

## Lesson 10 Demo 02

### Creating a Container Registry Using AWS ECR

**Objective:** To create an AWS ECR container registry to configure Docker on your EC2 instance and push a Docker image into your ECR repository

**Tools required:** AWS Management Console

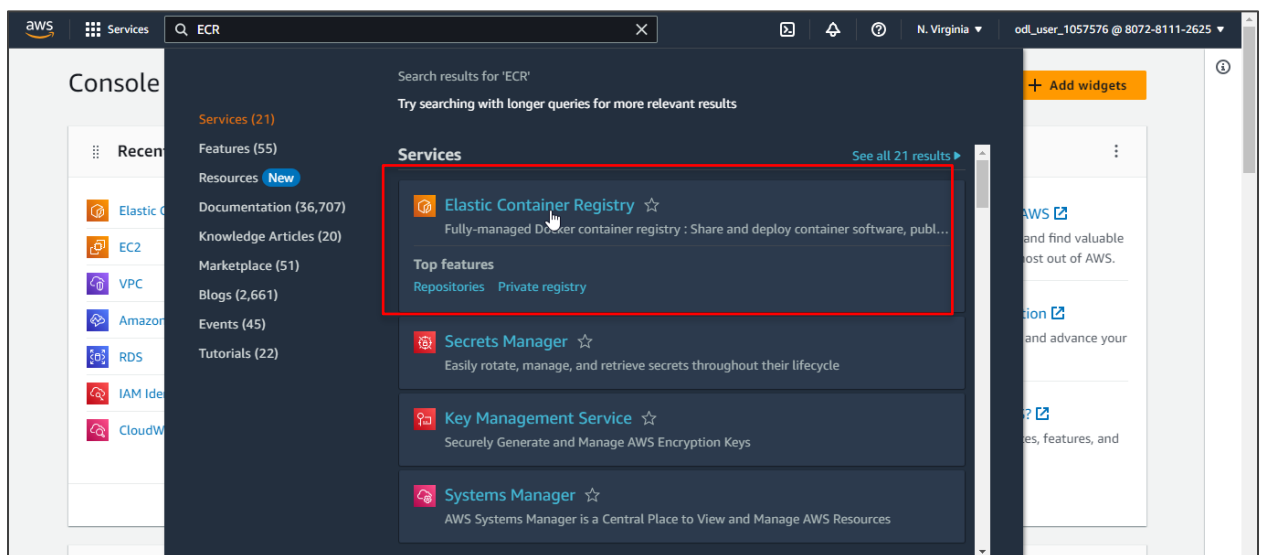
**Prerequisites:** None

Steps to be followed:

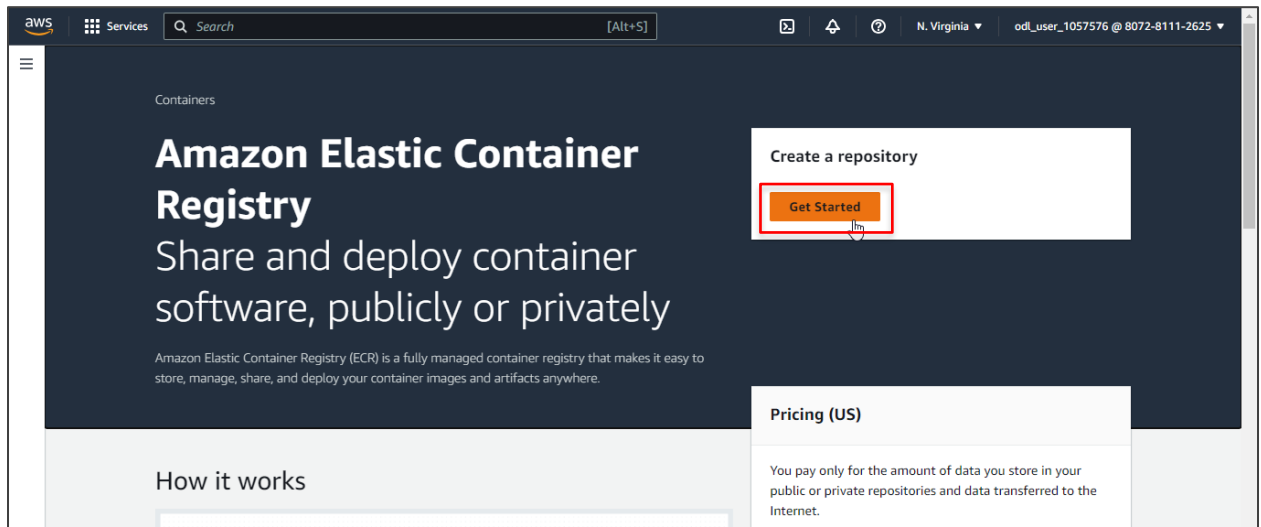
1. Create an ECR repository
2. Launch an EC2 instance
3. Install Docker on the EC2 instance
4. Create and push the Docker image to the repository

#### Step 1: Create an ECR repository

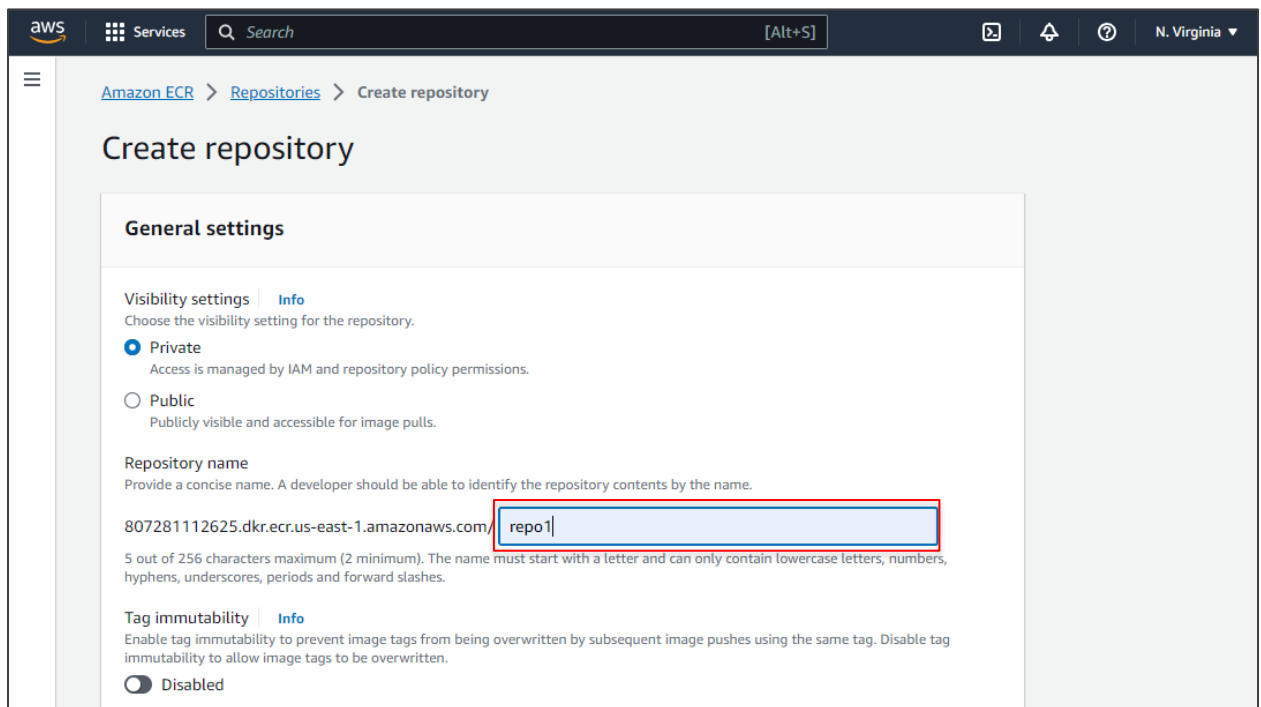
- 1.1 Navigate to the AWS Management Console, search for **ECR** and then click on **Elastic Container Registry**



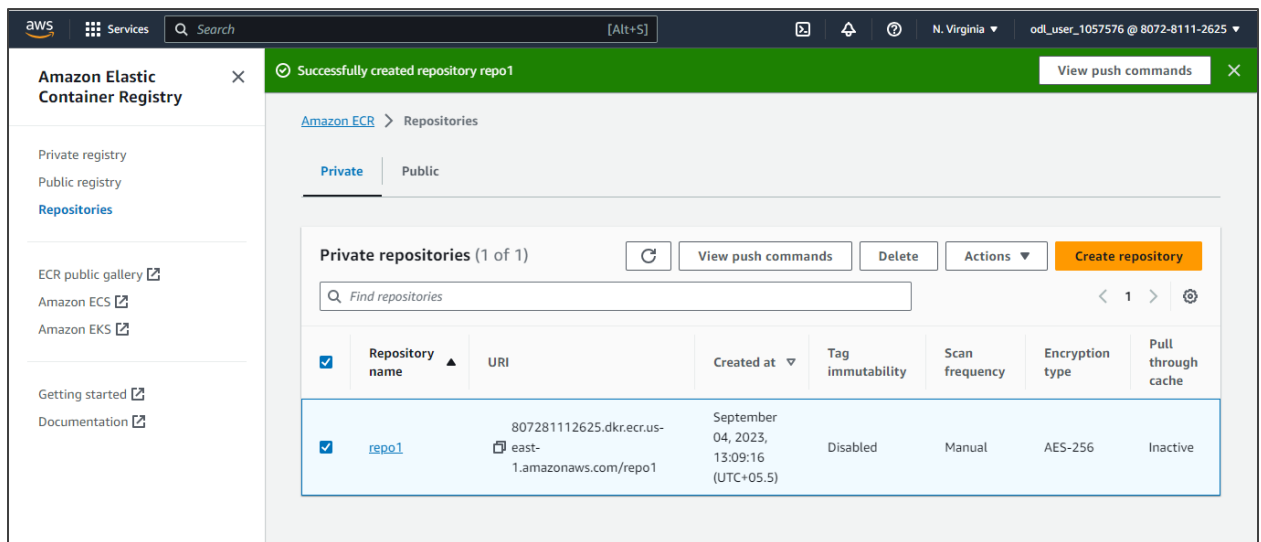
## 1.2 Click on **Get Started** in the ECR console



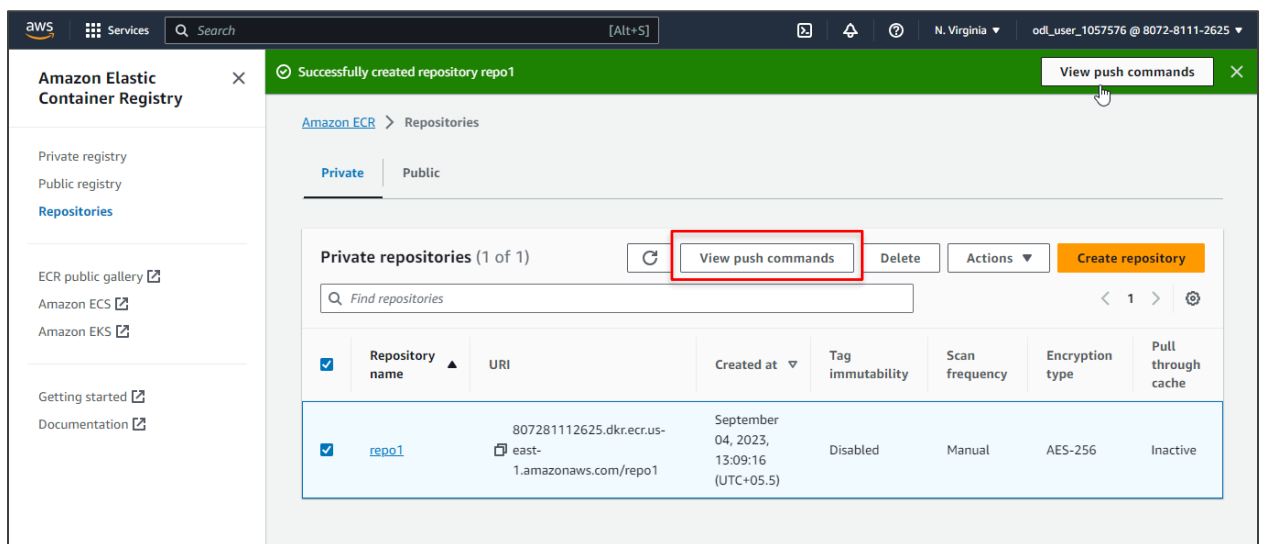
## 1.3 Provide an arbitrary name for your repository in the **Repository name** section and then click on **Create repository**

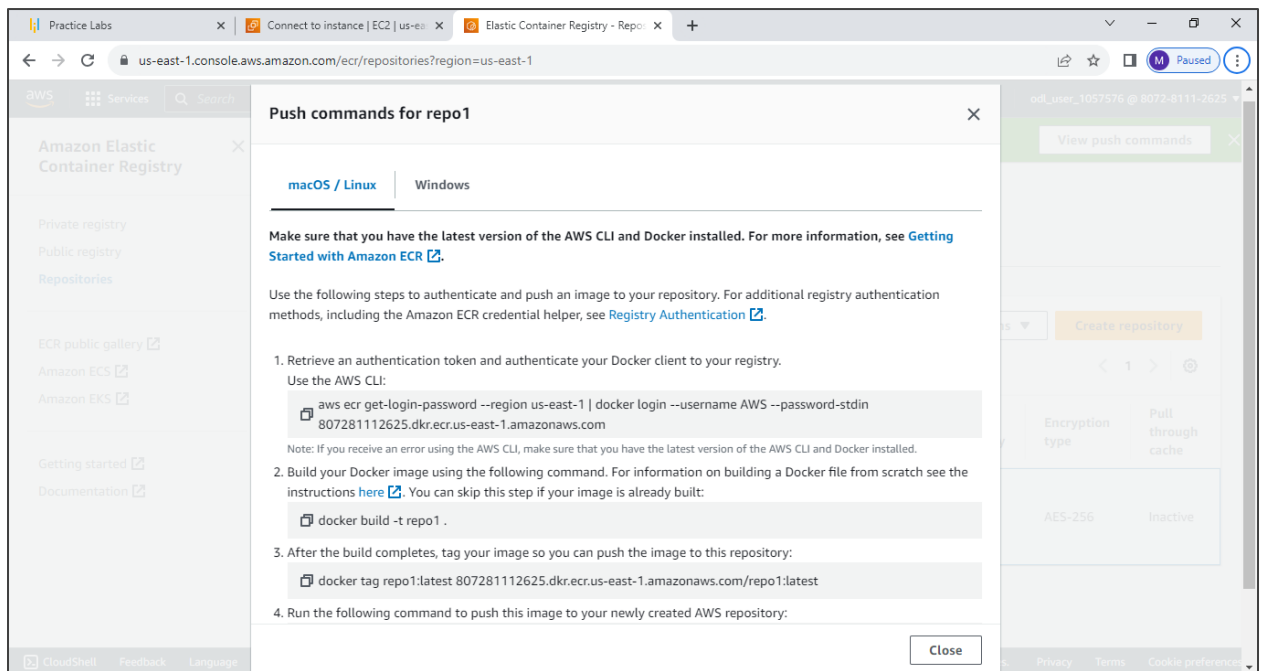


Once you successfully create the repository, it will appear on the Repositories dashboard.



#### 1.4 Click on View push commands on the Repositories dashboard

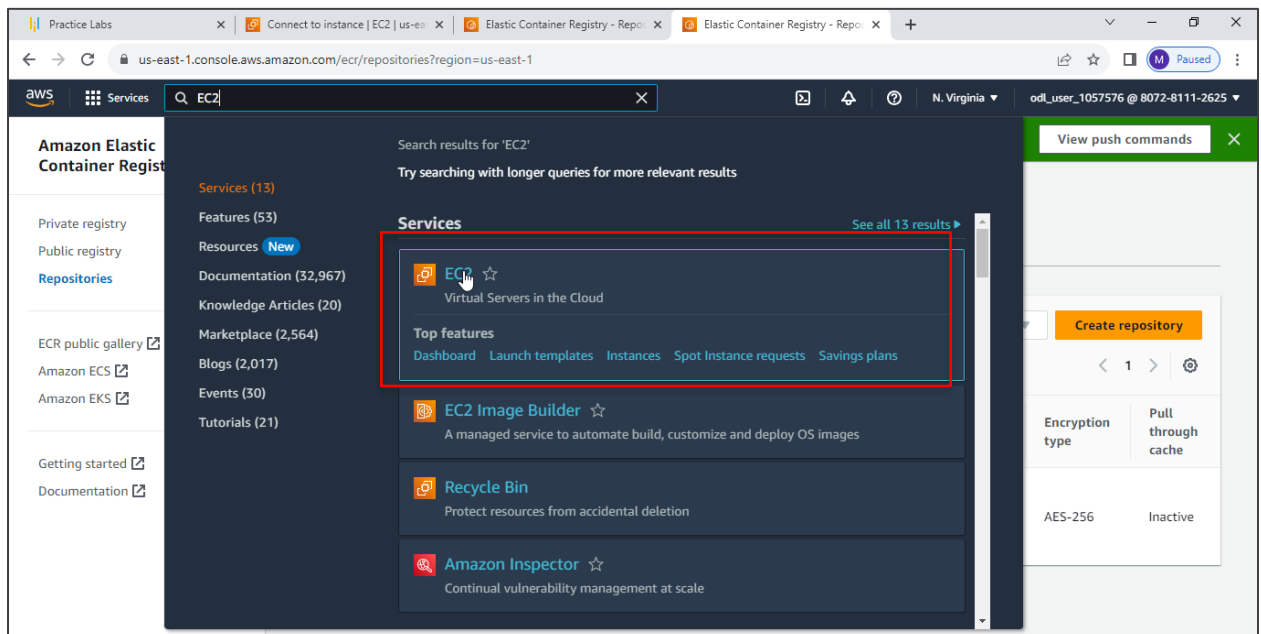




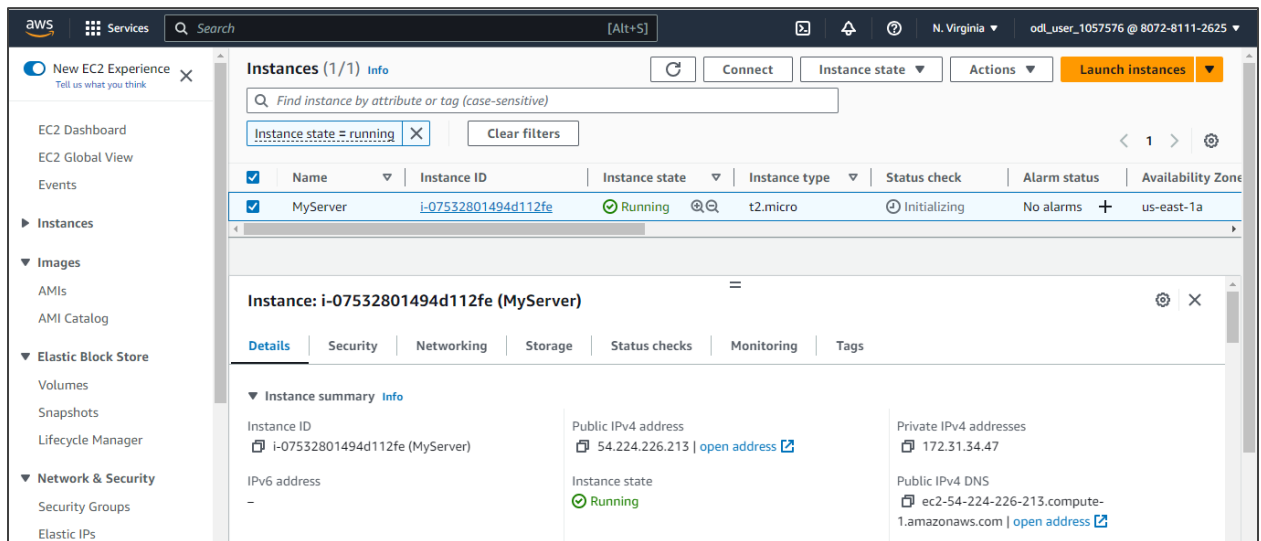
Keep this page open and duplicate it in a new tab, as you will use these commands in next steps

## Step 2: Launch an EC2 instance

2.1 Navigate to the AWS Management Console, search for **EC2**, and then click on it

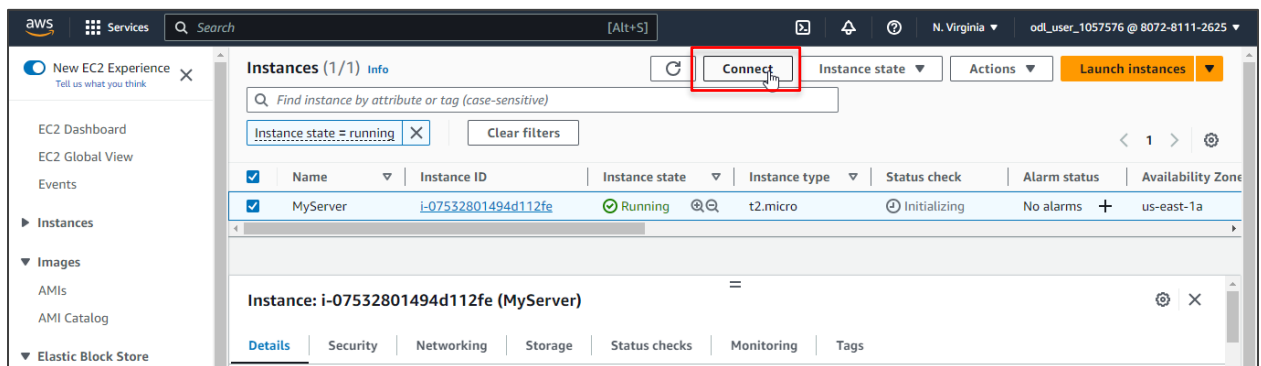


## 2.2 Launch a new EC2 instance using Amazon AMI 2 as the operating system and ensure the necessary security group rules are in place to allow SSH access



**Note:** Please refer to previous lesson demos on how to launch an EC2 instance.

## 2.3 Select the instance and click **Connect**



## 2.4 Click **Connect**

The screenshot shows the AWS Management Console interface for 'EC2 Instance Connect'. The top navigation bar includes the AWS logo, 'Services', a search bar, and the region 'N. Virginia'. The main content area has tabs for 'EC2 Instance Connect', 'Session Manager', 'SSH client', and 'EC2 serial console'. The 'EC2 Instance Connect' tab is active, displaying the following information:

- Instance ID:** i-07532801494d112fe (MyServer)
- Connection Type:** Two radio buttons are present. The first, 'Connect using EC2 Instance Connect', is selected. Its description is 'Connect using the EC2 Instance Connect browser-based client, with a public IPv4 address.' The second option is 'Connect using EC2 Instance Connect Endpoint', with a description 'Connect using the EC2 Instance Connect browser-based client, with a private IPv4 address and a VPC endpoint.'
- Public IP address:** 54.224.226.213
- User name:** A text input field contains 'ec2-user'. Below it, a note states: 'Note: In most cases, the default user name, ec2-user, is correct. However, read your AMI usage instructions to check if the AMI owner has changed the default AMI user name.'
- Buttons:** At the bottom right, there are 'Cancel' and 'Connect' buttons. The 'Connect' button is highlighted with a red rectangular box, and a mouse cursor is pointing at it.

You will see the following interface:

The screenshot shows the terminal interface for the EC2 instance. The top navigation bar is the same as the previous screenshot. The main content area is a terminal window with a black background. It displays the Amazon Linux 2 AMI logo and the command prompt [ec2-user@ip-172-31-34-47 ~]\$. Below the terminal window, there is a summary bar showing the instance ID i-07532801494d112fe (MyServer) and its public and private IP addresses: PublicIPs: 54.224.226.213, PrivateIPs: 172.31.34.47. A close button (X) is visible in the top right corner of the summary bar.

## Step 3: Install Docker on the EC2 instance

3.1 Execute the following commands on your EC2 instance to install Docker:

```
sudo yum update -y
sudo amazon-linux-extras install docker
sudo systemctl start docker
sudo systemctl enable docker
```

```

aws Services Search [Alt+S] N. Virginia odt_user_1057576 @ 8072-8111-2625
Amazon Linux 2 AMI
https://aws.amazon.com/amazon-linux-2/
[ec2-user@ip-172-31-34-47 ~]$ sudo yum update -y
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
amzn2-core | 3.7 kB 00:00:00
No packages marked for update
[ec2-user@ip-172-31-34-47 ~]$ sudo amazon-linux-extras install docker
Installing docker
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
Cleaning repos: amzn2-core amzn2extra-docker amzn2extra-kernel-5.10
17 metadata files removed
6 sqlite files removed
0 metadata files removed
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
amzn2-core | 3.7 kB 00:00:00
amzn2extra-docker | 3.0 kB 00:00:00
amzn2extra-kernel-5.10 | 3.0 kB 00:00:00
(1/7): amzn2-core/2/x86_64/group.gz | 2.5 kB 00:00:00
(2/7): amzn2-core/2/x86_64/updateinfo | 677 kB 00:00:00
(3/7): amzn2extra-docker/2/x86_64/updateinfo | 12 kB 00:00:00
(4/7): amzn2extra-kernel-5.10/2/x86_64/updateinfo | 35 kB 00:00:00

i-07532801494d112fe (MyServer)
PublicIPs: 54.224.226.213 PrivateIPs: 172.31.34.47

```

```

aws Services Search [Alt+S] N. Virginia
51 php8.0 available [ =stable ]
52 tomcat9 available [ =stable ]
53 unbound1.13 available [ =stable ]
54 mariadb10.5 available [ =stable ]
55 kernel-5.10=latest enabled [ =stable ]
56 redis6 available [ =stable ]
57 ruby3.0 available [ =stable ]
58 postgresql12 available [ =stable ]
59 postgresql13 available [ =stable ]
60 mock2 available [ =stable ]
61 dnsmasq2.85 available [ =stable ]
62 kernel-5.15 available [ =stable ]
63 postgresql14 available [ =stable ]
64 firefox available [ =stable ]
65 lustre available [ =stable ]
66 php8.1 available [ =stable ]
67 awscli1 available [ =stable ]
68 php8.2 available [ =stable ]
69 dnsmasq available [ =stable ]
70 unbound1.17 available [ =stable ]
71 golang1.19 available [ =stable ]
72 collectd-python3 available [ =stable ]
[ec2-user@ip-172-31-34-47 ~]$ sudo systemctl start docker
[ec2-user@ip-172-31-34-47 ~]$ sudo systemctl enable docker
Created symlink from /etc/systemd/system/multi-user.target.wants/docker.service to /usr/lib/systemd/system/docker.service.

i-07532801494d112fe (MyServer)
PublicIPs: 54.224.226.213 PrivateIPs: 172.31.34.47

```

3.2 Add the **ec2-user** to the docker group to enable running Docker commands without using sudo by executing the following command:

**sudo usermod -a -G docker ec2-user**

```
aws Services Search [Alt+S] N. Virginia
55 kernel-5.10=latest enabled [ =stable ]
56 redis6 available [ =stable ]
57 ruby3.0 available [ =stable ]
58 postgresql12 available [ =stable ]
59 postgresql13 available [ =stable ]
60 mock2 available [ =stable ]
61 dnsmasq2.85 available [ =stable ]
62 kernel-5.15 available [ =stable ]
63 postgresql14 available [ =stable ]
64 firefox available [ =stable ]
65 lustre available [ =stable ]
66 php8.1 available [ =stable ]
67 awscli1 available [ =stable ]
68 php8.2 available [ =stable ]
69 dnsmasq available [ =stable ]
70 unbound1.17 available [ =stable ]
71 golang1.19 available [ =stable ]
72 collectd-python3 available [ =stable ]
[ec2-user@ip-172-31-34-47 ~]$ sudo systemctl start docker
[ec2-user@ip-172-31-34-47 ~]$ sudo systemctl enable docker
Created symlink from /etc/systemd/system/multi-user.target.wants/docker.service to /usr/lib/systemd/system/docker.service.
[ec2-user@ip-172-31-34-47 ~]$ sudo usermod -a -G docker ec2-user
```

After running this command, log out and then log back in to the EC2 instance to apply the group changes.

3.3 Execute exit command to log out:

**exit**

```
aws Services Search [Alt+S] N. Virginia
55 kernel-5.10=latest enabled [ =stable ]
56 redis6 available [ =stable ]
57 ruby3.0 available [ =stable ]
58 postgresql12 available [ =stable ]
59 postgresql13 available [ =stable ]
60 mock2 available [ =stable ]
61 dnsmasq2.85 available [ =stable ]
62 kernel-5.15 available [ =stable ]
63 postgresql14 available [ =stable ]
64 firefox available [ =stable ]
65 lustre available [ =stable ]
66 php8.1 available [ =stable ]
67 awscli1 available [ =stable ]
68 php8.2 available [ =stable ]
69 dnsmasq available [ =stable ]
70 unbound1.17 available [ =stable ]
71 golang1.19 available [ =stable ]
72 collectd-python3 available [ =stable ]
[ec2-user@ip-172-31-34-47 ~]$ sudo systemctl start docker
[ec2-user@ip-172-31-34-47 ~]$ sudo systemctl enable docker
Created symlink from /etc/systemd/system/multi-user.target.wants/docker.service to /usr/lib/systemd/system/docker.service.
[ec2-user@ip-172-31-34-47 ~]$ sudo usermod -a -G docker ec2-user
[ec2-user@ip-172-31-34-47 ~]$ exit
logout
i-07532801494d112fe (MyServer)
PublicIPs: 54.224.226.213 PrivateIPs: 172.31.34.47
```



3.4 Reconnect to your EC2 instance and verify that the ec2-user can run Docker commands without using sudo by executing the following command:  
**docker ps**

The screenshot shows an AWS CLI terminal window. At the top, it says "Last login: Mon Sep 4 09:46:41 2023 from ec2-18-206-107-28.compute-1.amazonaws.com". Below that is the Amazon Linux 2 AMI logo. The terminal shows the command `https://aws.amazon.com/amazon-linux-2/` and then `[ec2-user@ip-172-31-34-47 ~]$ docker ps`. The output is a table with columns: CONTAINER ID, IMAGE, COMMAND, CREATED, STATUS, PORTS, and NAMES. The table is empty. A red box highlights the output table.

| CONTAINER ID | IMAGE | COMMAND | CREATED | STATUS | PORTS | NAMES |
|--------------|-------|---------|---------|--------|-------|-------|
|              |       |         |         |        |       |       |

Below the terminal output, the instance details are shown: i-07532801494d112fe (MyServer), PublicIPs: 54.224.226.213, PrivateIPs: 172.31.34.47.

You will see that the command does not result in a permission error.

## Step 4: Create and push the Docker image to the repository

4.1 Run the following command to open the Docker file:  
**vi Dockerfile**

The screenshot shows an AWS CLI terminal window. At the top, it says "Last login: Mon Sep 4 09:46:41 2023 from ec2-18-206-107-28.compute-1.amazonaws.com". Below that is the Amazon Linux 2 AMI logo. The terminal shows the command `https://aws.amazon.com/amazon-linux-2/` and then `[ec2-user@ip-172-31-34-47 ~]$ docker ps`. The output is a table with columns: CONTAINER ID, IMAGE, COMMAND, CREATED, STATUS, PORTS, and NAMES. The table is empty. Below the terminal output, the instance details are shown: i-07532801494d112fe (MyServer), PublicIPs: 54.224.226.213, PrivateIPs: 172.31.34.47. A red box highlights the command `vi Dockerfile`.

4.2 Paste the following code:

**FROM** ubuntu:18.04

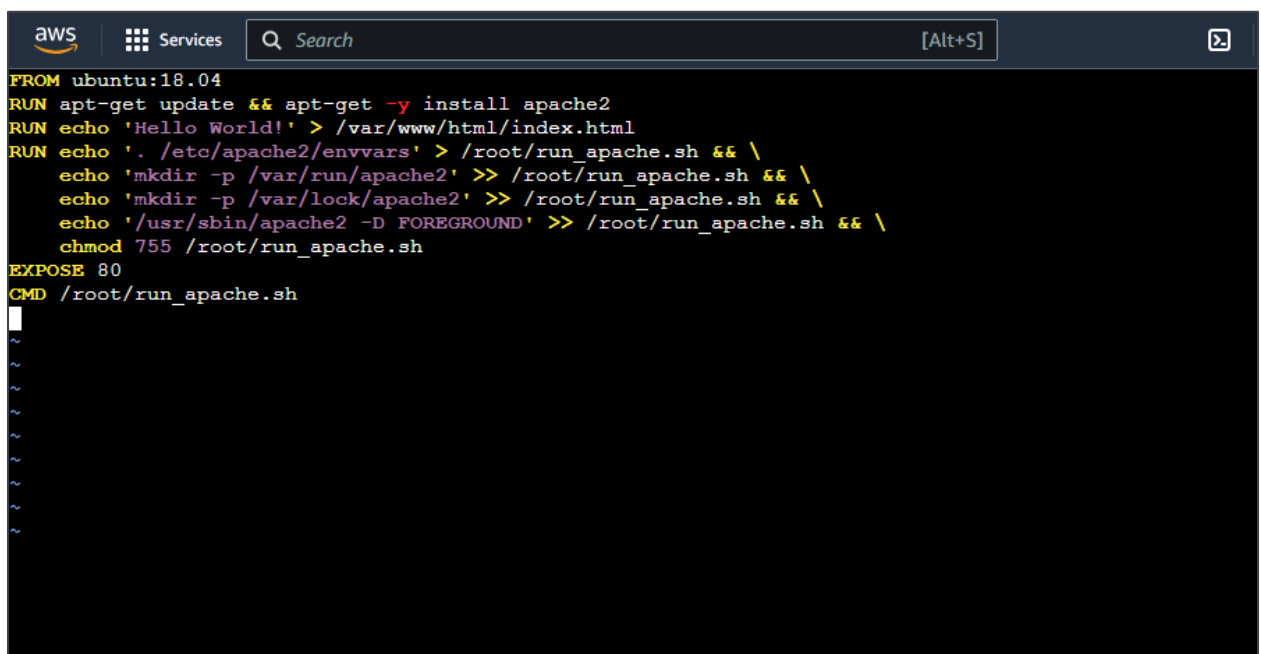
**RUN** apt-get update && apt-get -y install apache2

**RUN** echo 'Hello World!' > /var/www/html/index.html

**RUN** echo './etc/apache2/envvars' > /root/run\_apache.sh && \  
echo 'mkdir -p /var/run/apache2' >> /root/run\_apache.sh && \  
echo 'mkdir -p /var/lock/apache2' >> /root/run\_apache.sh && \  
echo '/usr/sbin/apache2 -D FOREGROUND' >> /root/run\_apache.sh && \  
chmod 755 /root/run\_apache.sh

**EXPOSE** 80

**CMD** /root/run\_apache.sh



The screenshot shows an AWS Cloud9 IDE interface. At the top, there is a header bar with the AWS logo, a 'Services' menu, a search bar, and a keyboard shortcut '[Alt+S]'. Below the header is a terminal window with a black background and yellow text. The terminal content is a Dockerfile for a web application, which matches the code provided in the previous blocks. The code includes instructions for installing Apache2, creating a default index.html file, setting up a run script, and exposing port 80. The terminal shows the first few lines of the Dockerfile being entered, with some lines already present and others being typed.

```
aws Services Q Search [Alt+S]
FROM ubuntu:18.04
RUN apt-get update && apt-get -y install apache2
RUN echo 'Hello World!' > /var/www/html/index.html
RUN echo './etc/apache2/envvars' > /root/run_apache.sh && \
    echo 'mkdir -p /var/run/apache2' >> /root/run_apache.sh && \
    echo 'mkdir -p /var/lock/apache2' >> /root/run_apache.sh && \
    echo '/usr/sbin/apache2 -D FOREGROUND' >> /root/run_apache.sh && \
    chmod 755 /root/run_apache.sh
EXPOSE 80
CMD /root/run_apache.sh
```

4.3 Save the changes and exit the vi editor by pressing the **escape** key and entering **:wq**

```

FROM ubuntu:18.04
RUN apt-get update && apt-get -y install apache2
RUN echo 'Hello World!' > /var/www/html/index.html
RUN echo './etc/apache2/envvars' > /root/run_apache.sh && \
  echo 'mkdir -p /var/run/apache2' >> /root/run_apache.sh && \
  echo 'mkdir -p /var/lock/apache2' >> /root/run_apache.sh && \
  echo '/usr/sbin/apache2 -D FOREGROUND' >> /root/run_apache.sh && \
  chmod 755 /root/run_apache.sh
EXPOSE 80
CMD /root/run_apache.sh

~
~
~
~
~
~
~
:wq

```

**Note:** Before pushing the Docker image to your ECR repository, ensure the AWS CLI on your EC2 instance is configured with the necessary credentials.

[IAM](#) > [Users](#) > [odl\\_user\\_1057576](#) > Create access key

Step 1  
[Access key best practices & alternatives](#)

Step 2 - optional  
[Set description tag](#)

Step 3  
**Retrieve access keys**

### Retrieve access keys [Info](#)

**Access key**  
If you lose or forget your secret access key, you cannot retrieve it. Instead, create a new access key and make the old key inactive.

✓ Access key Copied

Secret access key

AKIA3X5NUGYYW4QDAEPE \*\*\*\*\* [Show](#)

**Access key best practices**

- Never store your access key in plain text, in a code repository, or in code.
- Disable or delete access key when no longer needed.
- Enable least-privilege permissions.
- Rotate access keys regularly.

```
[ec2-user@ip-172-31-34-47 ~]$ aws configure
AWS Access Key ID [None]: AKIA3X5NUGYY747RS34V
AWS Secret Access Key [None]: EsrB8LHYBkcr4Mw/E2TQBXdFcSBtTvhpeswQ4se9
Default region name [None]: us-east-1
Default output format [None]:
```

4.4 Build and push the Docker image to your ECR repository by following the push commands from the ECR page. Copy and execute the commands.

The screenshot shows the AWS Elastic Container Registry console. The 'macOS / Linux' tab is selected, displaying instructions for pushing a Docker image to a repository. The instructions are as follows:

1. Retrieve an authentication token and authenticate your Docker client to your registry. Use the AWS CLI:  

```
aws ecr get-login-password --region us-east-1 | docker login --username AWS --password-stdin 807281112625.dkr.ecr.us-east-1.amazonaws.com
```

Note: If you receive an error using the AWS CLI, make sure that you have the latest version of the AWS CLI and Docker installed.
2. Build your Docker image using the following command. For information on building a Docker file from scratch see the instructions [here](#). You can skip this step if your image is already built:  

```
docker build -t repo1 .
```
3. After the build completes, tag your image so you can push the image to this repository:  

```
docker tag repo1:latest 807281112625.dkr.ecr.us-east-1.amazonaws.com/repo1:latest
```
4. Run the following command to push this image to your newly created AWS repository:  

```
docker push 807281112625.dkr.ecr.us-east-1.amazonaws.com/repo1:latest
```

The screenshot shows a terminal window with the following commands and output:

```
[ec2-user@ip-172-31-34-47 ~]$ aws ecr get-login-password --region us-east-1 | docker login --username AWS --password-stdin 807281112625.dkr.ecr.us-east-1.amazonaws.com
WARNING! Your password will be stored unencrypted in /home/ec2-user/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credentials-store

Login Succeeded
[ec2-user@ip-172-31-34-47 ~]$
```

Below the terminal window, the instance details are shown:

i-07532801494d112fe (MyServer)  
Public IPs: 54.224.226.213 Private IPs: 172.31.34.47

```
aws Services Search [Alt+S] N. Virginia odl_user_1057576 @ 8072-8111-2625
[ec2-user@ip-172-31-34-47 ~]$ aws ecr get-login-password --region us-east-1 | docker login --username AWS --password-stdin 807281112625.dkr.ecr.us-east-1.amazonaws.com
WARNING! Your password will be stored unencrypted in /home/ec2-user/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credentials-store

Login Succeeded
[ec2-user@ip-172-31-34-47 ~]$ docker build -t repo1 .
Sending build context to Docker daemon 10.38MB
Step 1/6 : FROM ubuntu:18.04
18.04: Pulling from library/ubuntu
7c457f213c76: Pull complete
Digest: sha256:152dc042452c496007f07ca9127571cb9c29697f42acbfad72324b2bb2e43c98
Status: Downloaded newer image for ubuntu:18.04
--> f9a90a55f492
Step 2/6 : RUN apt-get update && apt-get -y install apache2
--> Running in 13631d543e11
Get:1 http://archive.ubuntu.com/ubuntu bionic InRelease [242 kB]
Get:2 http://archive.ubuntu.com/ubuntu bionic-updates InRelease [88.7 kB]
Get:3 http://archive.ubuntu.com/ubuntu bionic-backports InRelease [83.3 kB]
Get:4 http://security.ubuntu.com/ubuntu bionic-security InRelease [88.7 kB]
Get:5 http://archive.ubuntu.com/ubuntu bionic/restricted amd64 Packages [13.5 kB]
Get:6 http://archive.ubuntu.com/ubuntu bionic/main amd64 Packages [1344 kB]
Get:7 http://archive.ubuntu.com/ubuntu bionic/multiverse amd64 Packages [186 kB]
Get:8 http://archive.ubuntu.com/ubuntu bionic/universe amd64 Packages [11.3 MB]
i-07532801494d112fe (MyServer)
PublicIPs: 54.224.226.213 PrivateIPs: 172.31.34.47
```

```
aws Services Search [Alt+S] N. Virginia odl_user_1057576 @ 8072-8111-2625
invoke-rc.d: policy-rc.d denied execution of start.
Processing triggers for libc-bin (2.27-3ubuntu1.6) ...
Removing intermediate container 13631d543e11
--> b9f45fc50dfa
Step 3/6 : RUN echo 'Hello World!' > /var/www/html/index.html
--> Running in 17680b483b10
Removing intermediate container 17680b483b10
--> a9fdaeff00b
Step 4/6 : RUN echo '. /etc/apache2/envvars' > /root/run_apache.sh && echo 'mkdir -p /var/run/apache2' >> /root/run_apache.sh && echo 'mkdir -p /var/lock/apache2' >> /root/run_apache.sh && echo '/usr/sbin/apache2 -D FOREGROUND' >> /root/run_apache.sh && chmod 755 /root/run_apache.sh
--> Running in fcdc5b904d9b
Removing intermediate container fcdc5b904d9b
--> 1d8e1e74ba
Step 5/6 : EXPOSE 80
--> Running in 0a45a8854b51
Removing intermediate container 0a45a8854b51
--> 885c39606e83
Step 6/6 : CMD /root/run_apache.sh
--> Running in bdce326f5f5b
Removing intermediate container bdce326f5f5b
--> 9da3708b837f
Successfully built 9da3708b837f
Successfully tagged repo1:latest
[ec2-user@ip-172-31-34-47 ~]$ docker tag repo1:latest 807281112625.dkr.ecr.us-east-1.amazonaws.com/repo1:latest
[ec2-user@ip-172-31-34-47 ~]$
```

```

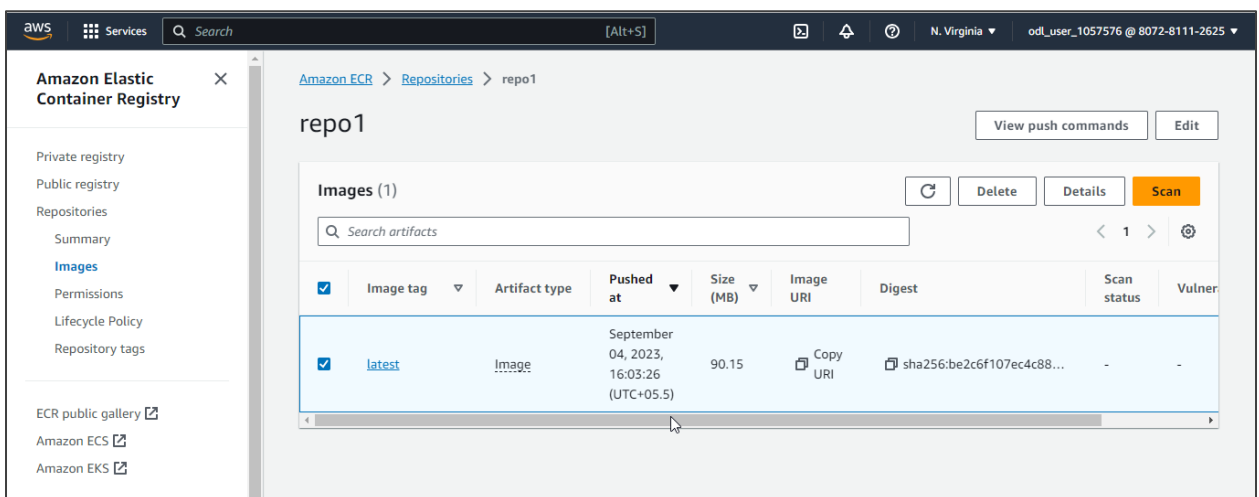
aws
Services
[Alt+S]
N. Virginia
odl_user_1057576 @ 8072-8111-2625

---> a9fdacffd0fb
Step 4/6 : RUN echo '. /etc/apache2/envvars' > /root/run_apache.sh && echo 'mkdir -p /var/run/apache2' >> /root/run_apache.sh && echo 'mkdir -p /var/lock/apache2' >> /root/run_apache.sh && echo '/usr/sbin/apache2 -D FOREGROUND' >> /root/run_apache.sh && chmod 755 /root/run_apache.sh
---> Running in fcdc5b904d9b
Removing intermediate container fcdc5b904d9b
---> 1d8e1e74ba
Step 5/6 : EXPOSE 80
---> Running in 0a45a8854b51
Removing intermediate container 0a45a8854b51
---> 885c39606e83
Step 6/6 : CMD /root/run_apache.sh
---> Running in bdce326f5f5b
Removing intermediate container bdce326f5f5b
---> 9da3708b837f
Successfully built 9da3708b837f
Successfully tagged repo1:latest
[ec2-user@ip-172-31-34-47 ~]$ docker tag repo1:latest 807281112625.dkr.ecr.us-east-1.amazonaws.com/repo1:latest
[ec2-user@ip-172-31-34-47 ~]$ docker push 807281112625.dkr.ecr.us-east-1.amazonaws.com/repo1:latest
The push refers to repository [807281112625.dkr.ecr.us-east-1.amazonaws.com/repo1]
a2c7567ceba: Pushed
87edd34079e1: Pushed
6ba892931abb: Pushed
548a79621a42: Pushed
latest: digest: sha256:be2c6f107ec4c8852c3a7abfbcfc65b543dc77be69c5d586910eb472c1717b61 size: 1195
[ec2-user@ip-172-31-34-47 ~]$

i-07532801494d112fe (MyServer)
PublicIPs: 54.224.226.213 PrivateIPs: 172.31.34.47

```

#### 4.5 Locate the image you pushed in step 4.3 within your ECR repository console



You will see that the Docker image has been successfully pushed to your ECR repository.

By following these steps, you have successfully created an AWS ECR container registry, configured Docker on your EC2 instance, and pushed a Docker image into your ECR repository.