:9000 sonarqube:latest
docker: error during connect: Head "http://%2F%2Fpipe%2FdockerDesktopLinuxEngine/_ping": open //./pipe/dockerDesktopLinuxEngine:
the system cannot find the file specified.
See 'docker run --help'.
PS C:\Users\Santosh.Sawant> docker run sonarqube SONAR_ES_BOOTSTRAP_CHECKS_DISABLE=true 9000:9000 sonarqube:latest
docker: Error response from daemon: Conflict. The container name "/sonarqube" is already in use by container "4f18dd2a380b6123c23b375b26ff242670188ab50f190e8f86ac0889441a113a". You have to remove (or rename) that container to be able to reuse that name.
See 'docker run --help'.
PS C:\Users\Santosh.Sawant> docker rm 4f18dd2a380b6123c23b375b26ff242670188ab50f190e8f86ac0889441a113a
4f18dd2a380b6123c23b375b26ff242670188ab50f190e8f86ac0889441a113a
PS C:\Users\Santosh.Sawant> docker run sonarqube SONAR_ES_BOOTSTRAP_CHECKS_DISABLE=true 9000:9000 sonarqube:latest
c03b891be998f1eb8b41665ce2b42c481c2751f4e9bd6b14a147d49bfe67fc64
```



SonarQube™ technology is powered by SonarSource SA

Search (CTRL + K)

ARNAV SANTOSH SAWANT log out

Dashboard > sonarQube2 #8 Console Output

Status Changes Console Output View as plain text Edit Build Information Timings Previous Build

Console Output

Started by user ARNAV SANTOSH SAWANT
Running as SYSTEM
Building on the built-in node in workspace C:\ProgramData\Jenkins\jenkins\workspace\sonarQube2
[sonarQube2] \$ C:\ProgramData\Jenkins\jenkins\tools\hudson.plugins.sonar.SonarRunnerInstallation\sonarQube\bin\sonar-scanner.bat -Dsonar.host.url=http://localhost:9000 -Dsonar.projectKey=sonarcube-test2 -Dsonar.login=saip_818cb0bf90002086c6c3f278128d119e5c2e0ab -Dsonar.host.url=http://localhost:9000 -Dsonar.sources=HelloWorldCore -Dsonar.projectBaseDir=C:\ProgramData\Jenkins\jenkins\workspace\sonarQube2
13:12:17.541 WARN Property 'sonar.host.url' with value 'http://localhost:9000' is overridden with value 'http://localhost:9000'
13:12:17.641 INFO Scanner configuration file: C:\ProgramData\Jenkins\jenkins\tools\hudson.plugins.sonar.SonarRunnerInstallation\sonarQube\bin\..\conf\sonar-scanner.properties
13:12:17.648 INFO Project root configuration file: NONE
13:12:17.763 INFO SonarScanner CLI 6.2.0-4584
13:12:17.778 INFO Java 21.0.4 Eclipse Adoptium (64-bit)
13:12:17.795 INFO Windows 11 10.0 amd64



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Advance DevOps Lab

Experiment No.	08
Experiment Title.	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.
Roll No.	53
Name	Arnav 'S' Sawant
Class	D15 A
Subject	Advance DevOps
Lab Outcome	LO4: To identify and remediate application vulnerabilities earlier and help integrate security in the development process using SAST Techniques.
Signature:	
Grade:	

Advanced DevOps - Experiment No. 8

25

Aim:- Create a Jenkins CI-CD 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 App.

Theory:- A pipeline is a concept that introduces a series of events or tasks that are connected in a sequence to make quick software releases. For eg, there is a task, that task has got five different stages, and each stage has got some steps. All the steps in phase one have to be completed, to mark the latter stage to be complete.

SonarQube is an open-source platform developed by SonarSource for continuous inspection of code quality. Sonar does static code analysis, which provides a detailed report of bugs, code smells, vulnerabilities, code duplications.

Code smells → It refers to patterns in code that indicate poor design that can lead to issues like increased complexity, decreased maintainability, and bugs in long run.

pipeline script

- Conclusion :-
- 1) I was not getting what to write in so i referred chatgpt for that. "withsonarqubeenv"
 - 2) In the code, it was giving me errors because in the i wrote wrong sonarqube name (not the one i downloaded).
 - 3) Also the bat command, sonar.login, sonar.password was wrong so i changed it.
 - 4) Also i was not knowing that it is necessary to give required global permissions.

Exp 8 -



A Administrator

profile Security Notifications Projects

0 New token "sonarqube-test3" has been created. Make sure you copy it now, you won't be able to see it again!
ssaeef1e1e25e77cb4dadcb5f2eff7815e07c5cfact097

Name	Type	Project	Last use	Created	Expiration	
mysonar	Project	sonarqube-test2	3 hours ago	September 26, 2024	October 26, 2024	Revoke
sonarqube-test3	Global		Never	September 26, 2024	October 26, 2024	Revoke

Enter a new password

All fields marked with * are required

Dashboard > sonarpipe > Configuration

Configure

Pipeline

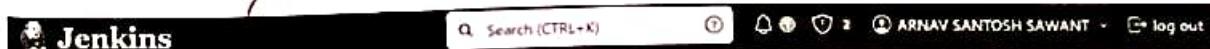
Definition

Pipeline script

```
1 docker network create sonarnet
2 node 0
3 stage [ Cloning the GitHub Repo ]
4 git -C /tmp/sonarpipe clone https://github.com/sonarqube/sonarqube.git
5
6 stage [ SonarQube analysis ]
7 withSonarQubeContainer(sonarqube)
8
9 docker run --rm -v /tmp/sonarpipe:/sonar -v /tmp/sonarpipe/.m2:/root/.m2 sonarqube:latest sonar-scanner -Dsonar.projectKey=sonarpipe-test -Dsonar.host.url=https://sonarqube-test.arnavsawant.repl.co -Dsonar.analysis.mode=single -Dsonar.log.level=INFO
10
11 stage [ SonarQube analysis ]
12 sonarQubeAnalysis(sonarpipe)
13
14 stage [ SonarQube analysis ]
15 sonarQubeAnalysis(sonarpipe-test)
16
17 stage [ SonarQube analysis ]
18 sonarQubeAnalysis(sonarpipe-test)
19
20 stage [ SonarQube analysis ]
21 sonarQubeAnalysis(sonarpipe-test)
```

Try sample Pipeline

Save Apply



Dashboard > sonarpipe >

Status

sonarpipe

Add description

Disable Project

Changes

Build Now

Configure

Delete Pipeline

Full Stage View

SonarQube

Stages

Rename

Pipeline Syntax

Stage View

Cloning the GitHub Repo

SonarQube analysis

Average stage times
Average full run time: ~24min 46s

5s from 7s

24min 46s

Sept 26 16:27 No Changes

**Vivekanand Education Society's
Institute of Technology**

(An Autonomous Institute Affiliated to University of Mumbai)

Department of Information Technology

A.Y. 24-25

Advance DevOps Lab

Experiment No.	09
Experiment Title.	To Understand Continuous monitoring and Installation and configuration of Nagios Core, Nagios Plugins and NRPE (Nagios Remote Plugin Executor) on Linux Machine.
Roll No.	53
Name	Arnav S. Sawant
Class	D15 A
Subject	Advance DevOps
Lab Outcome	LO5:To use Continuous Monitoring Tools to resolve any system errors (low memory, unreachable server etc.) before they have any negative impact on the business productivity.
Signature:	
Grade:	

Advance-DevOps-Experiment - 9

AT

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Aim :- To understand continuous monitoring and installation and configuration of Nagios (Core Nagios Plugins and NRPE (Nagios Remote Plugin Executor) on Linux Machine.

Theory :- Nagios is an open-source software for continuous monitoring of systems, networks, and infrastructure. It runs plugins stored on a server that is connected with a host or another server on your network or the network or the Internet. In case of any failure, Nagios alerts about the issues so that the technical team can perform the recovery process immediately.

Nagios is used for continuous monitoring of systems, applications, services and business processes in a DevOps culture.

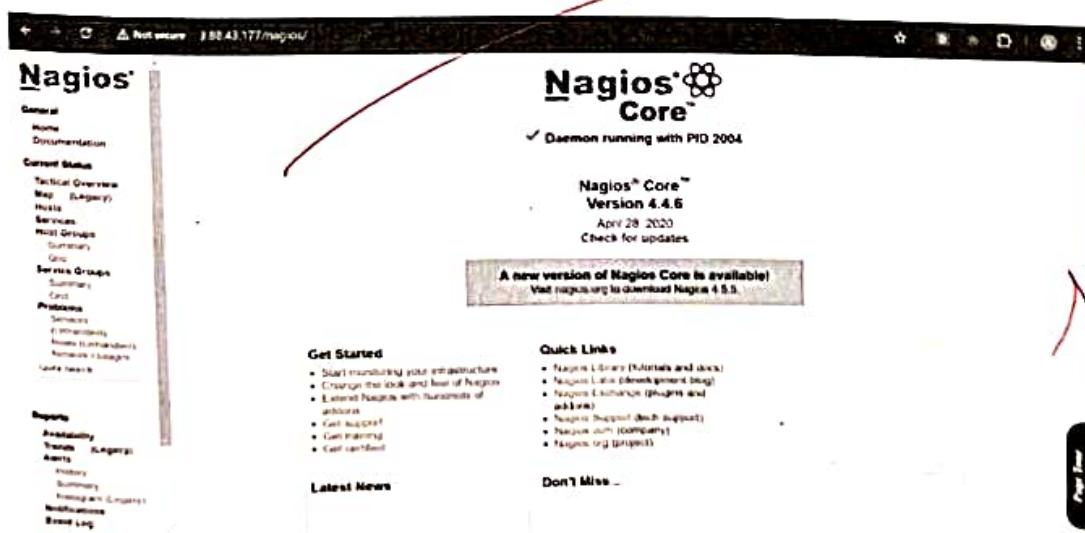
The main reason to use Nagios is to detect all types of network or server issues, helps to you to find the root cause of the problem which allows you to get the permanent solution to the problem.

Conclusion :- 1) Due to some issues was i was not able to execute some commands, due to most functionality.

a) Ensure proper details are being filled in nano files as well as proper commands being executed.

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Experiment 9 –





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Department of Information Technology

A.Y. 24-25

Advance DevOps Lab

Experiment No.	10
Experiment Title.	To perform Port, Service monitoring, Windows/Linux server monitoring using Nagios.
Roll No.	53
Name	Arnav S. Sawant
Class	D20 B
Subject	Advance DevOps
-Lab Outcome	LO5:To use Continuous Monitoring Tools to resolve any system errors (low memory, unreachable server etc.) before they have any negative impact on the business productivity.
Signature:	
Grade:	

Advance - DevOps Experiment - 1.0

Aim:- To perform Port, service monitoring, windows Linux Server monitoring using Nagios.

Theory:- Nagios is a comprehensive monitoring and alerting platform designed to keep track of IT infrastructure, network and applications. It provides real-time monitoring, alerting and reporting capabilities to ensure the health and performance of critical systems. Monitoring Capabilities

1. Port monitoring :- Nagios can monitor specific network ports to ensure they are open and responsive. This is crucial for services that rely on these ports.
2. Service, Monitoring :- Nagios checks the status of various services to ensure they are running smoothly.
3. Server Monitoring :- Nagios can monitor both windows and Linux servers using agents like NSClient for windows and NRPE for Linux. This includes metrics like CPU usage, memory usage, disk space, and more.

Conclusion:-
1) It was really important to continue with the process, as once you stop instance, the IP address changes, and the nagios server doesn't run again on it.

2) It was important to have root functionalities otherwise, you won't get the permission to use that command & execute it.

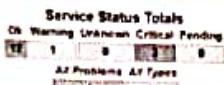
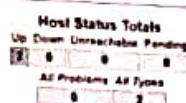
Nagios®

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 Quick Search

Reports Availability Trends (Legacy) Alerts History Summary Histogram (Legacy) Notifications Event Log

Current Network Status
Last Updated: Thu Mar 19 14:29 UTC 2024
Updated every 30 seconds.
Nagios Core 7.4.6 - www.nagios.org
Logged in as [nagiosadmin](#).

[View Service Status Details For All Host Groups](#)
[View Status Overview For All Host Groups](#)
[View Status Summary For All Host Groups](#)
[View Status Trend For All Host Groups](#)



Host Status Details For All Host Groups

Line Results: 100 ▾

Host: * * Status: * * Last Check: * * Duration: * * Status Information:
Administrator UP 19-03-2024 06:00:54 0d 0h 13m 57s PING OK - Packets loss = 0% RTA = 0.91 ms
Administrator UP 19-03-2024 06:12:32 0d 0h 10m 19s PING OK - Packets loss = 0% RTA = 0.04 ms

Results: 1 / 2 of 2 Matching Hosts

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Nagios® Core™

Daemon running with PID 72150

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 add-ons
- Get support
- Get training
- Get certified

Latest News

Quick Links

- Nagios Library (tutorials and docs)
- Nagios Labs (development blog)
- Nagios Exchange (plugins and add-ons)
- Nagios Support (tech support)
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- Nagios.org (project)

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A.Y. 24-25

Advance DevOps Lab

Experiment No.	11
Experiment Title.	To understand AWS Lambda, its workflow, various functions and create your first Lambda functions using Python / Java / Nodejs.
Roll No.	53
Name	Arnav S. Sawant
Class	D15 A
Subject	Advance DevOps
Lab Outcome	LO6: To engineer a composition of nano services using AWS Lambda and Step Functions with the Serverless Framework.
Signature:	
Grade:	

Advance - DevOps - Experiment - 1

3x

Aim :- To understand AWS Lambda its workflow, various functions & create your first lambda functions using Python (Java) Node.js.

Theory :-

- AWS Lambda is a serverless compute service that allows you to run code in response to events without provisioning or managing servers.
- The workflow begins by creating a Lambda function, where you upload your code & configure settings like memory and execution time.
- When an event triggers the function, AWS Lambda allocates resources & executes the code in a managed environment.
- This approach enables automatic scaling and built-in fault tolerance across multiple availability zones.

- Conclusion :-
- 1) I was trying to test that code without deploying so i changed that.
 - 2) I tried deploying a different code , so while testing it gave me error.
 - 3) I learnt which proper code to actually deploy & test.

Experiment 11 -

Screenshot of the AWS Lambda console showing the Functions list. The interface includes a search bar, filter dropdowns for Function name, Description, Package type, Runtime, and Last modified. A red arrow points from the search bar to the first function entry.

Function name	Description	Package type	Runtime	Last modified
lambdafunction-14474574		Zip	Python 3.8	3 months ago
lambdafunction-14474575	Create Lambda function	Zip	Python 3.8	3 months ago
lambdafunction-14474576	Update Lambda function	Zip	Python 3.8	3 months ago
lambdafunction-14474577	Update Lambda function	Zip	Python 3.8	3 months ago

Screenshot of the AWS Lambda console showing the execution of the lambdafunction-14474574 function. The code source editor shows the Python script content. A red arrow points from the "Start" button to the execution results pane, which displays the output: "Hello, World!".

```

Code source
File Edit View Go Tools Window
Start Execution results
Environment Variables
Execution result: 2021-07-14T14:52:44.447Z
{
    "statusCode": 200,
    "body": "Hello, World!"
}
    
```

Screenshot of the AWS Lambda console showing the execution of the lambdafunction-14474574 function again. The code source editor shows the Python script content. A red arrow points from the "Start" button to the execution results pane, which displays the output: "Hello, World!".

```

Code source
File Edit View Go Tools Window
Start Execution results
Environment Variables
Execution result: 2021-07-14T14:52:44.447Z
{
    "statusCode": 200,
    "body": "Hello, World!"
}
    
```



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A.Y. 24-25

Advance DevOps Lab

Experiment No.	12
Experiment Title.	To create a Lambda function which will log “An Image has been added” once you add an object to a specific bucket in S3
Roll No.	53
Name	Arnav S. Sawant
Class	D15 A
Subject	Advance DevOps
Lab Outcome	LO6: To engineer a composition of nano services using AWS Lambda and Step Functions with the Serverless Framework.
Signature:	
Grade:	

Advance-DevOps - Experiment 12

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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.

Theory:- AWS Lambda is a serverless compute service that enables users to run code in response to events without managing servers.

- For instance, integrating Lambda with Amazon S3 allows you to automatically execute code when an object is added to a specified bucket.
- This is achieved by configuring S3 event notifications to invoke the Lambda function, which can log actions or perform additional processing on the uploaded files.
- This serverless architecture enhances scalability and reduces operational overhead.

Conclusion:-

- 1) At first it was showing me nothing in groups as i havent ~~not~~ added anything in the S3 bucket (uploaded).
- 2) Lambda functions was studied properly.

Experiment 12 -

Screenshot of the AWS CloudFront console showing the creation of a new bucket named "lambdacheck1". The "General configuration" section is displayed, with the "Bucket type" set to "Info". The "Bucket name" field contains "lambdacheck1". A note states: "Bucket names must be unique within the global namespace and across the AWS Regions you have selected." Below this, there are two options: "General purpose" (selected) and "Directory". The "General purpose" option is described as "Recommended for most user cases and the original S3 bucket type. These buckets store a mix of files and objects that independently allow access to more than one Availability Zone." The "Directory" option is described as "Recommended for low-latency use cases. These buckets support the S3 Standard One Zone storage class, which provides faster processing of data within a single Availability Zone." A "Copy settings from existing bucket" link is present, followed by a note: "Only the bucket settings in the following configuration are copied." The "CloudFront" tab is selected in the navigation bar.

Screenshot of the AWS CloudFront console showing the configuration of "lambdacheck1". The "Block all public access" checkbox is checked. A note below it states: "Turning off block all public access might result in this bucket and the objects within becoming public." A warning message box contains: "AWS recommends that you turn on block all public access, unless public access is required for specific and verified use cases such as static website hosting." A checkbox labeled "I acknowledge that the current settings might result in this bucket and the objects within becoming public" is checked. The "CloudFront" tab is selected in the navigation bar.

Screenshot of the AWS CloudWatch Logs console showing the log group "/aws/lambda/lambda_arxiv". The "Log events" section displays several log entries. The first entry is: "No older events at this moment. Abort." The second entry is: "2024-10-08T09:59:59.811Z START RequestId: 49c11573d542c1993fae25486732b VersionId: 1.0.0+0x00000000000000000000000000000000 FunctionName: lambda_arxiv". The third entry is: "2024-10-08T09:59:59.819Z START RequestId: 49c11573d542c1993fae25486732b VersionId: 1.0.0+0x00000000000000000000000000000000 FunctionName: lambda_arxiv". The fourth entry is: "2024-10-08T09:59:59.819Z CONTENT TYPE: image/png". The fifth entry is: "2024-10-08T09:59:59.819Z END RequestId: 49c11573d542c1993fae25486732b VersionId: 1.0.0+0x00000000000000000000000000000000 FunctionName: lambda_arxiv". The sixth entry is: "2024-10-08T09:59:59.819Z version: 1.0.0+0x00000000000000000000000000000000 duration: 183 ms to KillDuration: 183 ms". The "CloudFront" tab is selected in the navigation bar.