



Xavier Institute of Engineering

Mahim, Mumbai 400016

Department of Information Technology

(Affiliated to University of Mumbai)

(Academic Year: 2022-23 Semester: ODD)

Class: TE IT

Subject: Advance DevOps Lab

Experiment No.	1
Title	To explain the benefits of Cloud Infrastructure and Setup AWS Cloud9 IDE, Launch AWS Cloud9 IDE and Perform Collaboration Demonstration.
Lab Outcome No.	1
Date of Performance	26/07/2022
Date of submission	10/08/2022
ID	202003040
Name of the Student	Sarvesh Chavan

Evaluation:

	Below Expectation	Average	Good
Knowledge (3)	1	2	3
Performance (3)	1	2	3
Content & Neatness of Documentation(2)	0	1	2
Punctuality & Submission on Time (2)	0	1	2

Signature of the Teacher: _____

What is cloud computing?

Cloud computing is the on-demand delivery of IT resources over the Internet with pay-as-you-go pricing. Instead of buying, owning, and maintaining physical data centers and servers, you can access technology services, such as computing power, storage, and databases, on an as-needed basis from a cloud provider like Amazon Web Services (AWS).

Users no longer need to rely on their hardware or software resources and can instead access data, programs, and services hosted on remote servers from any location. Because you only pay for the cloud services you use, you can cut your operational costs and improve the efficiency of your infrastructure.

Essential Characteristics of Cloud Computing:

- Resources Pooling
- On-Demand Self-Service
- Scalability And Rapid Elasticity
- Large Network Access
- Measured And Reporting Service

Cloud Deployment Models:

Different types of cloud computing deployment models are:

- Public cloud
- Private cloud
- Hybrid cloud
- Community cloud

1. Public Cloud

The public cloud makes it possible for anybody to access systems and services. The public cloud may be less secure as it is open for everyone. The public cloud is one in which cloud infrastructure services are provided over the internet to the general people or major industry groups. The infrastructure in this cloud model is owned by the entity that delivers the cloud services, not by the consumer. It is a type of cloud hosting that allows customers and users to easily access systems and services. This form of cloud computing is an excellent example of cloud hosting, in which service providers supply services to a variety of customers. In this arrangement, storage backup and retrieval services are given for free, as a subscription, or on a per-use basis. Example: Google App Engine etc.

Advantages of the public cloud model:

- **Minimal Investment:** Because it is a pay-per-use service, there is no substantial upfront fee, making it excellent for enterprises that require immediate access to resources.
- **No setup cost:** The entire infrastructure is fully subsidized by the cloud service providers, thus there is no need to set up any hardware.
- **Infrastructure Management is not required:** Using the public cloud does not necessitate infrastructure management.
- **No maintenance:** The maintenance work is done by the service provider (Not users).
- **Dynamic Scalability:** To fulfil your company's needs, on-demand resources are accessible.

2. Private Cloud

The private cloud deployment model is the exact opposite of the public cloud deployment model. It's a one-on-one environment for a single user (customer). There is no need to share your hardware with anyone else. The distinction between private and public cloud is in how you handle all of the hardware. It is also called the "internal cloud" & it refers to the ability to access systems and services within a given border or organization. The cloud platform is implemented in a cloud-based secure environment that is protected by powerful firewalls and under the supervision of an organization's IT department. The private cloud gives the greater flexibility of control over cloud resources.

Advantages of the private cloud model:

- **Better Control:** You are the sole owner of the property. You gain complete command over service integration, IT operations, policies, and user behaviour.
- **Data Security and Privacy:** It's suitable for storing corporate information to which only authorized staff have access. By segmenting resources within the same infrastructure, improved access and security can be achieved.
- **Supports Legacy Systems:** This approach is designed to work with legacy systems that are unable to access the public cloud.
- **Customization:** Unlike a public cloud deployment, a private cloud allows a company to tailor its solution to meet its specific needs.

3. Hybrid cloud

By bridging the public and private worlds with a layer of proprietary software, hybrid cloud computing gives the best of both worlds. With a hybrid solution, you may host the app in a safe environment while taking advantage of the public cloud's cost savings. Organizations can move data and applications between different clouds using a combination of two or more cloud deployment methods, depending on their needs.

Advantages of the hybrid cloud model:

- **Flexibility and control:** Businesses with more flexibility can design personalized solutions that meet their particular needs.
- **Cost:** Because public clouds provide for scalability, you'll only be responsible for paying for the extra capacity if you require it.
- **Security:** Because data is properly separated, the chances of data theft by attackers are considerably reduced.

4. Community cloud

It allows systems and services to be accessible by a group of organizations. It is a distributed system that is created by integrating the services of different clouds to address the specific needs of a community, industry, or business. The infrastructure of the community could be shared between the organization which has shared concerns or tasks. It is generally managed by a third party or by the combination of one or more organizations in the community.

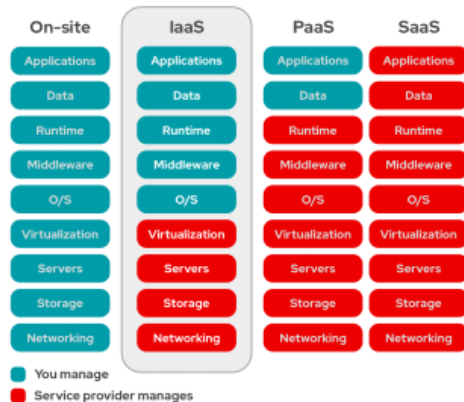
Advantages of the community cloud model:

- **Cost Effective:** It is cost-effective because the cloud is shared by multiple organizations or communities.
- **Security:** Community cloud provides better security.

- **Shared resources:** It allows you to share resources, infrastructure, etc. with multiple organizations.
- **Collaboration and data sharing:** It is suitable for both collaboration and data sharing.

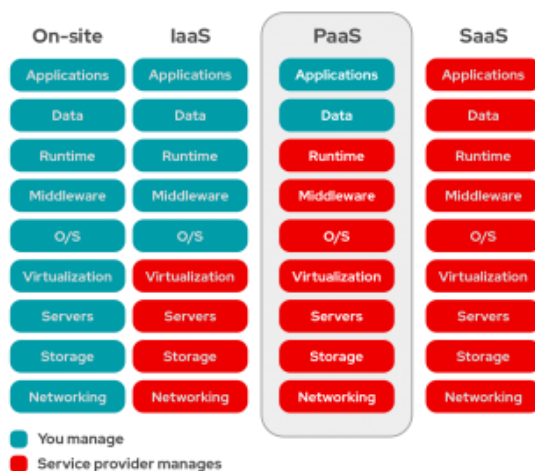
Cloud Computing Services:

IaaS



IaaS means a cloud service provider manages the infrastructure for you—the actual servers, network, virtualization, and data storage—through an internet connection. The user has access through an API or dashboard, and essentially rents the infrastructure. The user manages things like the operating system, apps, and middleware while the provider takes care of any hardware, networking, hard drives, data storage, and servers; and has the responsibility of taking care of outages, repairs, and hardware issues. This is the typical deployment model of cloud storage providers.

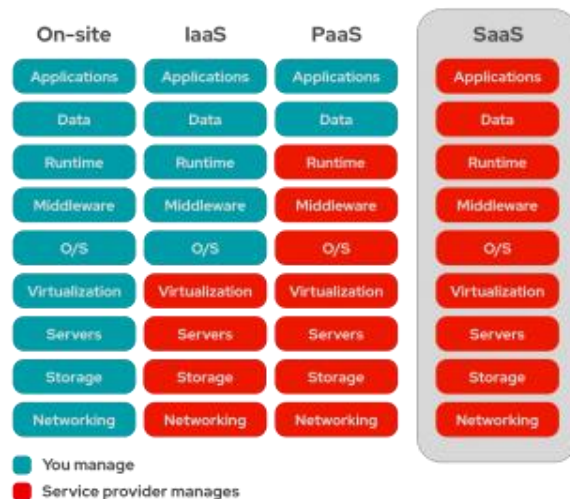
PaaS



PaaS means the hardware and an application-software platform are provided and managed by an outside cloud service provider, but the user handles the apps running on top of the platform

and the data the app relies on. Primarily for developers and programmers, PaaS gives users a shared cloud platform for application development and management (an important DevOps component) without having to build and maintain the infrastructure usually associated with the process.

SaaS



SaaS is a service that delivers a software application—which the cloud service provider manages—to its users. Typically, SaaS apps are web applications or mobile apps that users can access via a web browser. Software updates, bug fixes, and other general software maintenance are taken care of for the user, and they connect to the cloud applications via a dashboard or API. SaaS also eliminates the need to have an app installed locally on each individual user's computer, allowing greater methods of group or team access to the software.

Different Cloud Service Providers:

Amazon Web Services (AWS)

Amazon Web Services is a cloud computing platform that provides services such as compute power, database storage, content delivery and many other functions which will help to integrate a business.

ServerSpace Cloud Servers

These are Cloud Servers with Windows & Linux OS. At ServerSpace Cloud Servers, you can choose your own custom configurations, spin up your VM in 40 sec, change the configuration at any time and pay as you go. Unlimited traffic, High-end performance and 24/7/365 human tech support.

Microsoft Azure

Microsoft Azure is a cloud computing service which is used for building testing deploying and managing the application. This process is done in a global network of the Microsoft-managed data centre. It is private as well as a **public cloud** platform.

Uses of DevOps:

- Continuous delivery of software
- Better collaboration between teams
- Easy deployment
- Better efficiency and scalability
- Errors are fixed at the initial stage
- More security
- Less manual intervention (which means fewer chances of error)

Uses of Advance DevOps:

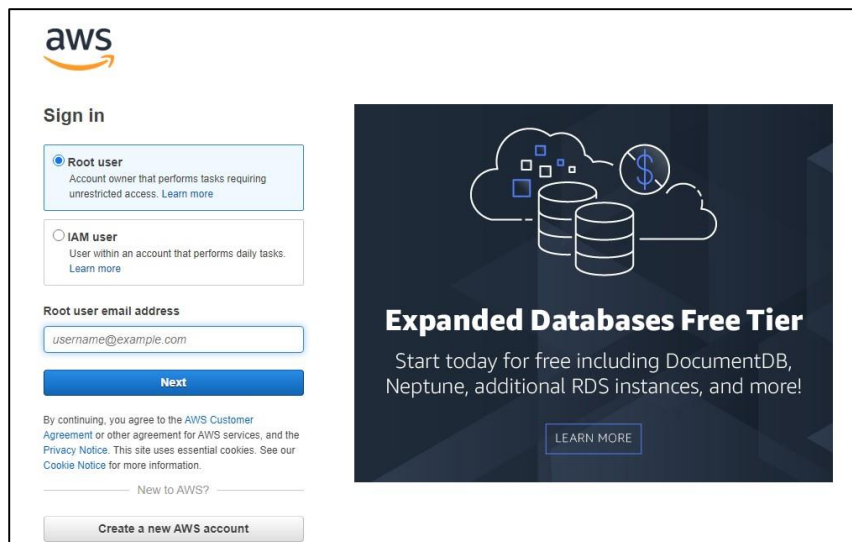
- Using automated unit tests to provide in-depth code review and QA
- Using Docker containers for continuous apps delivery
- Using rolling updates to ensure an uninterrupted end-user experience.
- Using Kubernetes for fast and reliable container management
- Using Terraform for state-of-the-art infrastructure orchestration
- Provisioning, configuring and managing the infrastructure on AWS, Azure, and GCP for our customers
- Using Prometheus & Grafana, Sumologic and ELK Stack for in-depth service monitoring and logging.
- Using Jenkins, Gitlab CI and CircleCI for building continuous software delivery pipelines

AWS:

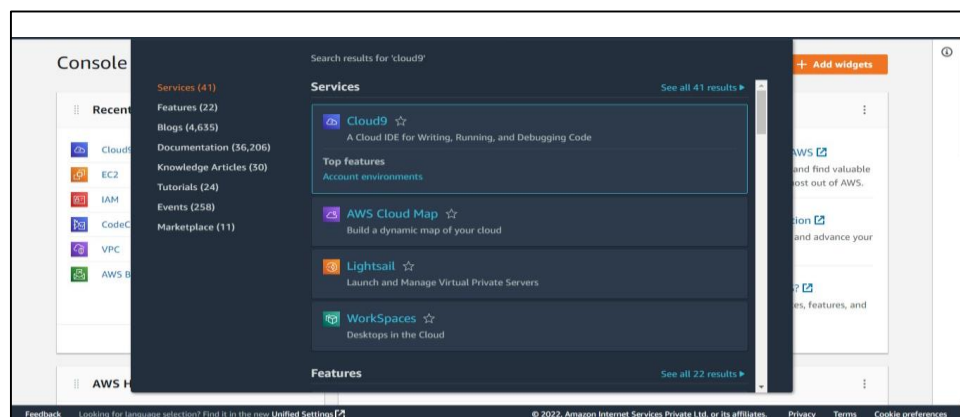
AWS Cloud9 is a cloud-based integrated development environment (IDE) that lets you write, run, and debug your code with just a browser. It includes a code editor, debugger, and terminal. Cloud9 comes prepackaged with essential tools for popular programming languages, including JavaScript, Python, PHP,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

Steps to perform this experiment:

- Log in into your AWS account. (IAM/Root).



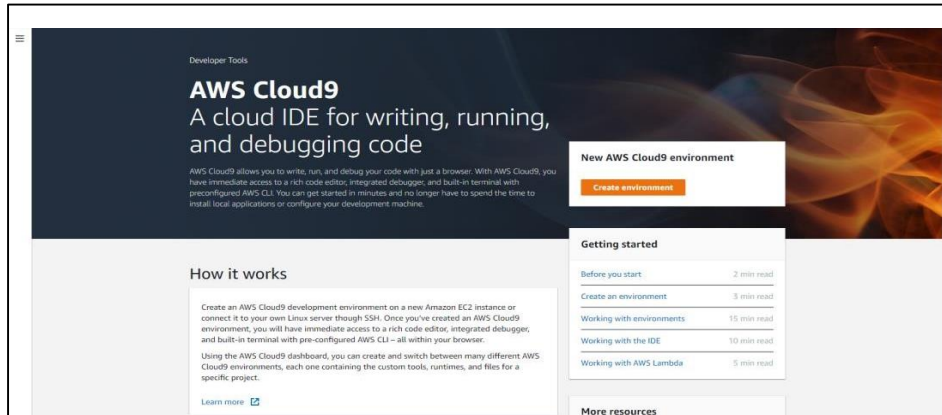
- Navigate to Cloud9 service from developer tool section as shown below.



- Click on create environment.

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- Provide name for the environment (environment name), click on next.

- Keep all the default setting as shown below.

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Platform

- ☒ Amazon Linux 2 (recommended)
- ☐ Amazon Linux AMI
- ☐ Ubuntu Server 18.04 LTS

Cost-saving setting

Choose a predetermined amount of time to auto-hibernate your environment and prevent unnecessary charges. We recommend a hibernation settings of half an hour of no activity to maximize savings.

After 30 minutes (default)

IAM role

AWS Cloud9 creates a service-linked role for you. This allows AWS Cloud9 to call other AWS services on your behalf. You can delete the role from the AWS IAM console once you no longer have any AWS Cloud9 environments. [Learn more](#)

AWSServiceRoleForAWSCloud9

▼ Network settings (advanced)

Network (VPC)

Launch your EC2 instance into an existing Amazon Virtual Private Cloud (VPC) or create a new one. To allow the AWS Cloud9 environment to connect to its EC2 instance, attach an internet gateway (IGW) to your new VPC.

vpc-09d41b4578f6a5941 (default) [Create new VPC](#)

Subnet

Select a public subnet in which the EC2 instance is created. (For a private subnet, you must create an environment that connects to its instance via Systems Manager.)

subnet-05af1ba4e2430056b | Default in ap-south-1a [Create new subnet](#)

No tags associated with the resource.

[Add new tag](#)

Review the environment and setting and click on create environment

Environment name and settings

Name

WebAppEnv

Description

No description provided

Environment type

EC2

Instance type

t2.micro

Subnet

subnet-0824659a2d6919414

Platform

Amazon Linux 2 (recommended)

Cost-saving settings

After 30 minutes (default)

IAM role

AWSServiceRoleForAWSCloud9 (generated)

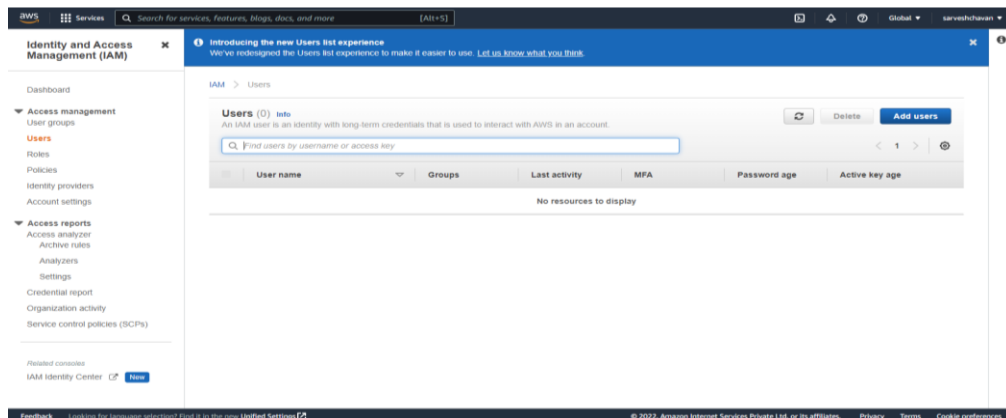
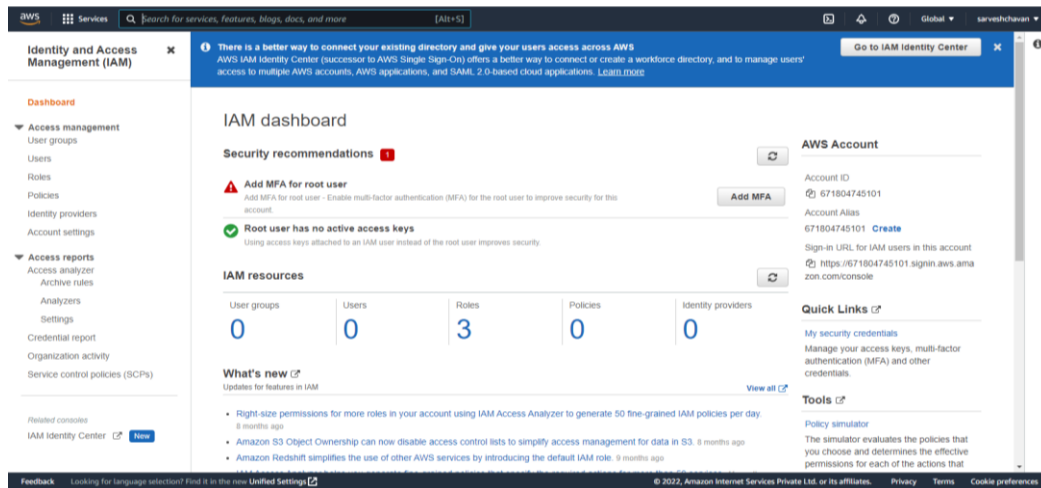
We recommend the following best practices for using your AWS Cloud9 environment

- Use source control and backup your environment frequently. AWS Cloud9 does not perform automatic backups.
- Perform regular updates of software on your environment. AWS Cloud9 does not perform automatic updates on your behalf.

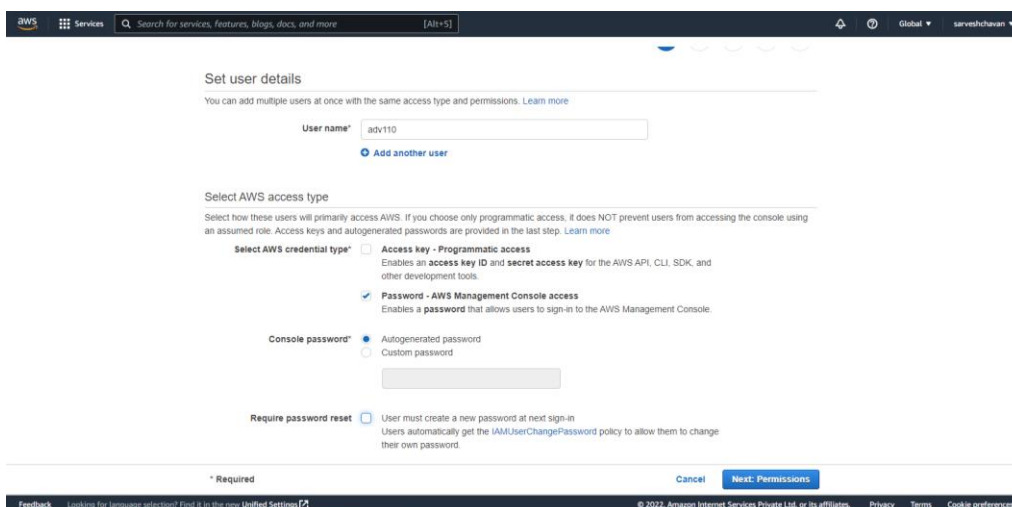
- Till that time open the IAM Identity and access management in order to add user in other tab

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- Add User provide with password selection with auto generate password and click on auto generate tab.



- Click on create group.

1 2 3 4 5

▼ Set permissions

Add user to group Copy permissions from existing user Attach existing policies directly

Get started with groups
You haven't created any groups yet. Using groups is a best-practice way to manage users' permissions by job functions, AWS service access, or your custom permissions. Get started by creating a group. [Learn more](#)

[Create group](#)

► Set permissions boundary

Cancel Previous **Next: Tags**

- Provide group name and click create group by selecting current policy.

1 2 3 4 5

Create group

Create a group and select the policies to be attached to the group. Using groups is a best-practice way to manage users' permissions by job functions, AWS service access, or your custom permissions. [Learn more](#)

Group name

[Create policy](#) [Refresh](#)

Filter policies Showing 4 results

	Policy name	Type	Used as	Description
<input type="checkbox"/>	AWSCloud9Administrator	AWS managed	None	Provides administrator access to AWS Cloud9.
<input checked="" type="checkbox"/>	AWSCloud9EnvironmentMember	AWS managed	None	Provides the ability to be invited into AWS Cloud9 shared development environments.
<input type="checkbox"/>	AWSCloud9SSMInstanceProfile	AWS managed	None	This policy will be used to attach a role on a InstanceProfile which will allow Cloud9 to ...
<input type="checkbox"/>	AWSCloud9User	AWS managed	None	Provides permission to create AWS Cloud9 development environments and to manag...

Cancel **Create group**

Cancel Previous **Next: Tags**

- After the group is created click on next if you want provide tag else click on review for user setting and click on create user as shown below.

1 2 3 4 5

▼ Set permissions

Add user to group Copy permissions from existing user Attach existing policies directly

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](#)

Add user to group

[Create group](#) [Refresh](#)

Showing 1 result

Group	Attached policies
<input checked="" type="checkbox"/> advgroup	AWSCloud9EnvironmentMember

► Set permissions boundary

Cancel Previous **Next: Tags**

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Add user

Review

Review your choices. After you create the user, you can view and download the autogenerated password and access key.

User details

User name	adv110
AWS access type	AWS Management Console access - with a password
Console password type	Autogenerated
Require password reset	No
Permissions boundary	Permissions boundary is not set

Permissions summary

The user shown above will be added to the following groups.

Type	Name
Group	advgroup

Tags

No tags were added.

[Cancel](#) [Previous](#) [Create user](#)

- Now close that window to create the user.

Add user

Success

You successfully created the users shown below. You can view and download user security credentials. You can also email users instructions for signing in to the AWS Management Console. This is the last time these credentials will be available to download. However, you can create new credentials at any time.

Users with AWS Management Console access can sign in at: <https://671804745101.signin.aws.amazon.com/console>

[Download .csv](#)

User	Password	Email login instructions
adv110	***** Show	Send email

[Close](#)

- Now move towards Cloud9 IDE environment tab as shown below.

AWS Cloud9

Your environments (1)

[Open IDE](#) [View details](#) [Edit](#) [Delete](#) [Create environment](#)

WebAppEnv

Type: EC2 Permissions: Owner

Description: No description available

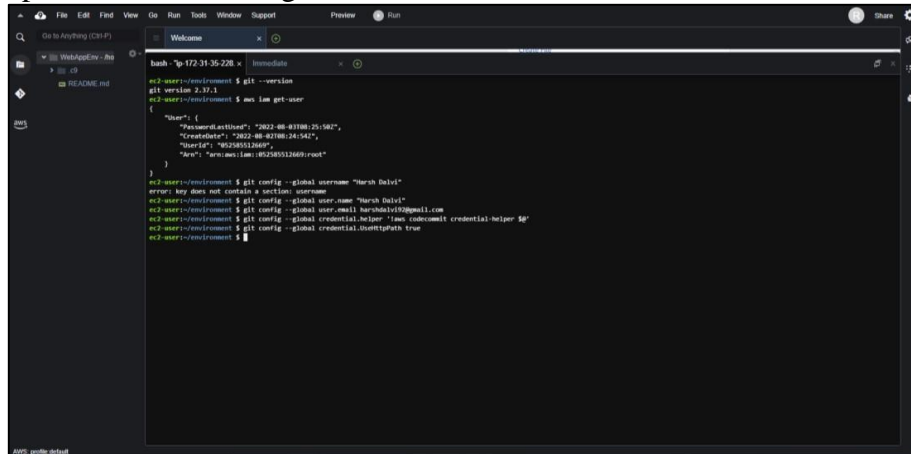
Owner ARN: arn:aws:iam:052585512669:root

[Open IDE](#)

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Roll No: 10

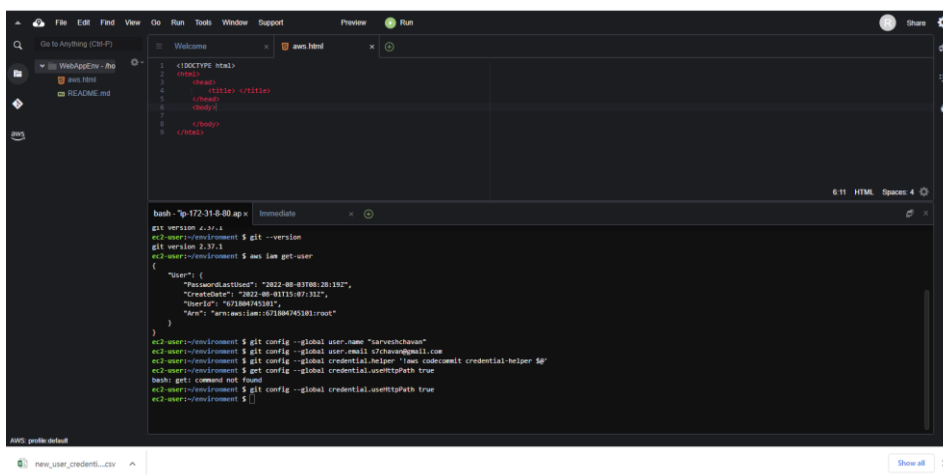
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- If you check at bottom side cloud9 IDE also giving you an AWS CLI for command operations. To check git version, IAM user details and so on.



```
bash -p-172-31-35-228 x
ec2-user:~$ git --version
git version 2.37.1
ec2-user:~$ aws iam get-user
{
  "User": {
    "PasswordLastUsed": "2022-08-03T08:25:16Z",
    "CreateDate": "2022-08-03T08:24:54Z",
    "UserId": "AID246512669",
    "Arn": "arn:aws:iam::85246512669:root"
  }
}
ec2-user:~$ git config --global user.name "Sarvesh Chavan"
error: key does not contain a section: user.name
ec2-user:~$ git config --global user.email "Sarvesh Chavan"
ec2-user:~$ git config --global user.email "sarveshchavan@gmail.com"
ec2-user:~$ git config --global credential.helper "aws codecommit credential-helper $@"
ec2-user:~$ git config --global credential.useHttpPath true
ec2-user:~$
```

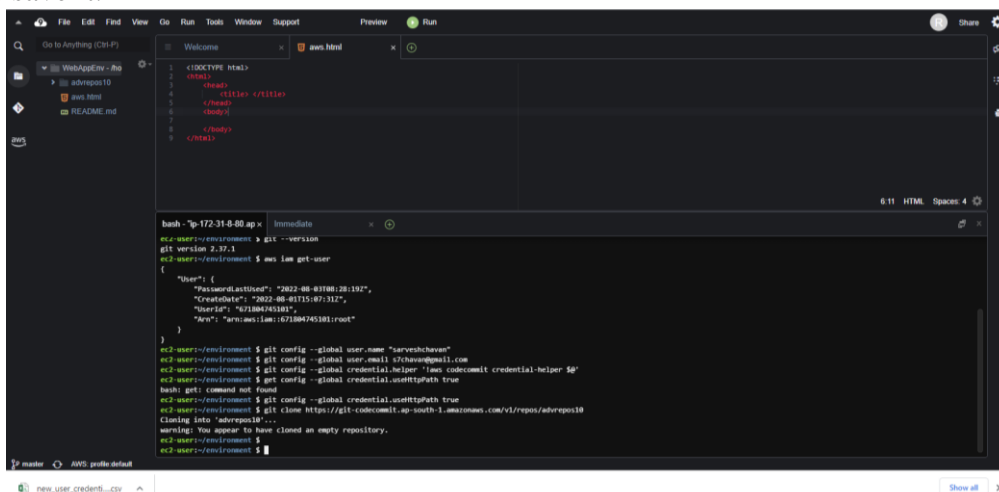
- Now setup collaborative environment. Create HTML file from the file tab. Edit HTML file and save it.



```
<!DOCTYPE html>
<html>
<head>
<title> </title>
</head>
<body>
</body>
</html>

bash -p-172-31-8-80 ap x
git version 2.37.1
ec2-user:~$ git --version
git version 2.37.1
ec2-user:~$ aws iam get-user
{
  "User": {
    "PasswordLastUsed": "2022-08-03T08:28:19Z",
    "CreateDate": "2022-08-03T15:07:31Z",
    "UserId": "AID246512669",
    "Arn": "arn:aws:iam::85246512669:root"
  }
}
ec2-user:~$ git config --global user.name "sarveshchavan"
ec2-user:~$ git config --global user.email "s7chavan@gmail.com"
ec2-user:~$ git config --global credential.helper "aws codecommit credential-helper $@"
ec2-user:~$ git config --global credential.useHttpPath true
bash: git: command not found
ec2-user:~$ git config --global credential.useHttpPath true
ec2-user:~$
```

- Now setup collaborative environment. Create HTML file from the file tab. Edit HTML file and save it.



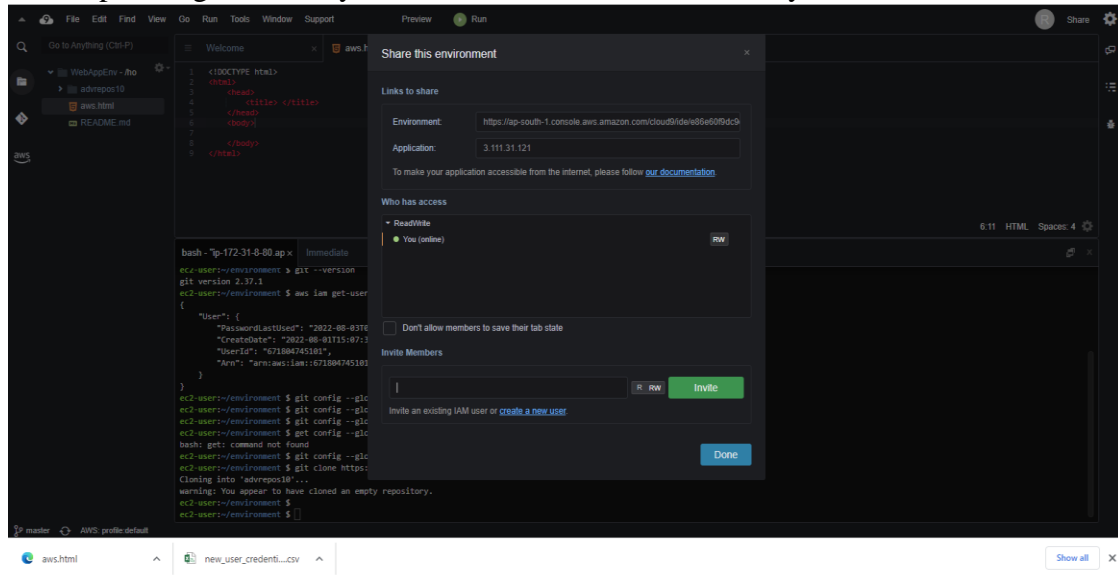
```
<!DOCTYPE html>
<html>
<head>
<title> </title>
</head>
<body>
</body>
</html>

bash -p-172-31-8-80 ap x
ec2-user:~$ git --version
git version 2.37.1
ec2-user:~$ aws iam get-user
{
  "User": {
    "PasswordLastUsed": "2022-08-03T08:28:19Z",
    "CreateDate": "2022-08-03T15:07:31Z",
    "UserId": "AID246512669",
    "Arn": "arn:aws:iam::85246512669:root"
  }
}
ec2-user:~$ git config --global user.name "sarveshchavan"
ec2-user:~$ git config --global user.email "s7chavan@gmail.com"
ec2-user:~$ git config --global credential.helper "aws codecommit credential-helper $@"
ec2-user:~$ git config --global credential.useHttpPath true
bash: git: command not found
ec2-user:~$ git config --global credential.useHttpPath true
ec2-user:~$ git clone https://git-codecommit.ap-south-1.amazonaws.com/v1/repos/adversus10
Cloning into 'adversus10'...
warning: You appear to have cloned an empty repository.
ec2-user:~$
ec2-user:~$
```

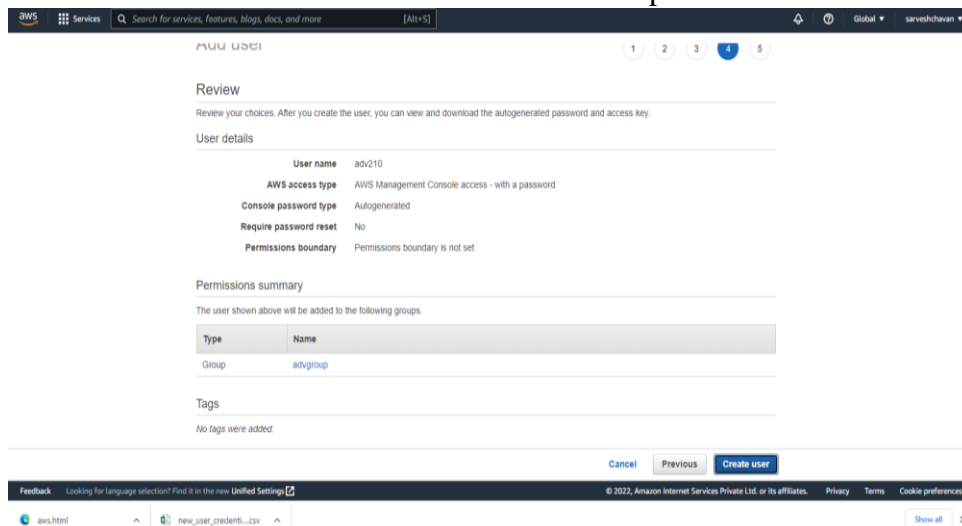
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- Now, in order to share this file to collaborate with other members of your team click on share option right-side of your window and username which you created in IAM.



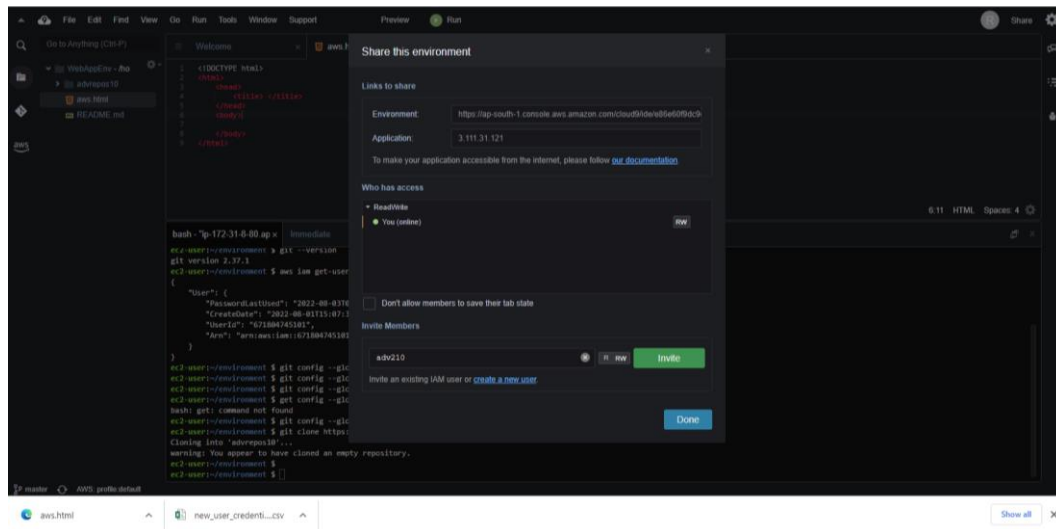
- Click on create New User and follow the same steps to create the user.



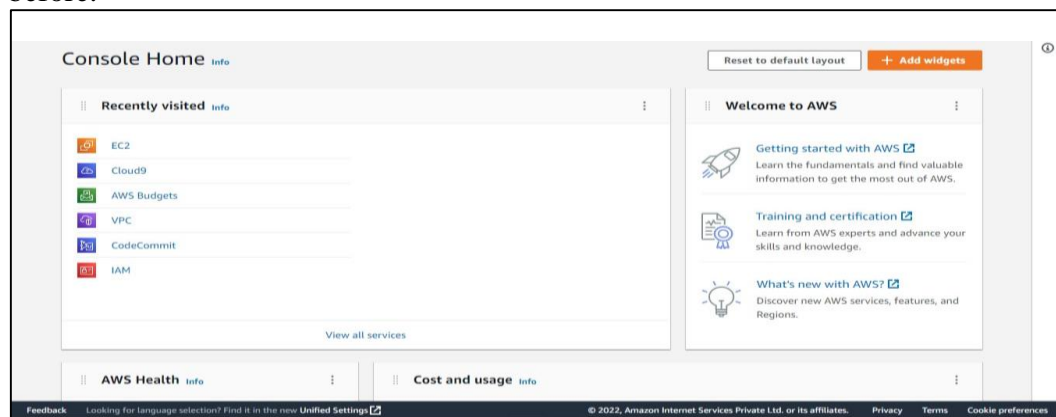
- Invite the new user by giving read and write permission and click on done. Click OK for security warning.

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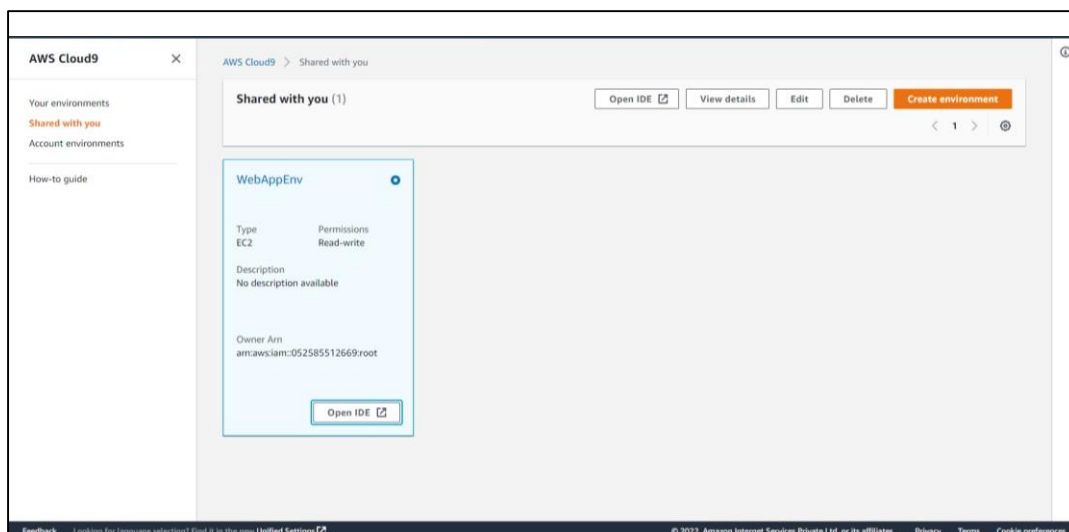
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- Now, open your browser incognito window and login with IAM user which you configured before.



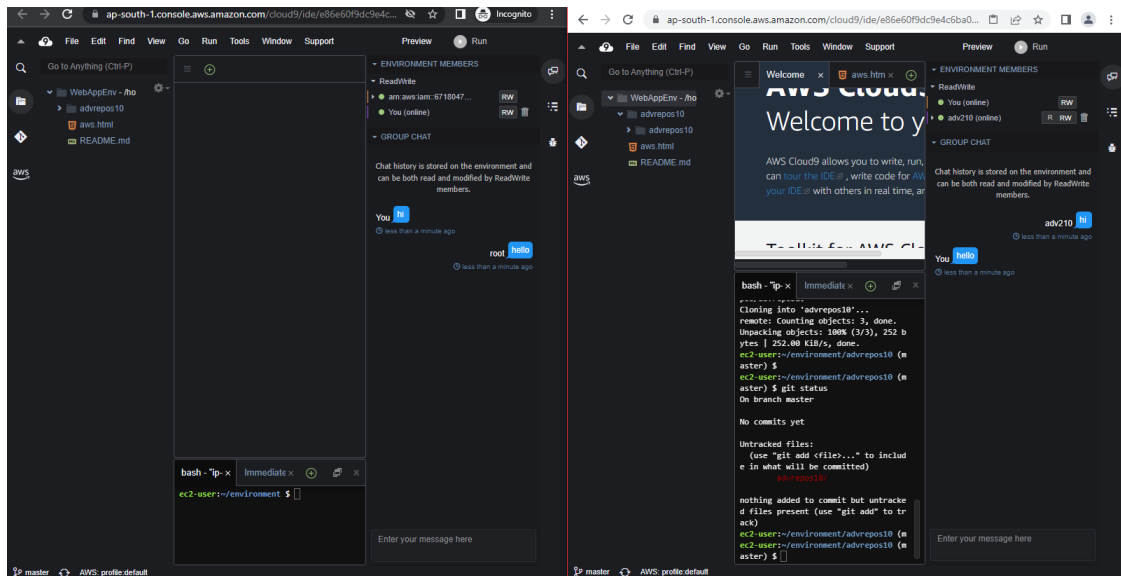
- After successful login with IAM user. Open cloud9 service from dashboard services and click on share with you environment to collaborate.



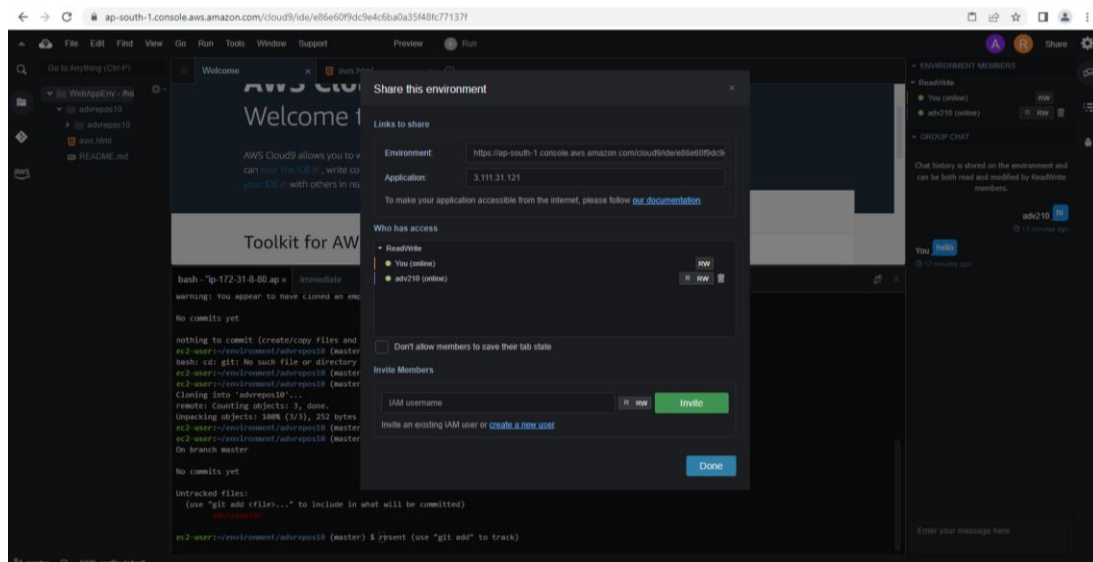
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- Click on open IDE you will get same interface as your other member have to collaborate in real time, also all you in team can do group chats as shown below.



- You can also explore settings where you can update permission of your team members from read write to write only or and you can remove user too.



Conclusion:

From the above experiment I was able to explain the benefits of Cloud Infrastructure and Setup AWS Cloud9 IDE, Launch AWS Cloud9 IDE and Perform Collaboration Demonstration, thus achieving LO1.