DevOps Engineer Challenge

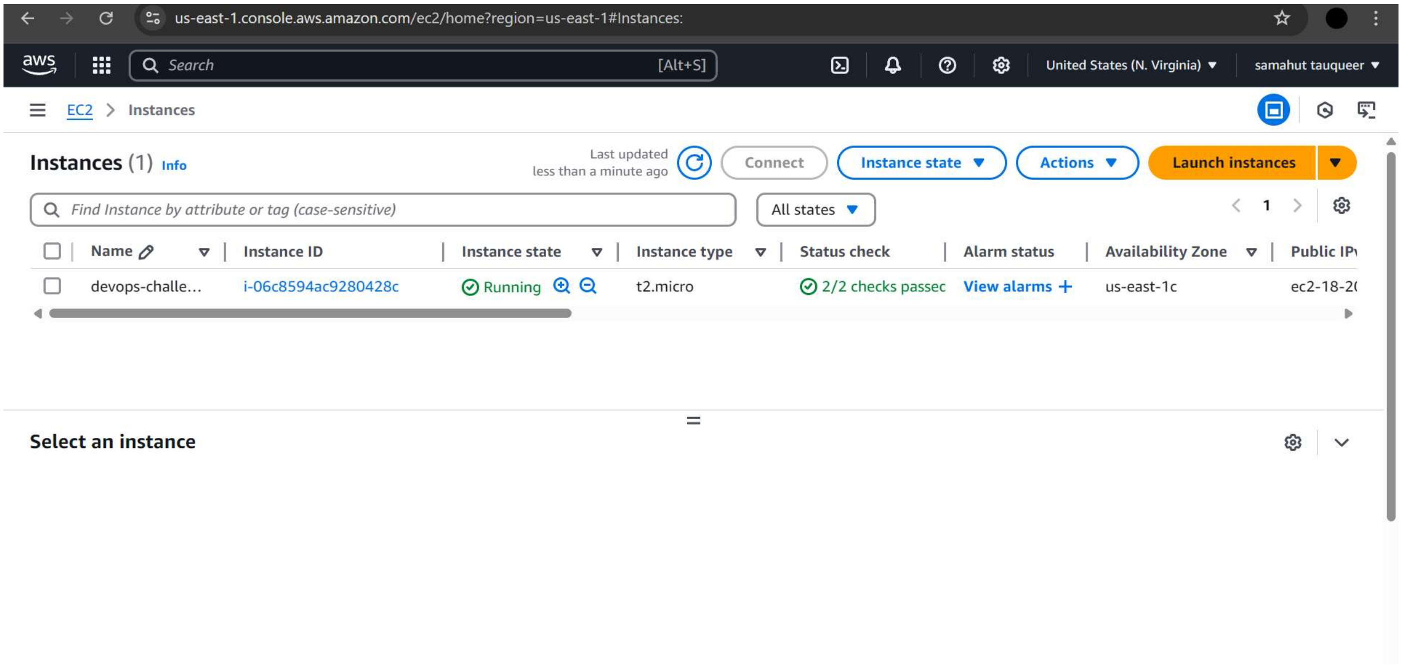
Part 1: Launch EC2 and Set Up User

- Launched an EC2 Ubuntu 24.04 instance in AWS.
- Created a new sudo user for security and best practices.
- Switched to the new user for all remaining configuration.

Commands Used:

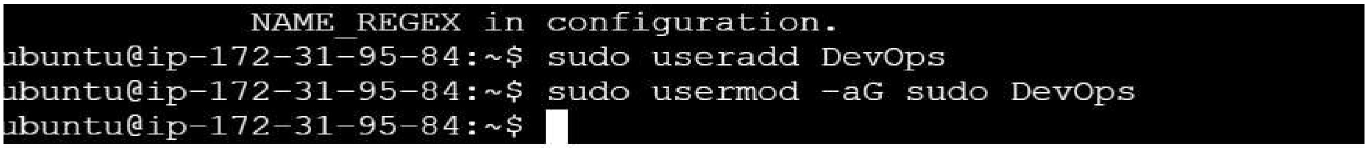
sudo adduser ubuntu

- sudo usermod -aG sudo ubuntu
- su – ubuntu

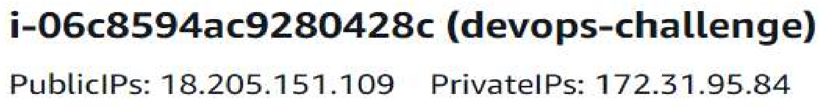

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#Instances:
aws
Search [Alt+S]
United States (N. Virginia) ▼
samahut tauqueer ▼
EC2 > Instances
Instances (1) Info
Last updated less than a minute ago
Connect
Instance state ▼
Actions ▼
Launch instances
Find Instance by attribute or tag (case-sensitive)
All states ▼
Select an instance

□	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IP
□	devops-challe...	i-06c8594ac9280428c	Running	t2.micro	2/2 checks passec	View alarms +	us-east-1c	ec2-18-2(

user created:



```
            NAME_REGEX in configuration.
ubuntu@ip-172-31-95-84:~$ sudo useradd DevOps
ubuntu@ip-172-31-95-84:~$ sudo usermod -aG sudo DevOps
ubuntu@ip-172-31-95-84:~$
```



i-06c8594ac9280428c (devops-challenge)

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Part 2: Clone React App and Install Dependencies

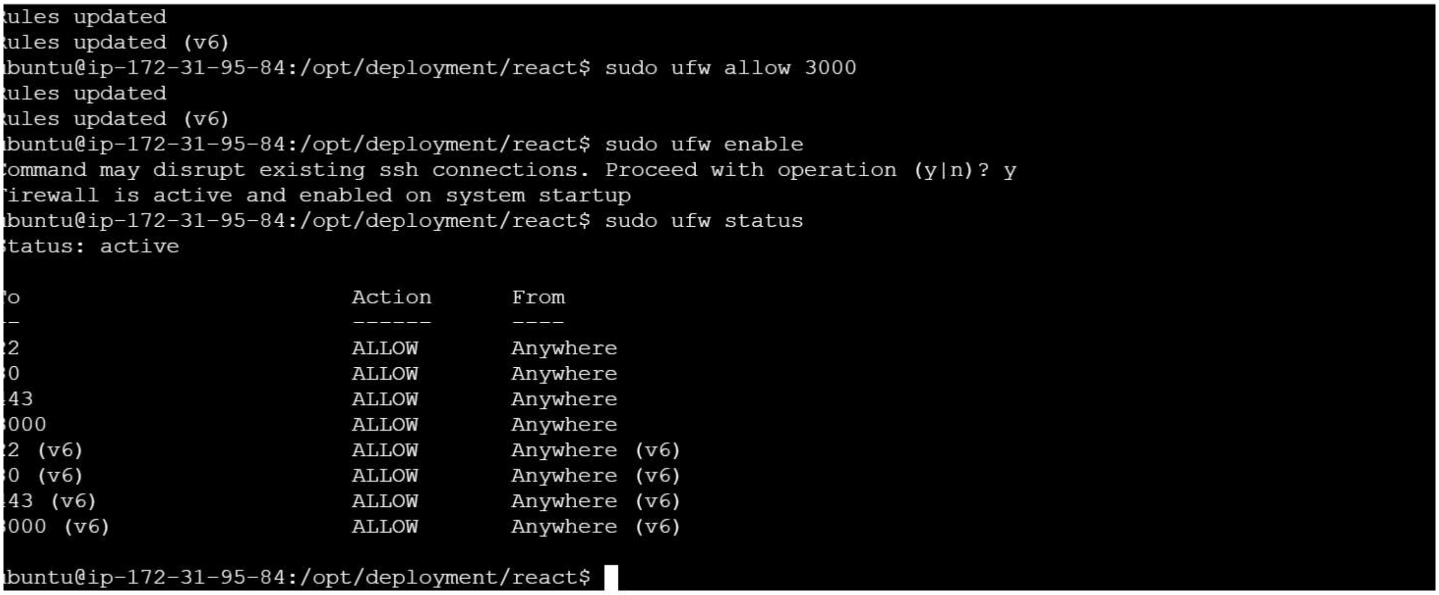
Step 2.1: Configure UFW

- Configured UFW (Uncomplicated Firewall) to allow essential ports:
    - SSH (22)
    - HTTP (80)
    - HTTPS (443)

commands used:

- sudo ufw allow 22
- sudo ufw allow 80
- sudo ufw allow 443
- sudo ufw enable

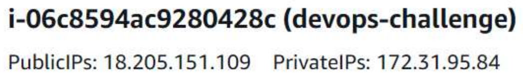
ufw-configured:



```
ules updated
ules updated (v6)
buntu@ip-172-31-95-84:/opt/deployment/react$ sudo ufw allow 3000
ules updated
ules updated (v6)
buntu@ip-172-31-95-84:/opt/deployment/react$ sudo ufw enable
ommand may disrupt existing ssh connections. Proceed with operation (y|n)? y
irewall is active and enabled on system startup
buntu@ip-172-31-95-84:/opt/deployment/react$ sudo ufw status
tatus: active

o                          Action      From
-                          ------      ----
2                          ALLOW       Anywhere
0                          ALLOW       Anywhere
43                         ALLOW       Anywhere
000                        ALLOW       Anywhere
2 (v6)                     ALLOW       Anywhere (v6)
0 (v6)                     ALLOW       Anywhere (v6)
43 (v6)                    ALLOW       Anywhere (v6)
000 (v6)                   ALLOW       Anywhere (v6)

buntu@ip-172-31-95-84:/opt/deployment/react$
```



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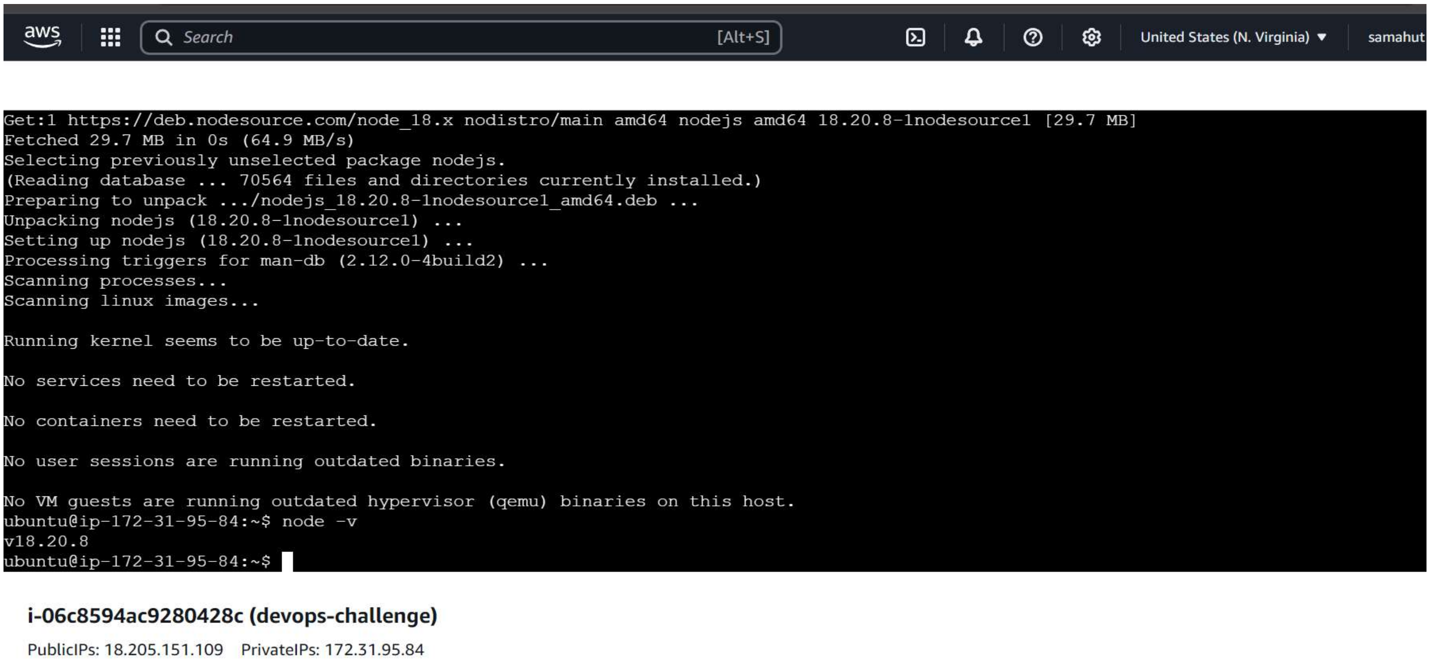
Step 2.3: Install Node and NPM

- Installed Node.js and npm:

commands:
sudo apt update
sudo apt install nodejs npm -y

node npm installed:



```
Get:1 https://deb.nodesource.com/node_18.x nodistro/main amd64 nodejs amd64 18.20.8-1nodesource1 [29.7 MB]
Fetched 29.7 MB in 0s (64.9 MB/s)
Selecting previously unselected package nodejs.
(Reading database ... 70564 files and directories currently installed.)
Preparing to unpack .../nodejs_18.20.8-1nodesource1_amd64.deb ...
Unpacking nodejs (18.20.8-1nodesource1) ...
Setting up nodejs (18.20.8-1nodesource1) ...
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-172-31-95-84:~$ node -v
v18.20.8
ubuntu@ip-172-31-95-84:~$
```

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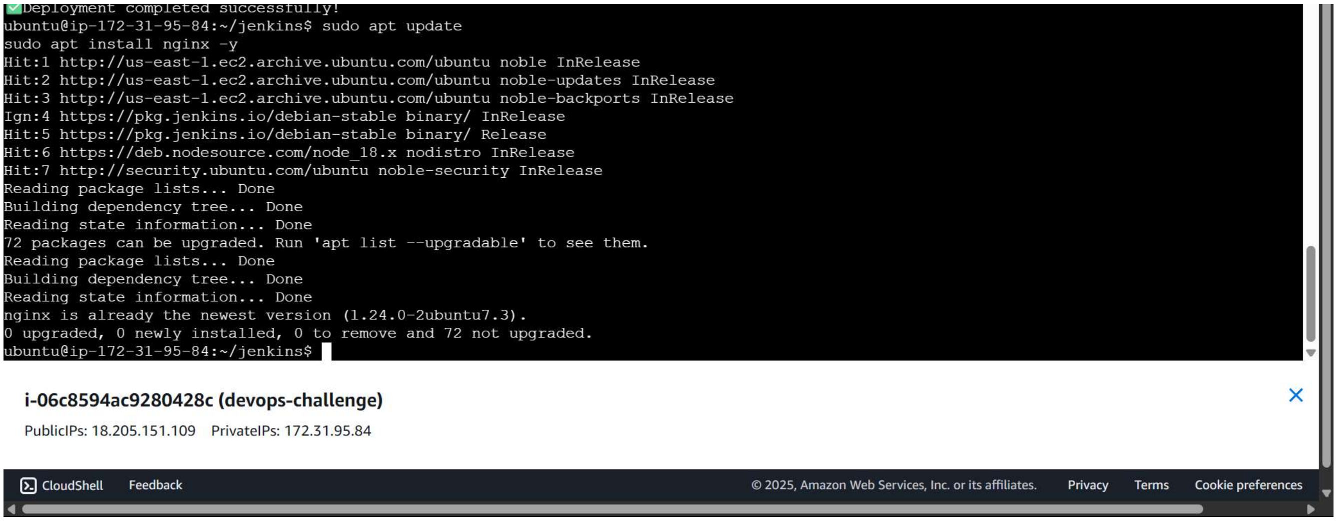
Part 3: Install and Configure Nginx

- Installed Nginx:

sudo apt install nginx -y

Configured Nginx to reverse proxy to the React app.

Nginx-installed:



```
✅Deployment completed successfully!
ubuntu@ip-172-31-95-84:~/jenkins$ sudo apt update
sudo apt install nginx -y
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
Ign:4 https://pkg.jenkins.io/debian-stable binary/ InRelease
Hit:5 https://pkg.jenkins.io/debian-stable binary/ Release
Hit:6 https://deb.nodesource.com/node_18.x nodistro InRelease
Hit:7 http://security.ubuntu.com/ubuntu noble-security InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
72 packages can be upgraded. Run 'apt list --upgradable' to see them.
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
nginx is already the newest version (1.24.0-2ubuntu7.3).
0 upgraded, 0 newly installed, 0 to remove and 72 not upgraded.
ubuntu@ip-172-31-95-84:~/jenkins$
```

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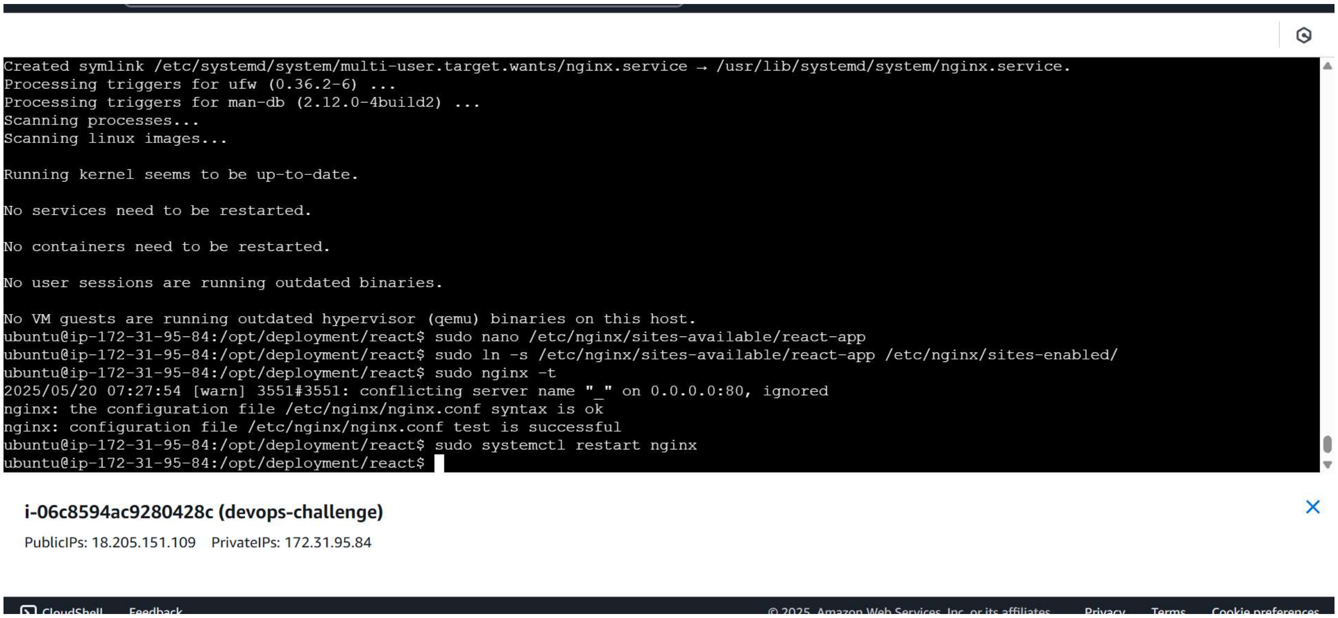
Nginx-configured:



```
Created symlink /etc/systemd/system/multi-user.target.wants/nginx.service → /usr/lib/systemd/system/nginx.service.
Processing triggers for ufw (0.36.2-6) ...
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-172-31-95-84:/opt/deployment/react$ sudo nano /etc/nginx/sites-available/react-app
ubuntu@ip-172-31-95-84:/opt/deployment/react$ sudo ln -s /etc/nginx/sites-available/react-app /etc/nginx/sites-enabled/
ubuntu@ip-172-31-95-84:/opt/deployment/react$ sudo nginx -t
2025/05/20 07:27:54 [warn] 3551#3551: conflicting server name "_" on 0.0.0.0:80, ignored
nginx: the configuration file /etc/nginx/nginx.conf syntax is ok
nginx: configuration file /etc/nginx/nginx.conf test is successful
ubuntu@ip-172-31-95-84:/opt/deployment/react$ sudo systemctl restart nginx
ubuntu@ip-172-31-95-84:/opt/deployment/react$
```

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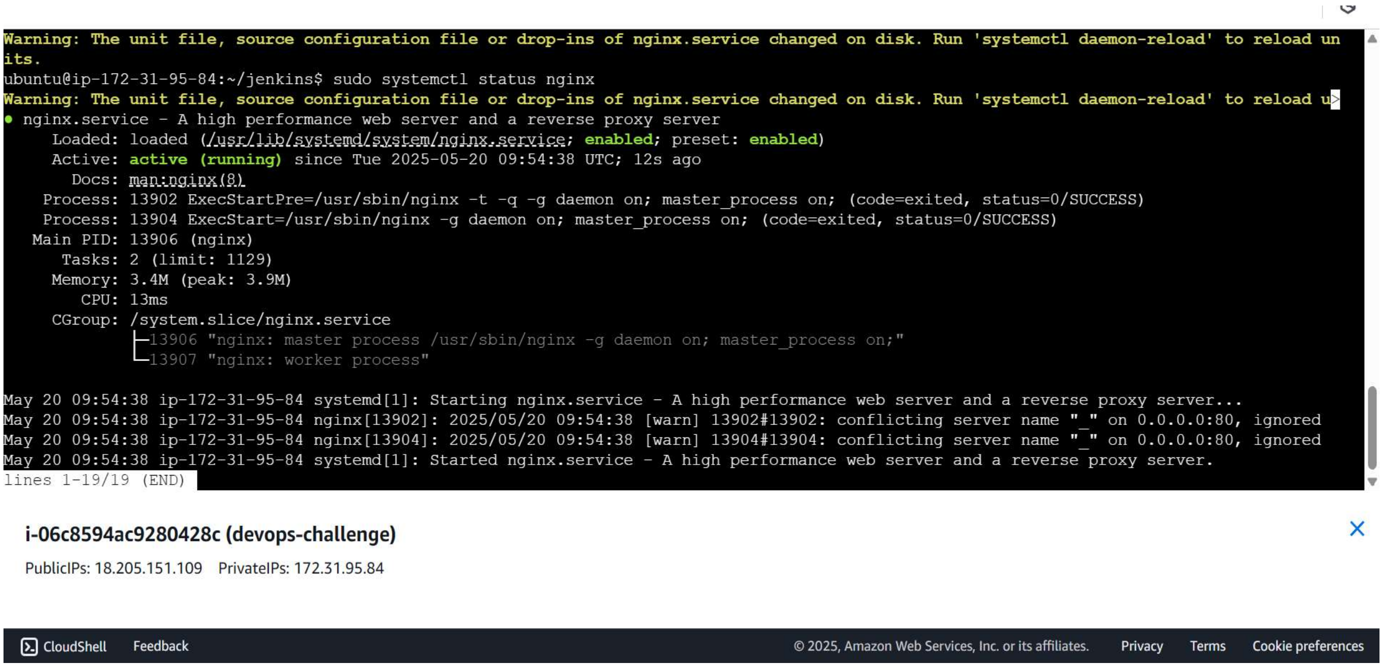
Nginx-running-status:



```
Warning: The unit file, source configuration file or drop-ins of nginx.service changed on disk. Run 'systemctl daemon-reload' to reload un
its.
ubuntu@ip-172-31-95-84:~/jenkins$ sudo systemctl status nginx
Warning: The unit file, source configuration file or drop-ins of nginx.service changed on disk. Run 'systemctl daemon-reload' to reload u>
● nginx.service - A high performance web server and a reverse proxy server
     Loaded: loaded (/usr/lib/systemd/system/nginx.service; enabled; preset: enabled)
     Active: active (running) since Tue 2025-05-20 09:54:38 UTC; 12s ago
       Docs: man:nginx(8)
    Process: 13902 ExecStartPre=/usr/sbin/nginx -t -q -g daemon on; master_process on; (code=exited, status=0/SUCCESS)
    Process: 13904 ExecStart=/usr/sbin/nginx -g daemon on; master_process on; (code=exited, status=0/SUCCESS)
   Main PID: 13906 (nginx)
      Tasks: 2 (limit: 1129)
     Memory: 3.4M (peak: 3.9M)
        CPU: 13ms
     CGroup: /system.slice/nginx.service
             ├─13906 "nginx: master process /usr/sbin/nginx -g daemon on; master_process on;"
             └─13907 "nginx: worker process"

May 20 09:54:38 ip-172-31-95-84 systemd[1]: Starting nginx.service - A high performance web server and a reverse proxy server...
May 20 09:54:38 ip-172-31-95-84 nginx[13902]: 2025/05/20 09:54:38 [warn] 13902#13902: conflicting server name "_" on 0.0.0.0:80, ignored
May 20 09:54:38 ip-172-31-95-84 nginx[13904]: 2025/05/20 09:54:38 [warn] 13904#13904: conflicting server name "_" on 0.0.0.0:80, ignored
May 20 09:54:38 ip-172-31-95-84 systemd[1]: Started nginx.service - A high performance web server and a reverse proxy server.
lines 1-19/19 (END)
```

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Part 4: Install and Configure Jenkins

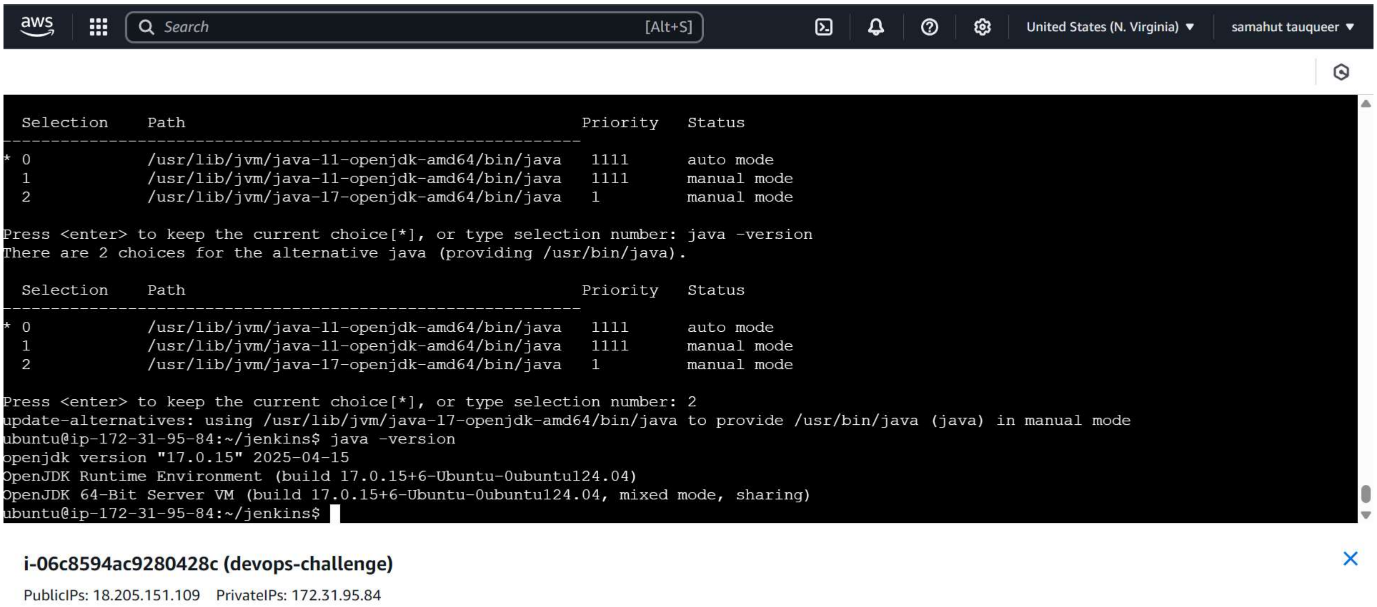
Step 4.1: Install Jenkins

- Installed Jenkins on the same EC2 instance:

commands used:

- sudo apt update
- sudo apt install openjdk-17-jdk -y
- java -version

Selected Java 17 manually. :



```
  Selection    Path                                         Priority   Status
------------------------------------------------------------
* 0            /usr/lib/jvm/java-11-openjdk-amd64/bin/java   1111      auto mode
  1            /usr/lib/jvm/java-11-openjdk-amd64/bin/java   1111      manual mode
  2            /usr/lib/jvm/java-17-openjdk-amd64/bin/java   1         manual mode

Press <enter> to keep the current choice[*], or type selection number: java -version
There are 2 choices for the alternative java (providing /usr/bin/java).

  Selection    Path                                         Priority   Status
------------------------------------------------------------
* 0            /usr/lib/jvm/java-11-openjdk-amd64/bin/java   1111      auto mode
  1            /usr/lib/jvm/java-11-openjdk-amd64/bin/java   1111      manual mode
  2            /usr/lib/jvm/java-17-openjdk-amd64/bin/java   1         manual mode

Press <enter> to keep the current choice[*], or type selection number: 2
update-alternatives: using /usr/lib/jvm/java-17-openjdk-amd64/bin/java to provide /usr/bin/java (java) in manual mode
ubuntu@ip-172-31-95-84:~/jenkins$ java -version
openjdk version "17.0.15" 2025-04-15
OpenJDK Runtime Environment (build 17.0.15+6-Ubuntu-0ubuntu124.04)
OpenJDK 64-Bit Server VM (build 17.0.15+6-Ubuntu-0ubuntu124.04, mixed mode, sharing)
ubuntu@ip-172-31-95-84:~/jenkins$
```

i-06c8594ac9280428c (devops-challenge)

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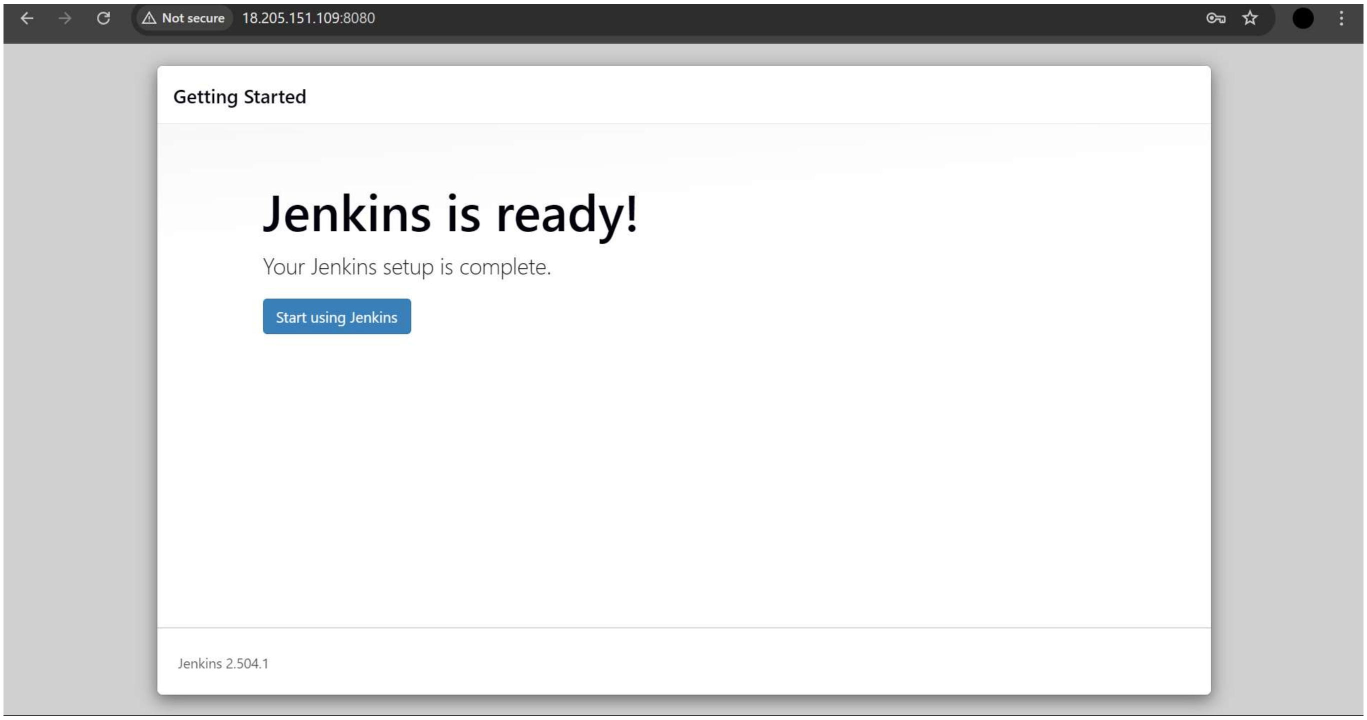
Installed Jenkins and unlocked initial setup:



Getting Started

Jenkins is ready!

Your Jenkins setup is complete.

Start using Jenkins

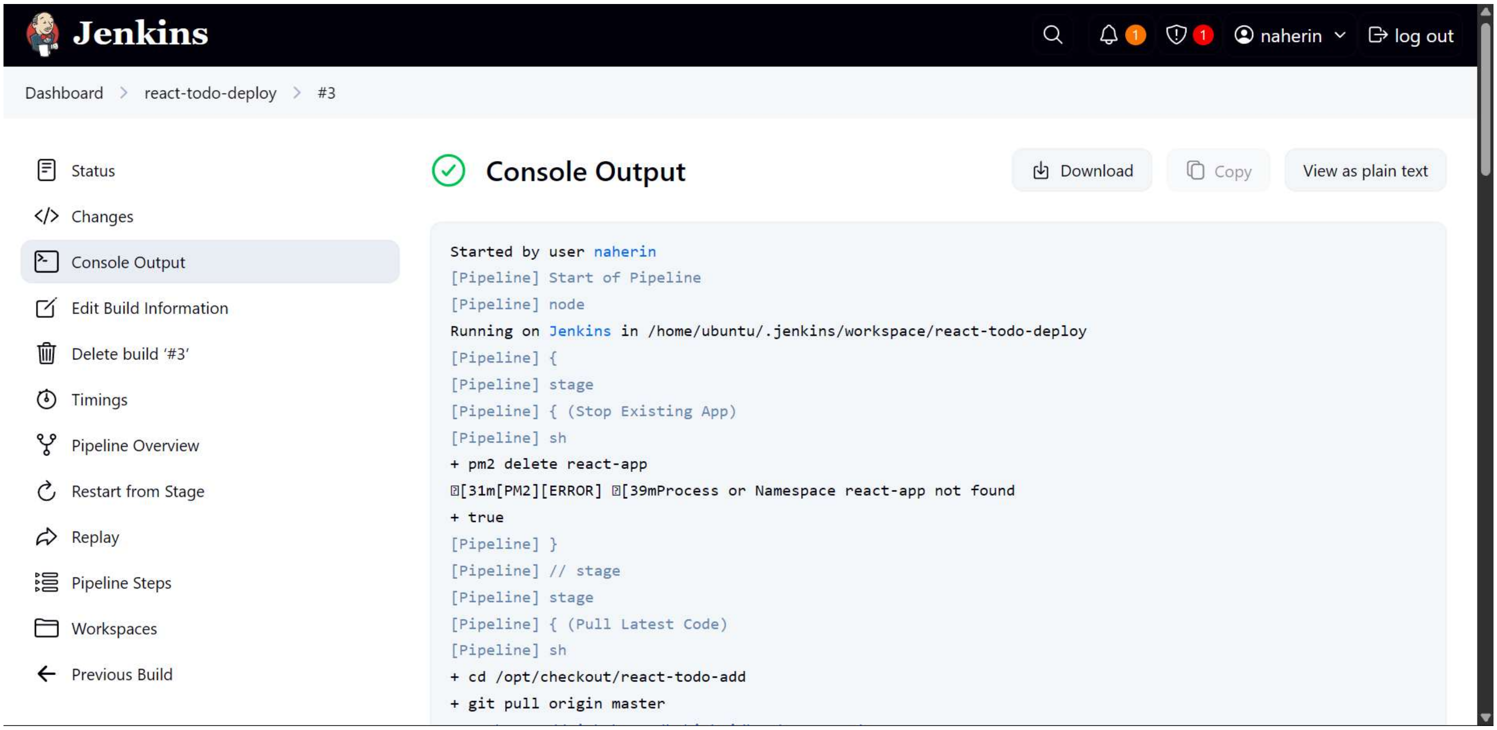
Jenkins 2.504.1

Step 4.2: Setup CI/CD Pipeline

- Configured a new Jenkins pipeline.
- Wrote Jenkinsfile to pull code, build it, and deploy using PM2.

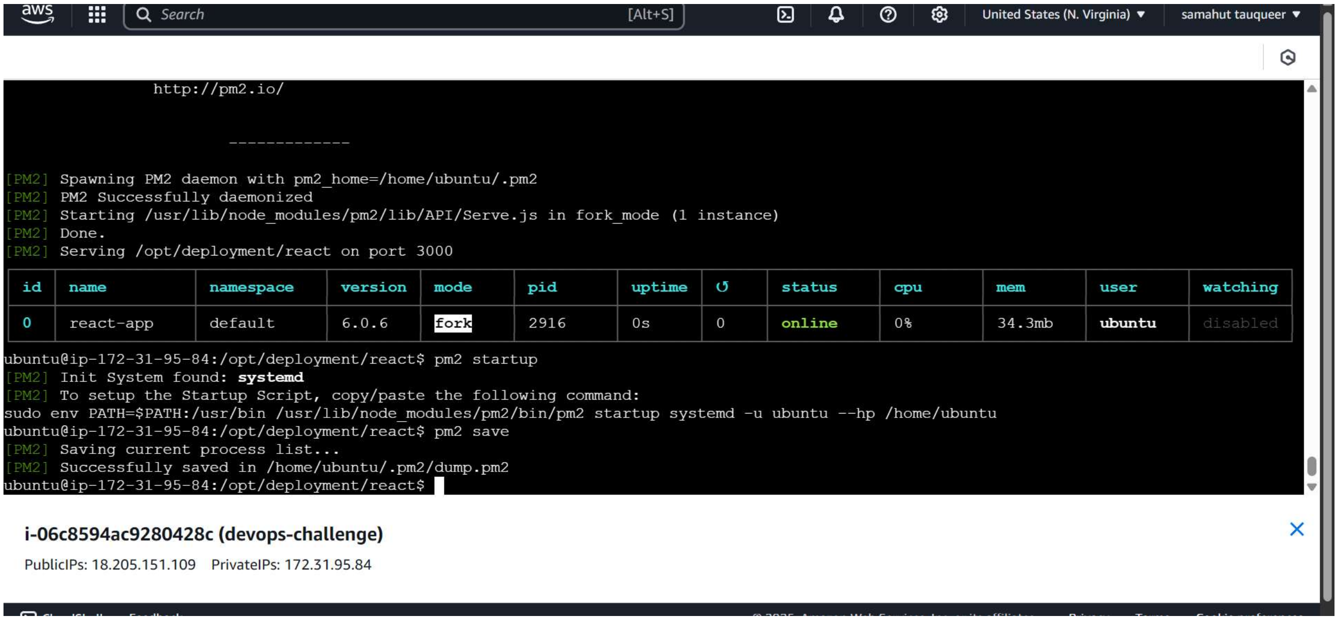
  Commands:
  pm2 serve /opt/deployment/react 3000 --spa --name react-app
- pm2 save

pipeline all stages success:



```
Started by user naherin
[Pipeline] Start of Pipeline
[Pipeline] node
Running on Jenkins in /home/ubuntu/.jenkins/workspace/react-todo-deploy
[Pipeline] {
[Pipeline] stage
[Pipeline] { (Stop Existing App)
[Pipeline] sh
+ pm2 delete react-app
⍰[31m[PM2][ERROR] ⍰[39mProcess or Namespace react-app not found
+ true
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Pull Latest Code)
[Pipeline] sh
+ cd /opt/checkout/react-todo-add
+ git pull origin master
```

pm2 deployed:



```
                http://pm2.io/


                        -------------

[PM2] Spawning PM2 daemon with pm2_home=/home/ubuntu/.pm2
[PM2] PM2 Successfully daemonized
[PM2] Starting /usr/lib/node_modules/pm2/lib/API/Serve.js in fork_mode (1 instance)
[PM2] Done.
[PM2] Serving /opt/deployment/react on port 3000
┌────┬───────────┬───────────┬─────────┬──────────┬──────────┬────────┬───┬──────────┬──────────┬──────────┬──────────┬──────────┐
│ id │ name      │ namespace │ version │ mode     │ pid      │ uptime │ ↺ │ status   │ cpu      │ mem      │ user     │ watching │
├────┼───────────┼───────────┼─────────┼──────────┼──────────┼────────┼───┼──────────┼──────────┼──────────┼──────────┼──────────┤
│ 0  │ react-app │ default   │ 6.0.6   │ fork     │ 2916     │ 0s     │ 0 │ online   │ 0%       │ 34.3mb   │ ubuntu   │ disabled │
└────┴───────────┴───────────┴─────────┴──────────┴──────────┴────────┴───┴──────────┴──────────┴──────────┴──────────┴──────────┘
ubuntu@ip-172-31-95-84:/opt/deployment/react$ pm2 startup
[PM2] Init System found: systemd
[PM2] To setup the Startup Script, copy/paste the following command:
sudo env PATH=$PATH:/usr/bin /usr/lib/node_modules/pm2/bin/pm2 startup systemd -u ubuntu --hp /home/ubuntu
ubuntu@ip-172-31-95-84:/opt/deployment/react$ pm2 save
[PM2] Saving current process list...
[PM2] Successfully saved in /home/ubuntu/.pm2/dump.pm2
ubuntu@ip-172-31-95-84:/opt/deployment/react$
```

i-06c8594ac9280428c (devops-challenge)

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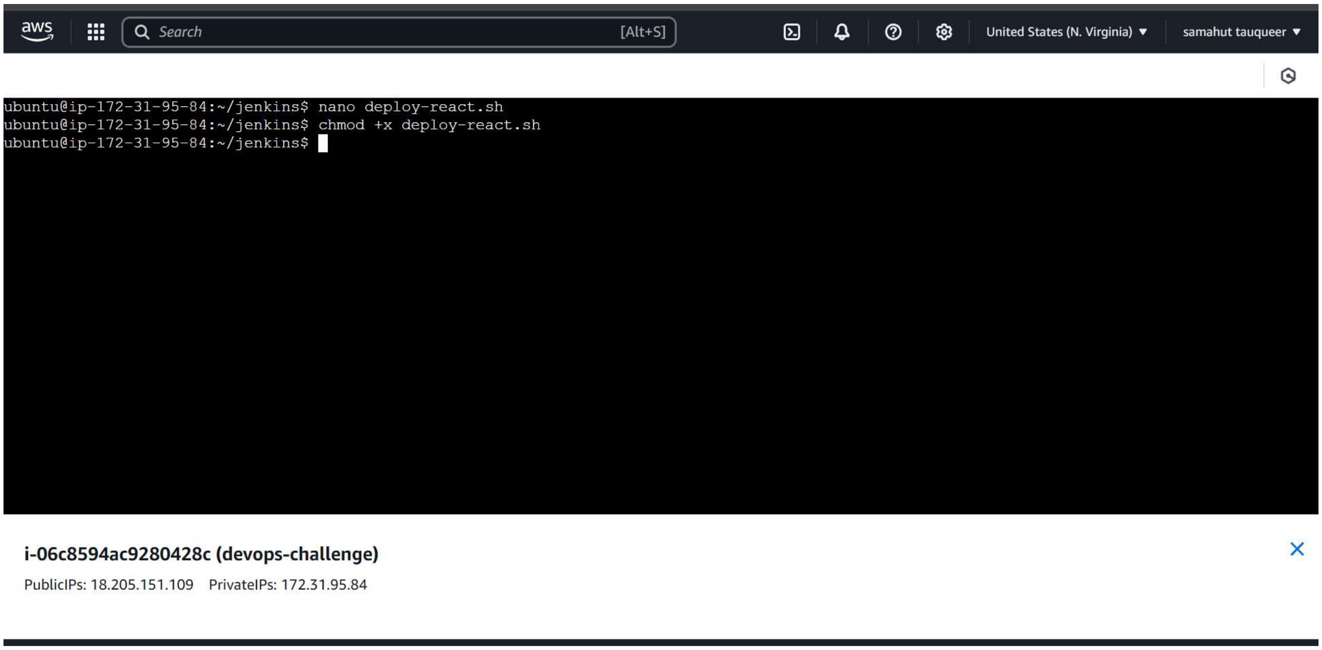
Part 5: Shell Script Automation

- Wrote a shell script (`java.sh`) to:
  - Update system
  - Install Java
  - Check Java version

Commands Used:

- `chmod +x java.sh`
- `./java.sh`

script_permission_set. :



```
ubuntu@ip-172-31-95-84:~/jenkins$ nano deploy-react.sh
ubuntu@ip-172-31-95-84:~/jenkins$ chmod +x deploy-react.sh
ubuntu@ip-172-31-95-84:~/jenkins$ 
```

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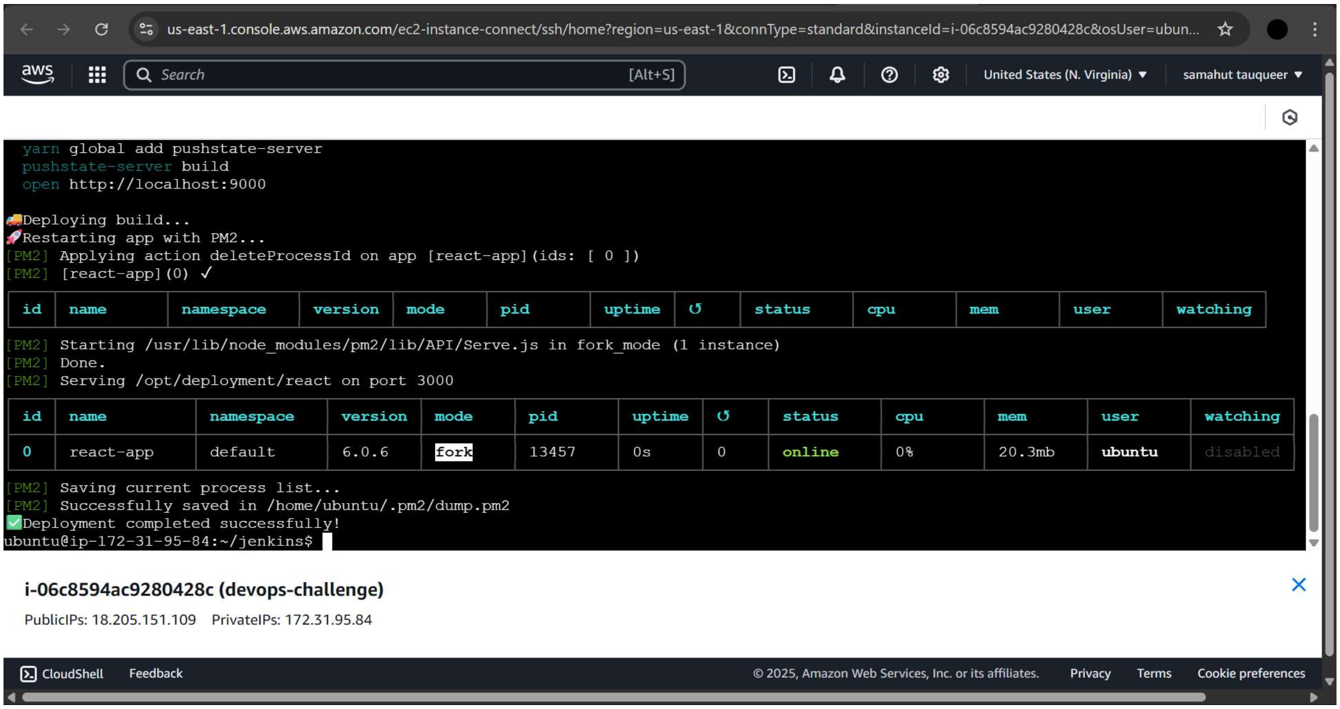
- script run success:


us-east-1.console.aws.amazon.com/ec2-instance-connect/ssh/home?region=us-east-1&connType=standard&instanceId=i-06c8594ac9280428c&osUser=ubun...
aws
Search
[Alt+S]
United States (N. Virginia) ▼
samahut tauqueer ▼
CloudShell
Feedback
© 2025, Amazon Web Services, Inc. or its affiliates.
Privacy
Terms
Cookie preferences

```
  yarn global add pushstate-server
  pushstate-server build
  open http://localhost:9000

🚚Deploying build...
🚀Restarting app with PM2...
[PM2] Applying action deleteProcessId on app [react-app](ids: [ 0 ])
[PM2] [react-app](0) ✓
│ id │ name      │ namespace  │ version │ mode   │ pid      │ uptime │ ↺    │ status    │ cpu      │ mem      │ user     │ watching │
[PM2] Starting /usr/lib/node_modules/pm2/lib/API/Serve.js in fork_mode (1 instance)
[PM2] Done.
[PM2] Serving /opt/deployment/react on port 3000
│ id │ name         │ namespace  │ version │ mode   │ pid      │ uptime │ ↺    │ status    │ cpu      │ mem      │ user     │ watching │
│ 0  │ react-app    │ default    │ 6.0.6   │ fork   │ 13457    │ 0s     │ 0    │ online    │ 0%       │ 20.3mb   │ ubuntu   │ disabled │
[PM2] Saving current process list...
[PM2] Successfully saved in /home/ubuntu/.pm2/dump.pm2
✅Deployment completed successfully!
ubuntu@ip-172-31-95-84:~/jenkins$ 
```

i-06c8594ac9280428c (devops-challenge)

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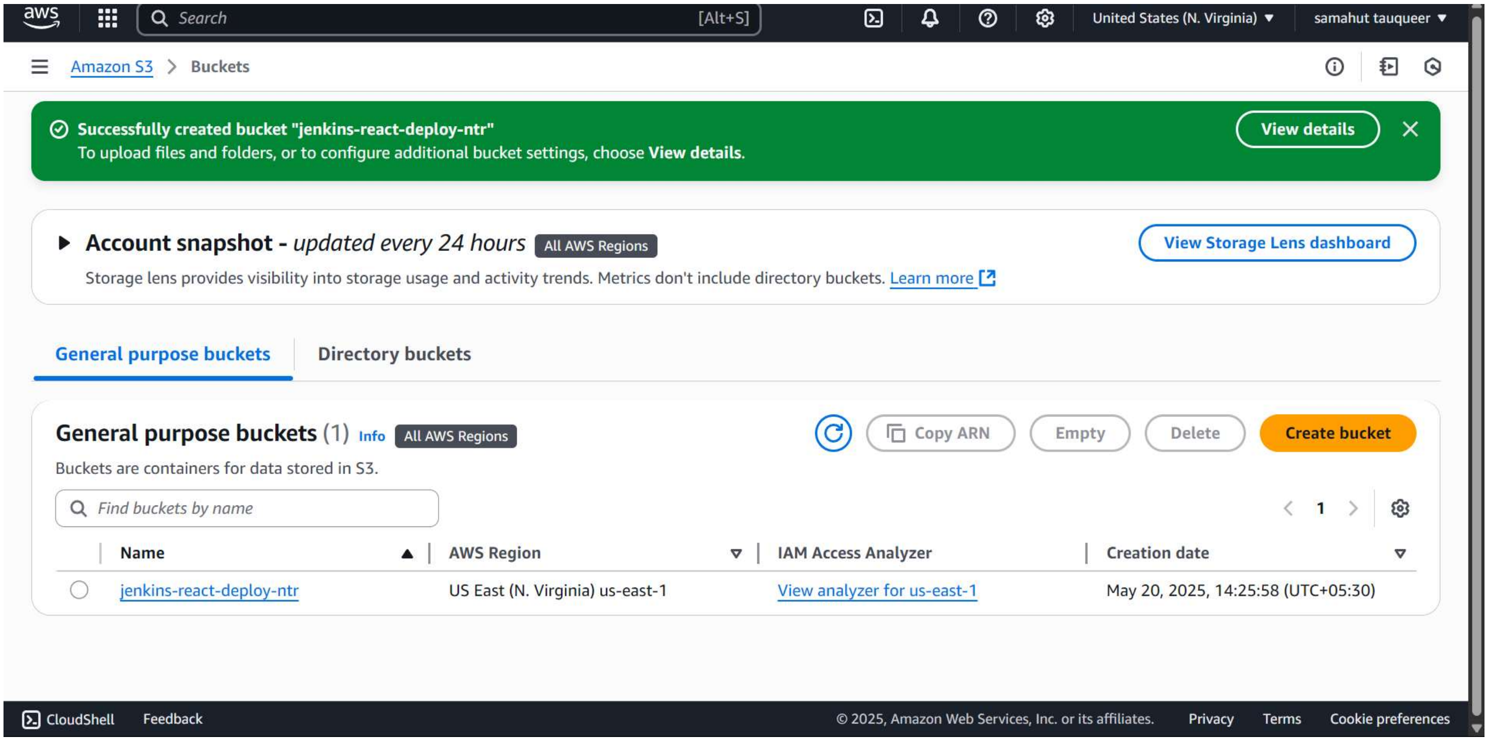
Part 6: S3 Upload from Jenkins

Step 6.1: Create S3 Bucket

- Created a new S3 bucket named appropriately.

S3 bucket-created:



Successfully created bucket "jenkins-react-deploy-ntr"
To upload files and folders, or to configure additional bucket settings, choose **View details**.

Account snapshot - *updated every 24 hours* All AWS Regions
Storage lens provides visibility into storage usage and activity trends. Metrics don't include directory buckets. Learn more

General purpose buckets (1) Info All AWS Regions
Buckets are containers for data stored in S3.

Find buckets by name

	Name	AWS Region	IAM Access Analyzer	Creation date
○	jenkins-react-deploy-ntr	US East (N. Virginia) us-east-1	View analyzer for us-east-1	May 20, 2025, 14:25:58 (UTC+05:30)

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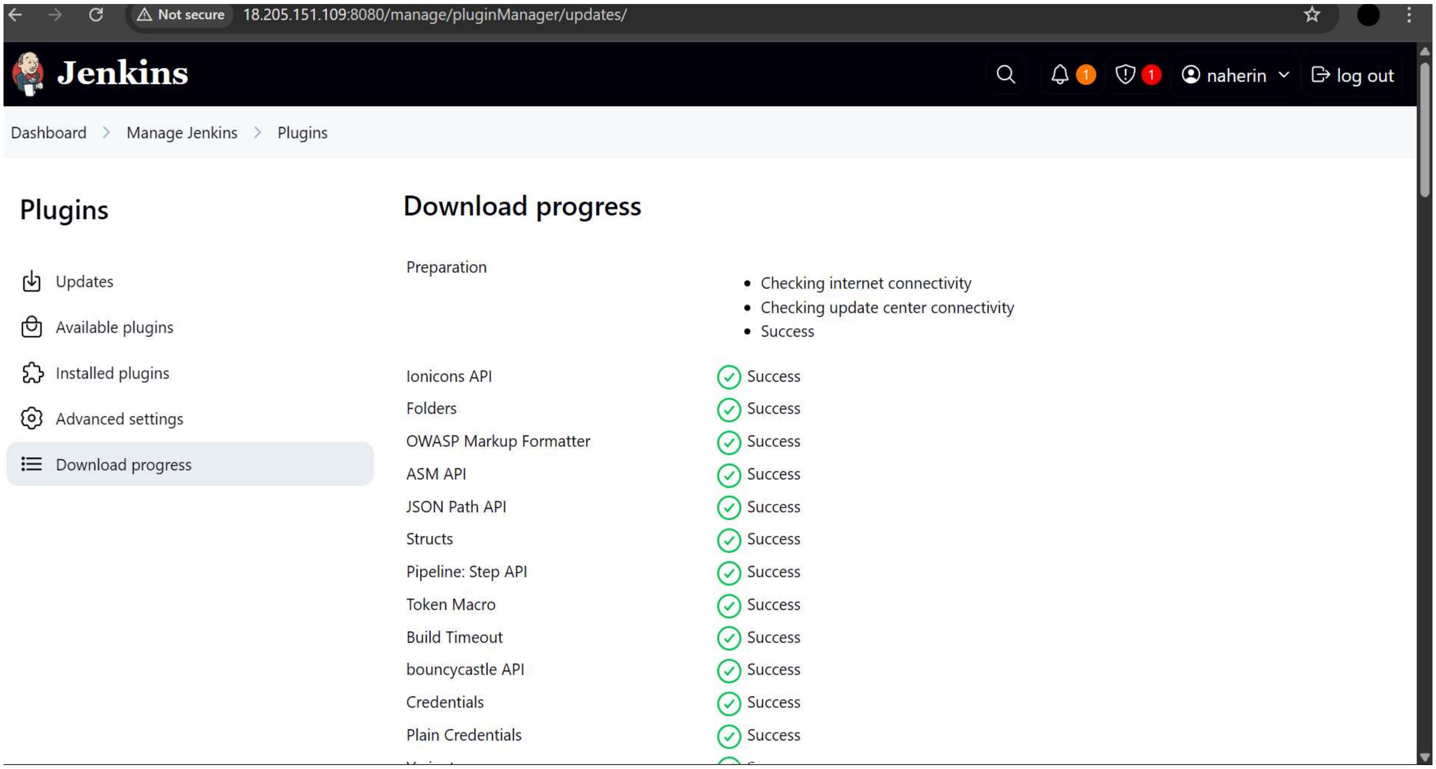
Step 6.2: Configure Jenkins for S3

- Installed Amazon S3 plugin.
- Added credentials using Access Key & Secret.

s3_plugin_done :



Plugins

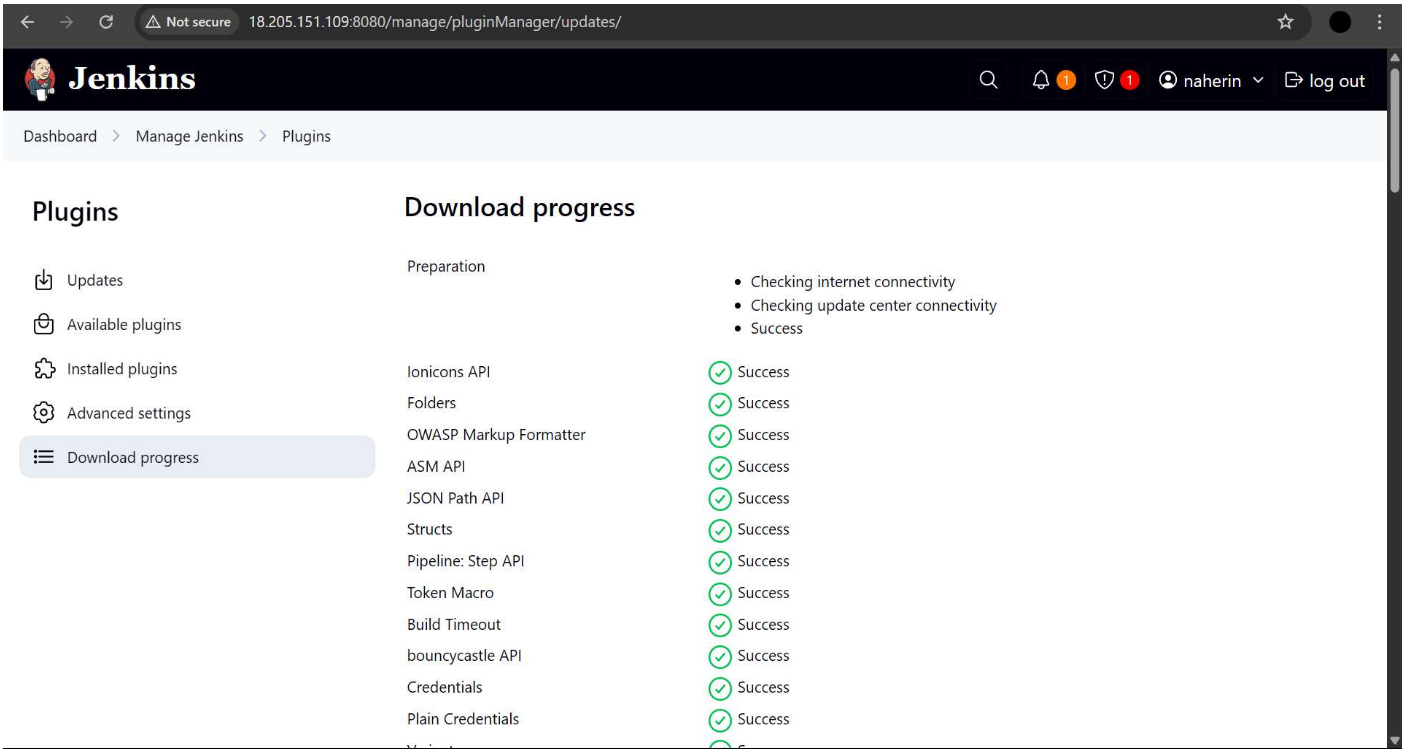
Download progress

Preparation

- Checking internet connectivity
- Checking update center connectivity
- Success

Ionicons API	✓ Success
Folders	✓ Success
OWASP Markup Formatter	✓ Success
ASM API	✓ Success
JSON Path API	✓ Success
Structs	✓ Success
Pipeline: Step API	✓ Success
Token Macro	✓ Success
Build Timeout	✓ Success
bouncycastle API	✓ Success
Credentials	✓ Success
Plain Credentials	✓ Success

aws_credentials_plugin_installed :



Dashboard > Manage Jenkins > Plugins

Plugins

- Updates
- Available plugins
- Installed plugins
- Advanced settings
- Download progress

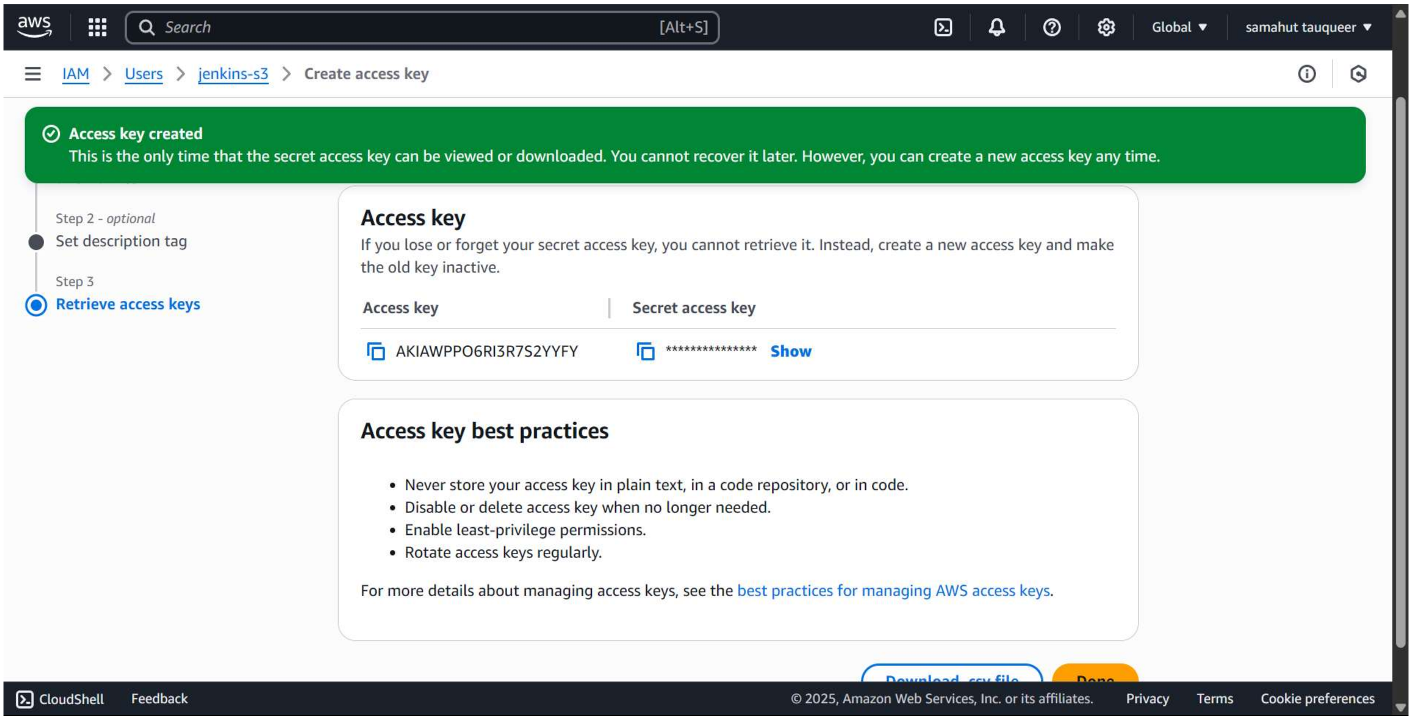
Download progress

Preparation

- Checking internet connectivity
- Checking update center connectivity
- Success

Ionicons API	✓ Success
Folders	✓ Success
OWASP Markup Formatter	✓ Success
ASM API	✓ Success
JSON Path API	✓ Success
Structs	✓ Success
Pipeline: Step API	✓ Success
Token Macro	✓ Success
Build Timeout	✓ Success
bouncycastle API	✓ Success
Credentials	✓ Success
Plain Credentials	✓ Success

access-keys-created :



IAM > Users > jenkins-s3 > Create access key

Access key created
This is the only time that the secret access key can be viewed or downloaded. You cannot recover it later. However, you can create a new access key any time.

Step 2 - *optional*
Set description tag

Step 3
Retrieve access keys

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.

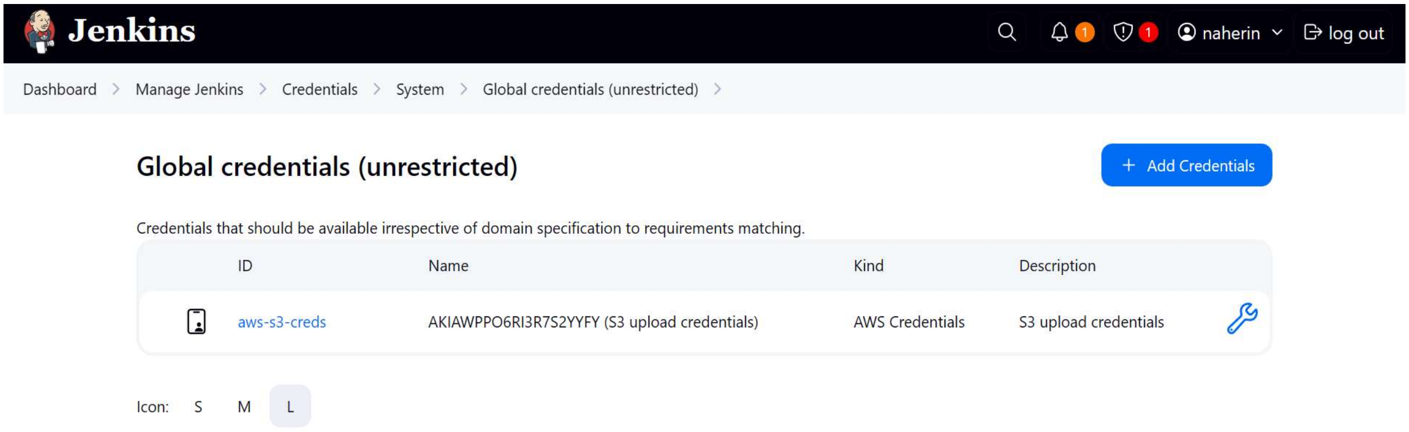
Access key	Secret access key
AKIAWPPO6RI3R7S2YYFY	*************** Show

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.

For more details about managing access keys, see the best practices for managing AWS access keys.

jenkins-s3-creds-added :


Jenkins
naherin
log out
Dashboard > Manage Jenkins > Credentials > System > Global credentials (unrestricted) >

Global credentials (unrestricted)

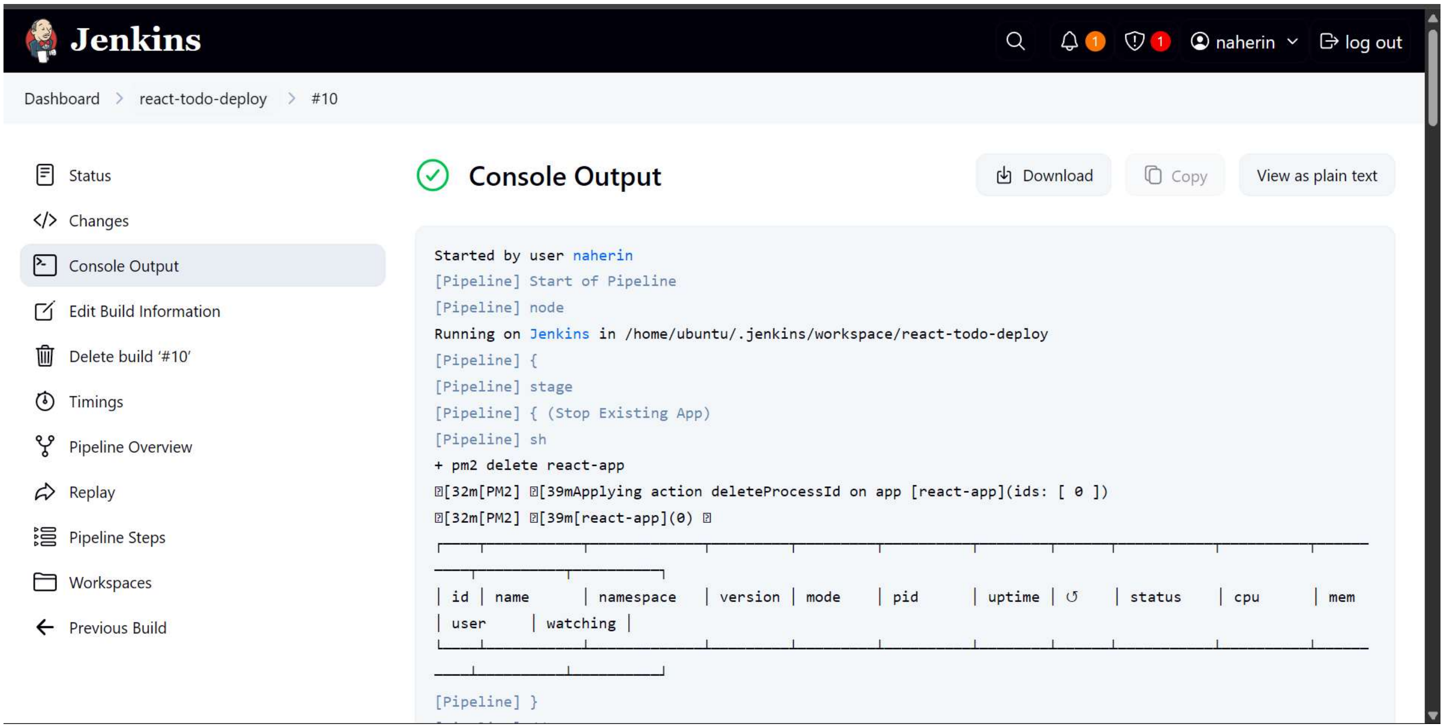
Credentials that should be available irrespective of domain specification to requirements matching.

ID	Name	Kind	Description
aws-s3-creds	AKIAWPPO6RI3R7S2YYFY (S3 upload credentials)	AWS Credentials	S3 upload credentials

Step 6.3: S3 Upload Success

- Configured Jenkins to upload files to S3 bucket.
- Verified upload.

final_s3_upload_success



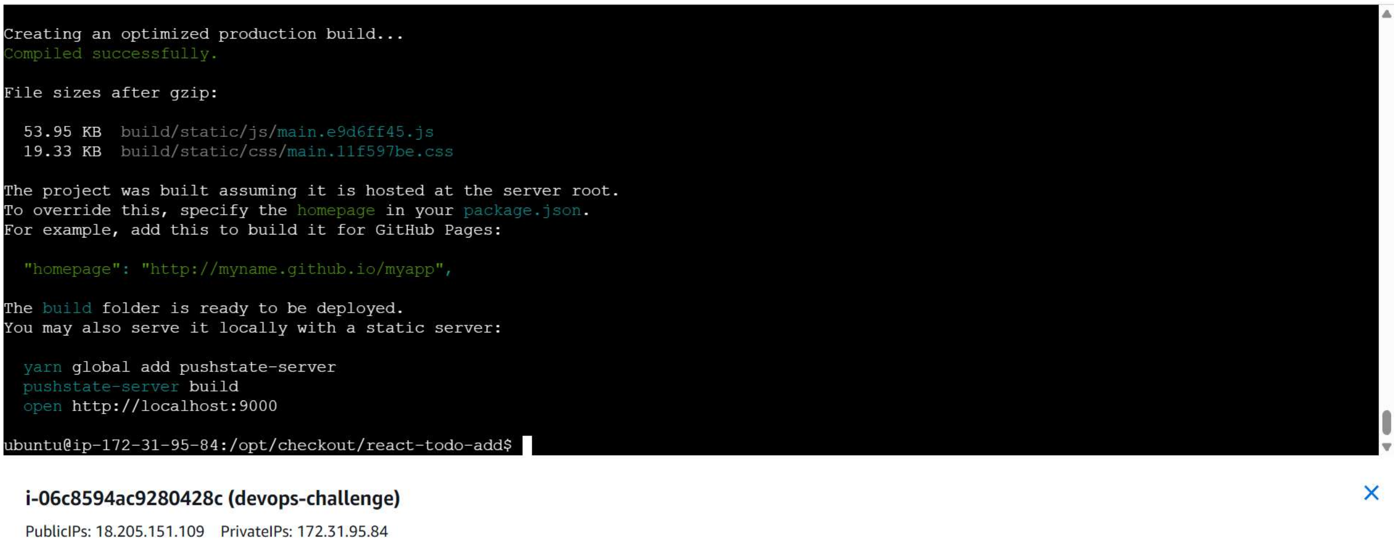
Console Output

```
Started by user naherin
[Pipeline] Start of Pipeline
[Pipeline] node
Running on Jenkins in /home/ubuntu/.jenkins/workspace/react-todo-deploy
[Pipeline] {
[Pipeline] stage
[Pipeline] { (Stop Existing App)
[Pipeline] sh
+ pm2 delete react-app
�[32m[PM2] �[39mApplying action deleteProcessId on app [react-app](ids: [ 0 ])
�[32m[PM2] �[39m[react-app](0) �
┌────┬───────────┬─────────────┬─────────┬─────────┬──────────┬────────┬──────┬───────────┬──────────┬──────────
────┬──────────┬──────────┐
│ id │ name      │ namespace   │ version │ mode    │ pid      │ uptime │ ↺    │ status    │ cpu      │ mem
│ user     │ watching │
└────┴───────────┴─────────────┴─────────┴─────────┴──────────┴────────┴──────┴───────────┴──────────┴──────────
────┴──────────┴──────────┘
[Pipeline] }
```

Final Result

- React app deployed and served via PM2.
- Nginx configured to reverse proxy to PM2 app.
- Jenkins CI/CD pipeline working with GitHub & S3 upload.
- Site is live and functional.

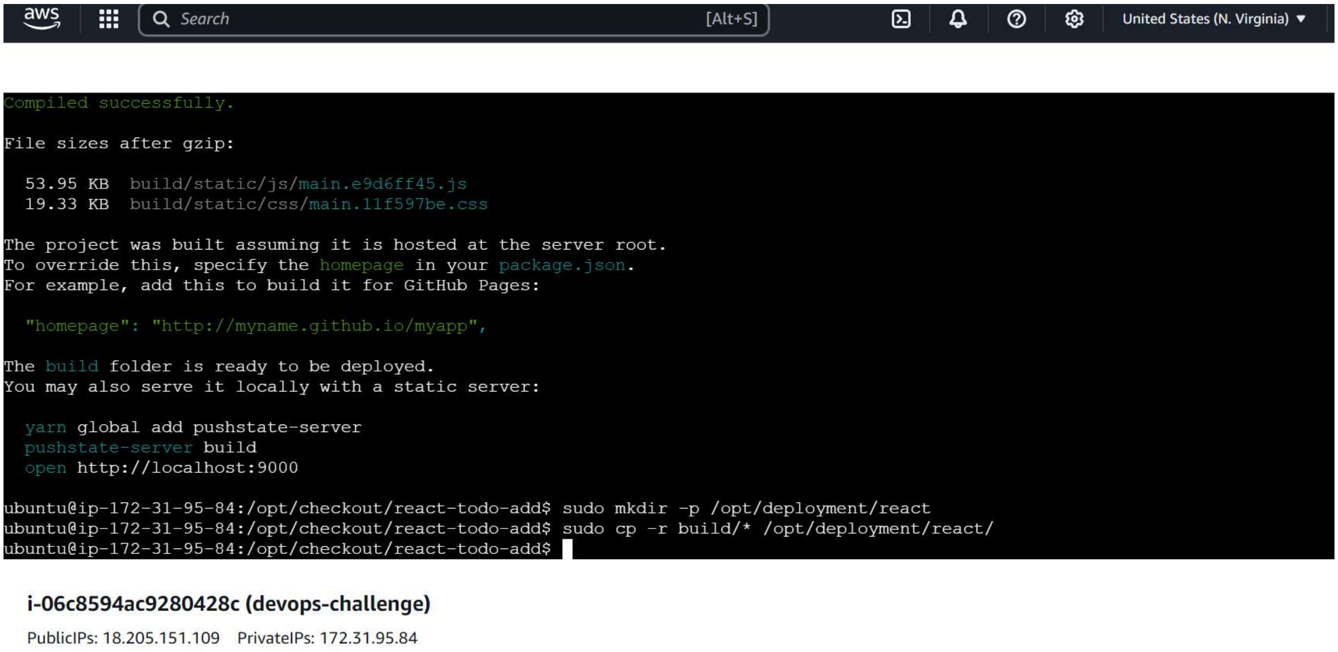
react_build:



```
Creating an optimized production build...
Compiled successfully.

File sizes after gzip:

  53.95 KB  build/static/js/main.e9d6ff45.js
  19.33 KB  build/static/css/main.11f597be.css

The project was built assuming it is hosted at the server root.
To override this, specify the homepage in your package.json.
For example, add this to build it for GitHub Pages:

  "homepage": "http://myname.github.io/myapp",

The build folder is ready to be deployed.
You may also serve it locally with a static server:

  yarn global add pushstate-server
  pushstate-server build
  open http://localhost:9000

ubuntu@ip-172-31-95-84:/opt/checkout/react-todo-add$
```

i-06c8594ac9280428c (devops-challenge)

PublicIPs: 18.205.151.109   PrivateIPs: 172.31.95.84



```
Compiled successfully.

File sizes after gzip:

  53.95 KB  build/static/js/main.e9d6ff45.js
  19.33 KB  build/static/css/main.11f597be.css

The project was built assuming it is hosted at the server root.
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  "homepage": "http://myname.github.io/myapp",

The build folder is ready to be deployed.
You may also serve it locally with a static server:

  yarn global add pushstate-server
  pushstate-server build
  open http://localhost:9000

ubuntu@ip-172-31-95-84:/opt/checkout/react-todo-add$ sudo mkdir -p /opt/deployment/react
ubuntu@ip-172-31-95-84:/opt/checkout/react-todo-add$ sudo cp -r build/* /opt/deployment/react/
ubuntu@ip-172-31-95-84:/opt/checkout/react-todo-add$ 
```
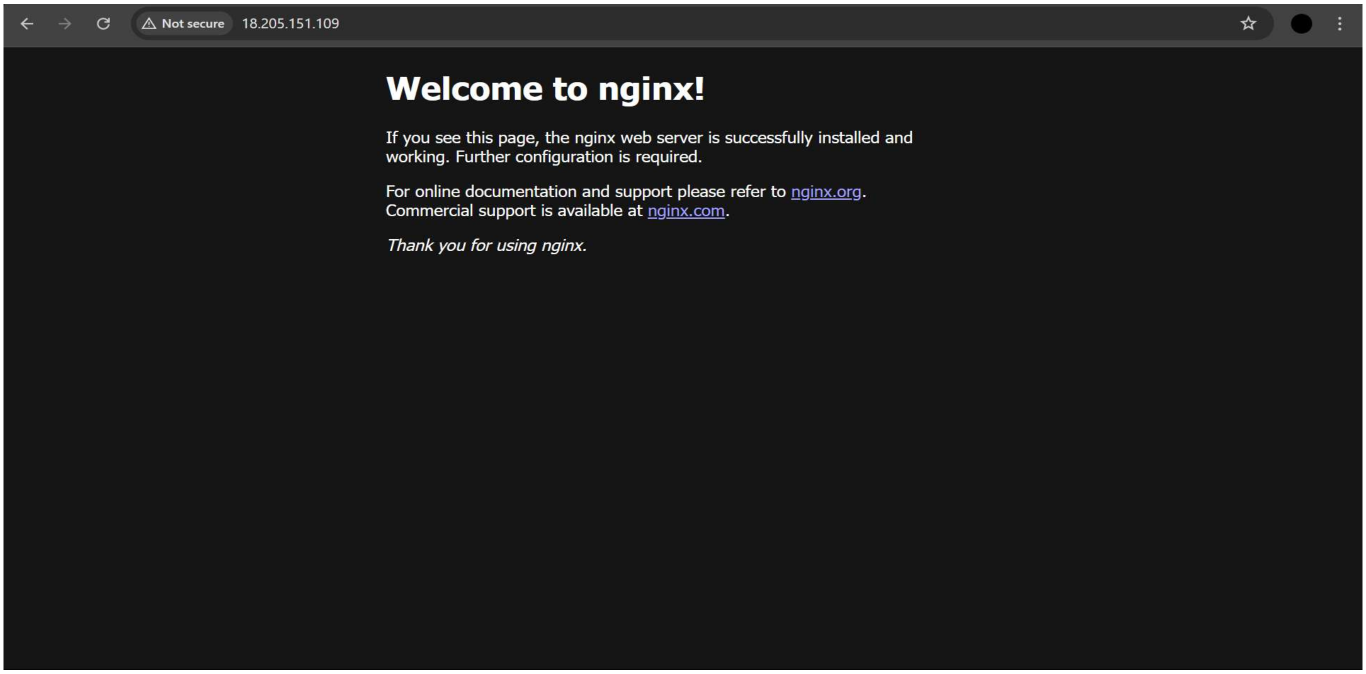

i-06c8594ac9280428c (devops-challenge)

PublicIPs: 18.205.151.109   PrivateIPs: 172.31.95.84

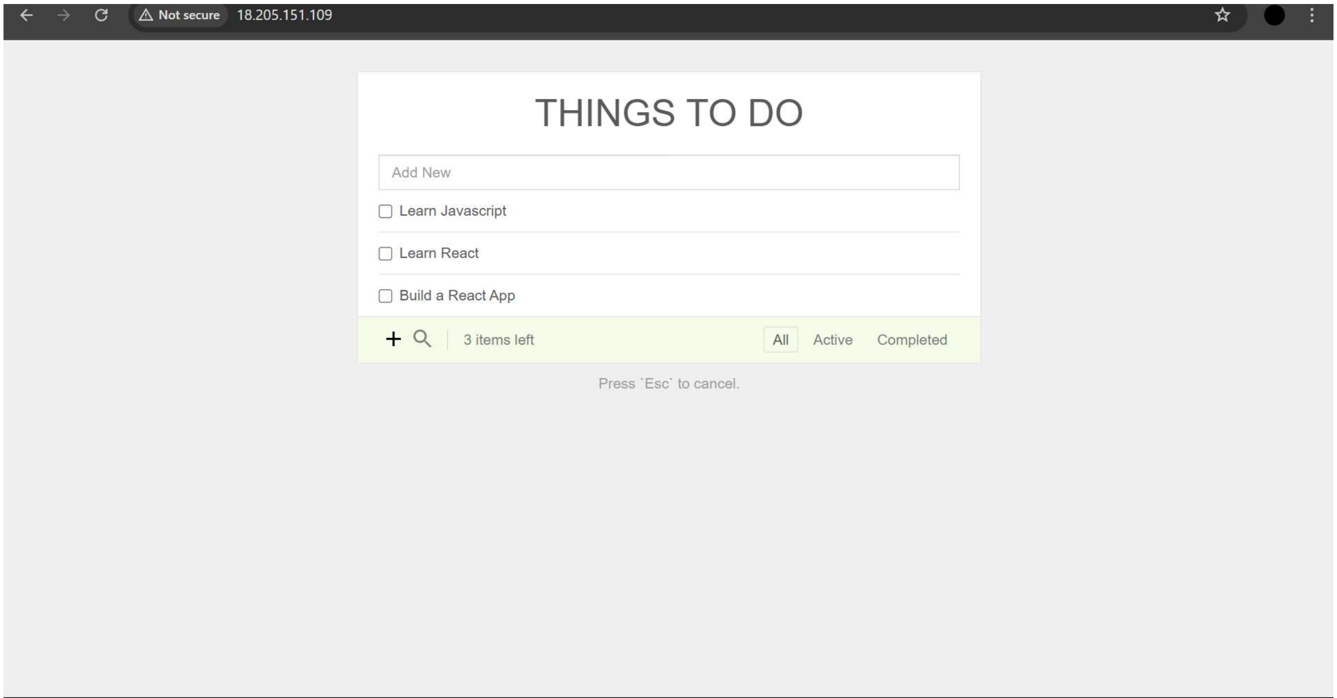


Welcome to nginx!

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.



THINGS TO DO

□ Learn Javascript

□ Learn React

□ Build a React App

3 items left

Press `Esc` to cancel.