DevOps Pipeline Case Study

PHASE 1

1.Creating file structure

cd "/Users/varshitanukala/Documents/Capgemini internship/case studies/2"

mkdir -p devops-nodejs-pipeline/myapp/src

mkdir devops-nodejs-pipeline/infra

mkdir devops-nodejs-pipeline/ansible

mkdir devops-nodejs-pipeline/scripts

touch devops-nodejs-pipeline/myapp/Jenkinsfile

touch devops-nodejs-pipeline/myapp/src/index.js

touch devops-nodejs-pipeline/infra/main.tf

touch devops-nodejs-pipeline/infra/variables.tf

touch devops-nodejs-pipeline/ansible/deploy.yml

touch devops-nodejs-pipeline/ansible/hosts.ini

touch devops-nodejs-pipeline/scripts/build_and_push.sh

touch devops-nodejs-pipeline/scripts/cleanup.sh

touch devops-nodejs-pipeline/REPORT.md

Step 1: Git & GitHub Workflow

1. New Repository
    - Name: devops-nodejs-pipeline
    - Description: End-to-end CI/CD pipeline using Docker, Jenkins, Ansible, Terraform, AWS

- URL: https://github.com/nukalavarshita/devops-nodejs-pipeline.git

2. GIT

cd "/Users/varshitanukala/Documents/Capgemini internship/case studies/2/devops-nodejs-pipeline"

git init

git remote add origin https://github.com/nukalavarshita/devops-nodejs-pipeline.git

git add .

git commit -m "Initial project structure"

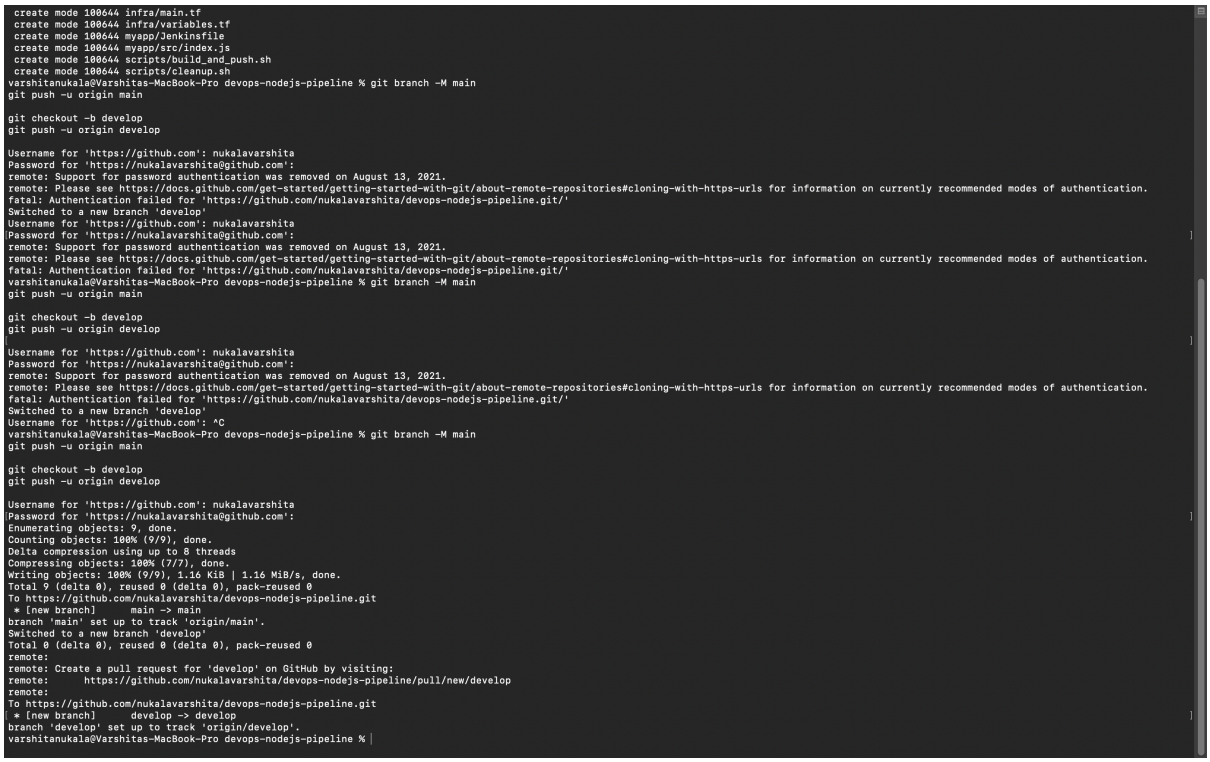
git branch -M main

git push -u origin main

git checkout -b develop

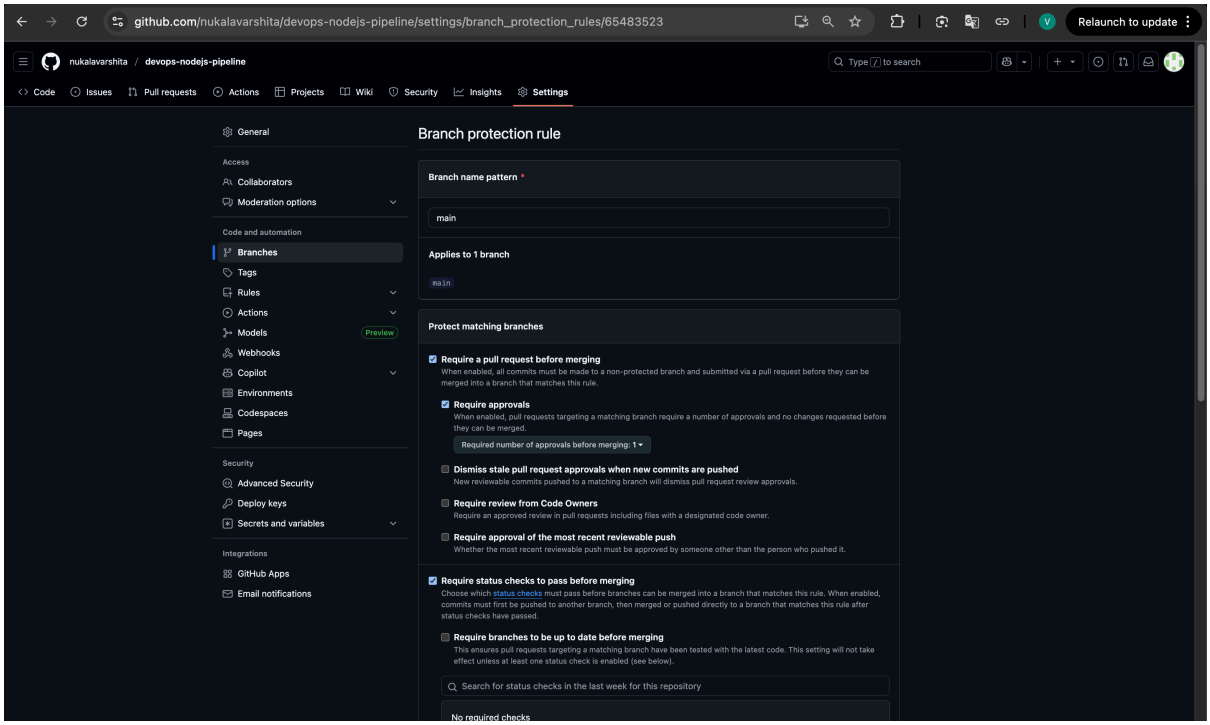
git push -u origin develop

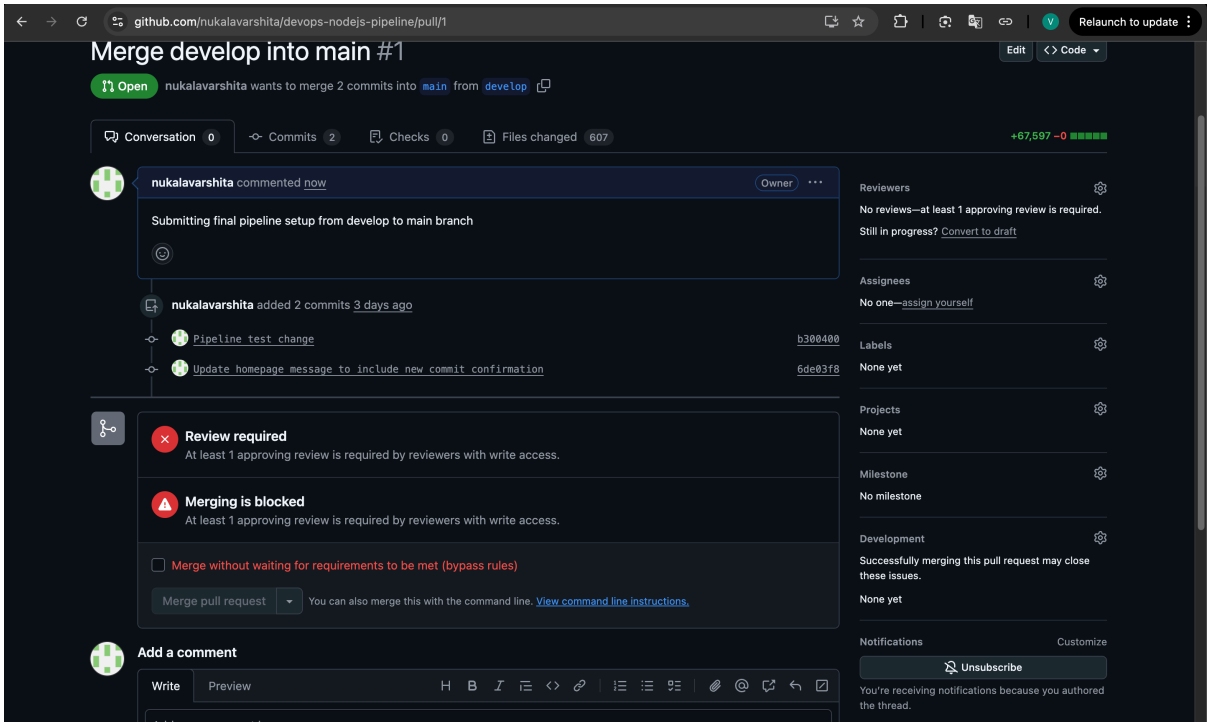
```
varshitanukala@Varshitas-MacBook-Pro ~ % cd "/Users/varshitanukala/Documents/Capgemini internship/case studies/2"
mkdir -p devops-nodejs-pipeline/myapp/src
mkdir devops-nodejs-pipeline/infra
mkdir devops-nodejs-pipeline/ansible
mkdir devops-nodejs-pipeline/scripts

touch devops-nodejs-pipeline/myapp/Jenkinsfile
touch devops-nodejs-pipeline/myapp/src/index.js
touch devops-nodejs-pipeline/infra/main.tf
touch devops-nodejs-pipeline/infra/variables.tf
touch devops-nodejs-pipeline/ansible/deploy.yml
touch devops-nodejs-pipeline/ansible/hosts.ini
touch devops-nodejs-pipeline/scripts/build_and_push.sh
touch devops-nodejs-pipeline/scripts/cleanup.sh
touch devops-nodejs-pipeline/REPORT.md

varshitanukala@Varshitas-MacBook-Pro 2 % cd "/Users/varshitanukala/Documents/Capgemini internship/case studies/2/devops-nodejs-pipeline"
git init

Reinitialized existing Git repository in /Users/varshitanukala/Documents/Capgemini internship/case studies/2/devops-nodejs-pipeline/.git/
varshitanukala@Varshitas-MacBook-Pro devops-nodejs-pipeline % git init
Reinitialized existing Git repository in /Users/varshitanukala/Documents/Capgemini internship/case studies/2/devops-nodejs-pipeline/.git/
varshitanukala@Varshitas-MacBook-Pro devops-nodejs-pipeline % git remote add origin https://github.com/nukalavarshita/devops-nodejs-pipeline.git

varshitanukala@Varshitas-MacBook-Pro devops-nodejs-pipeline % git add .
git commit -m "Initial project structure"

[main (root-commit) 273048b] Initial project structure
 10 files changed, 0 insertions(+), 0 deletions(-)
 create mode 100644 .DS_Store
 create mode 100644 REPORT.md
 create mode 100644 ansible/deploy.yml
 create mode 100644 ansible/hosts.ini
 create mode 100644 infra/main.tf
 create mode 100644 infra/variables.tf
 create mode 100644 myapp/Jenkinsfile
 create mode 100644 myapp/src/index.js
 create mode 100644 scripts/build_and_push.sh
 create mode 100644 scripts/cleanup.sh
```

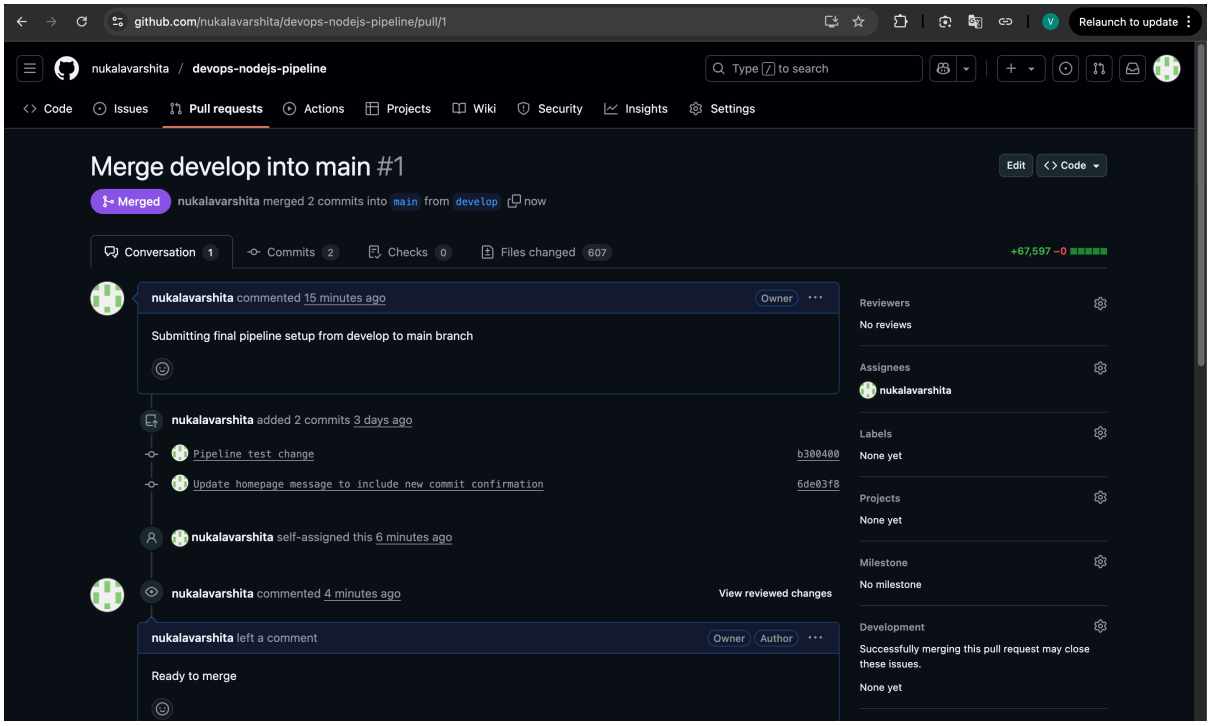


3. Protect `main` branch (via GitHub Web UI)

- Go to your repo → Settings → Branches → Add protection rule:
  - Branch: `main`
  - Require pull request before merging
  - Require at least 1 approving review


github.com/nukalavarshita/devops-nodejs-pipeline/settings/branch_protection_rules/65483523
Relaunch to update
nukalavarshita / devops-nodejs-pipeline
Code
Issues
Pull requests
Actions
Projects
Wiki
Security
Insights
Settings
General
Access
Collaborators
Moderation options
Code and automation
Branches
Tags
Rules
Actions
Models
Preview
Webhooks
Copilot
Environments
Codespaces
Pages
Security
Advanced Security
Deploy keys
Secrets and variables
Integrations
GitHub Apps
Email notifications
Branch protection rule
Branch name pattern *
main
Applies to 1 branch
main
Protect matching branches
Require a pull request before merging
When enabled, all commits must be made to a non-protected branch and submitted via a pull request before they can be merged into a branch that matches this rule.
Require approvals
When enabled, pull requests targeting a matching branch require a number of approvals and no changes requested before they can be merged.
Required number of approvals before merging: 1
Dismiss stale pull request approvals when new commits are pushed
New reviewable commits pushed to a matching branch will dismiss pull request review approvals.
Require review from Code Owners
Require an approved review in pull requests including files with a designated code owner.
Require approval of the most recent reviewable push
Whether the most recent reviewable push must be approved by someone other than the person who pushed it.
Require status checks to pass before merging
Choose which status checks must pass before branches can be merged into a branch that matches this rule. When enabled, commits must first be pushed to another branch, then merged or pushed directly to a branch that matches this rule after status checks have passed.
Require branches to be up to date before merging
This ensures pull requests targeting a matching branch have been tested with the latest code. This setting will not take effect unless at least one status check is enabled (see below).
Search for status checks in the last week for this repository
No required checks


github.com/nukalavarshita/devops-nodejs-pipeline/pull/1
Relaunch to update
Merge develop into main #1
Edit
Code
Open
nukalavarshita wants to merge 2 commits into main from develop
Conversation 0
Commits 2
Checks 0
Files changed 607
+67,597 −0
nukalavarshita commented now
Owner
Submitting final pipeline setup from develop to main branch
nukalavarshita added 2 commits 3 days ago
Pipeline test change
b300400
Update homepage message to include new commit confirmation
6de03f8
Review required
At least 1 approving review is required by reviewers with write access.
Merging is blocked
At least 1 approving review is required by reviewers with write access.
Merge without waiting for requirements to be met (bypass rules)
Merge pull request
You can also merge this with the command line. View command line instructions.
Add a comment
Write
Preview
Reviewers
No reviews—at least 1 approving review is required.
Still in progress? Convert to draft
Assignees
No one—assign yourself
Labels
None yet
Projects
None yet
Milestone
No milestone
Development
Successfully merging this pull request may close these issues.
None yet
Notifications
Customize
Unsubscribe
You're receiving notifications because you authored the thread.


github.com/nukalavarshita/devops-nodejs-pipeline/pull/1
Relaunch to update
nukalavarshita / devops-nodejs-pipeline
Type / to search
Code
Issues
Pull requests
Actions
Projects
Wiki
Security
Insights
Settings
Merge develop into main #1
Edit
Code
Merged
nukalavarshita merged 2 commits into main from develop now
Conversation 1
Commits 2
Checks 0
Files changed 607
+67,597 −0
nukalavarshita commented 15 minutes ago
Owner
Submitting final pipeline setup from develop to main branch
nukalavarshita added 2 commits 3 days ago
Pipeline test change
b300400
Update homepage message to include new commit confirmation
6de03f8
nukalavarshita self-assigned this 6 minutes ago
nukalavarshita commented 4 minutes ago
View reviewed changes
nukalavarshita left a comment
Owner
Author
Ready to merge
Reviewers
No reviews
Assignees
nukalavarshita
Labels
None yet
Projects
None yet
Milestone
No milestone
Development
Successfully merging this pull request may close these issues.
None yet

Node.js App (`myapp/src/index.js`)

index.js

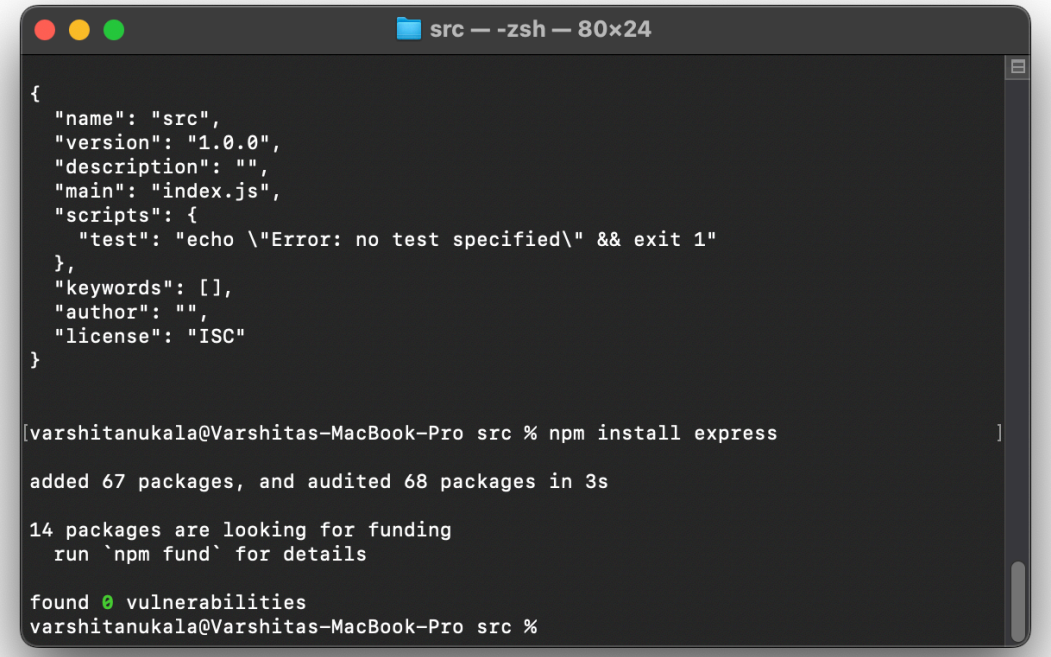
```
const express = require('express');
const app = express();

app.get('/', (req, res) => {
  res.send('Hello from DevOps Pipeline 🚀');
});

const PORT = process.env.PORT || 3000;
app.listen(PORT, () => {
  console.log(`Server is running on port ${PORT}`);
});
```

>> npm init -y ———this will create a package.json file in src folder

src — -zsh — 80×24

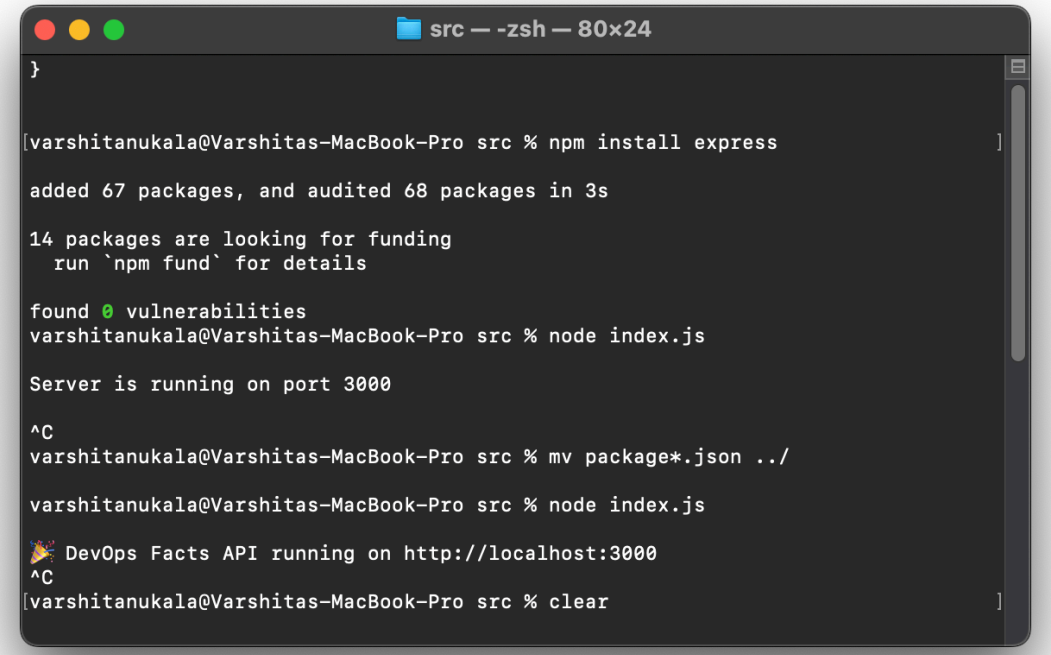
```
Jenkinsfile     src
varshitanukala@Varshitas-MacBook-Pro myapp % cd src
varshitanukala@Varshitas-MacBook-Pro src % pwd
/Users/varshitanukala/Documents/Capgemini internship/case studies/2/devops-nodej
s-pipeline/myapp/src
varshitanukala@Varshitas-MacBook-Pro src % npm init -y
Wrote to /Users/varshitanukala/Documents/Capgemini internship/case studies/2/dev
ops-nodejs-pipeline/myapp/src/package.json:

{
  "name": "src",
  "version": "1.0.0",
  "description": "",
  "main": "index.js",
  "scripts": {
    "test": "echo \"Error: no test specified\" && exit 1"
  },
  "keywords": [],
  "author": "",
  "license": "ISC"
}


varshitanukala@Varshitas-MacBook-Pro src %
```

>> npm install express



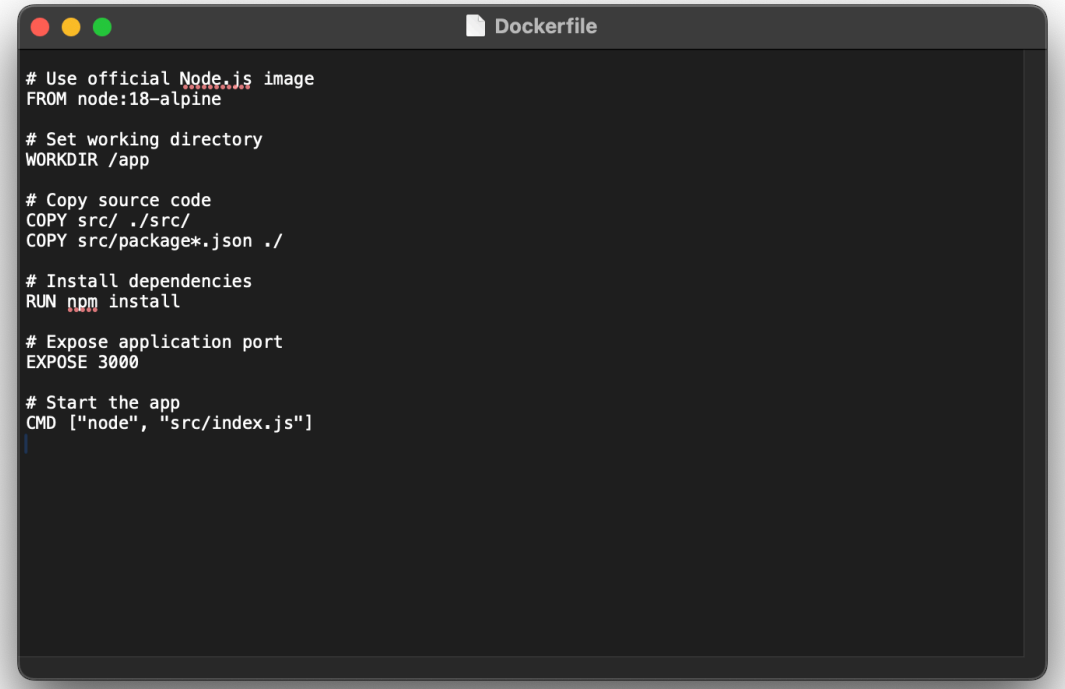
>> node index.js ———testing app locally

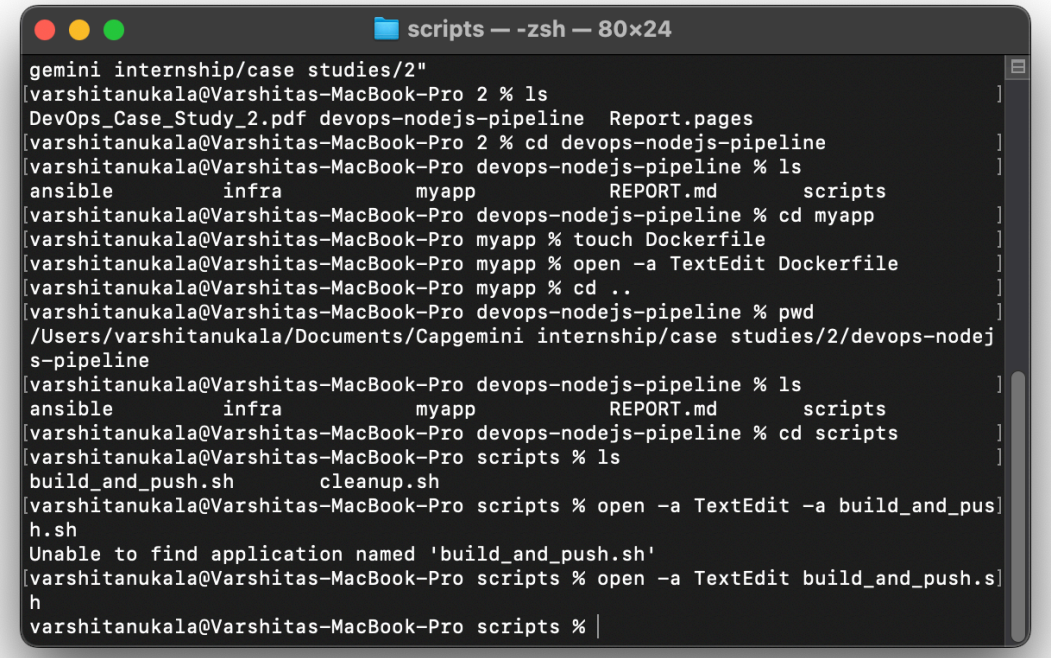
>> mv package*.json ../ ———*Moving `package.json` and `package-lock.json` up one level into `myapp/` so that Docker can install dependencies during build*



Dockerization

touch devops-nodejs-pipeline/myapp/Dockerfile



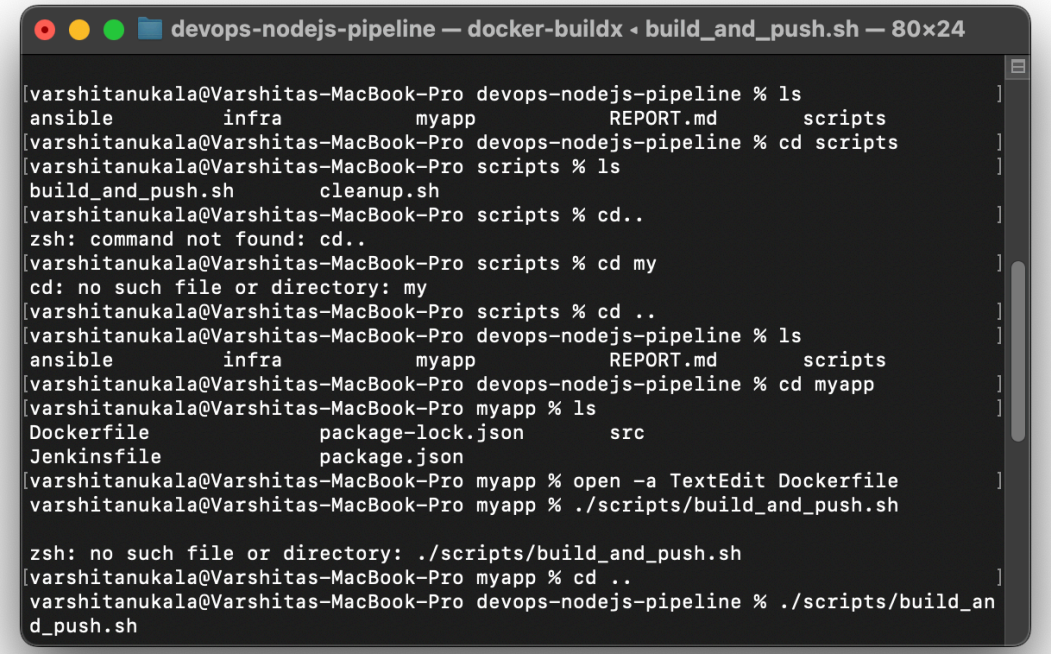


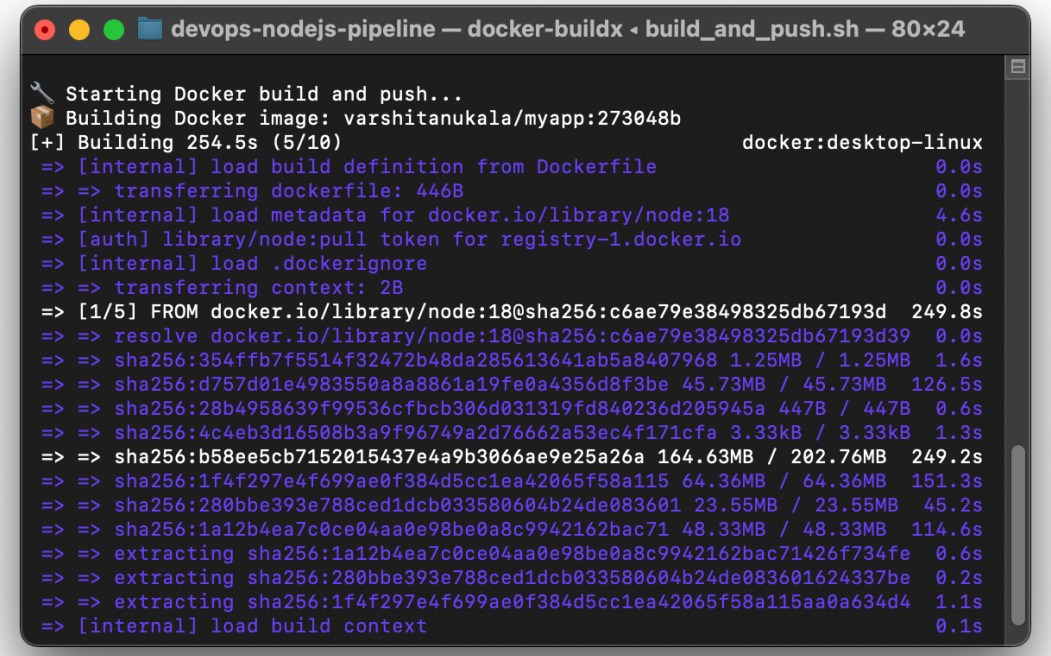
build_and_push.sh

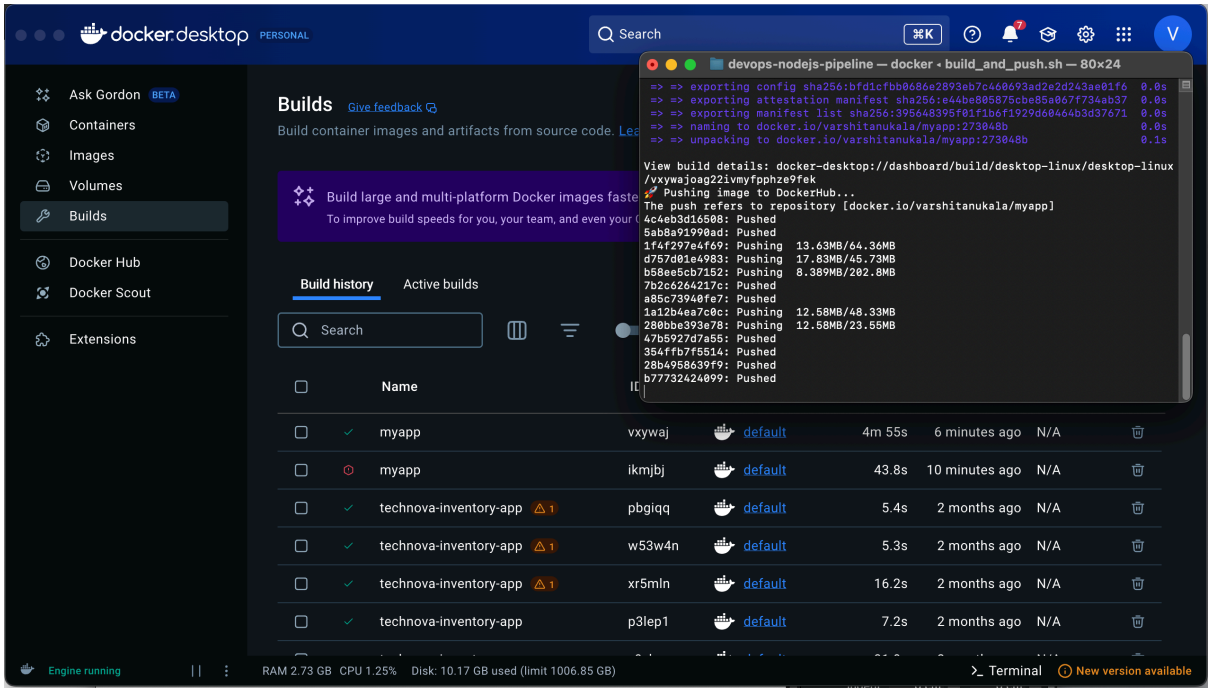
```
#!/usr/bin/env bash
set -euo pipefail

echo "🔧 Starting Docker build and push..."

# Replace with your DockerHub username
DOCKER_USER="varshitanukala"
APP_NAME="myapp"
GIT_COMMIT=$(git rev-parse --short HEAD)
IMAGE="$DOCKER_USER/$APP_NAME:$GIT_COMMIT"

echo "📦 Building Docker image: $IMAGE"
docker build -t $IMAGE ./myapp

echo "🚀 Pushing image to DockerHub..."
docker push $IMAGE

echo "✅ Build and push complete: $IMAGE"
```

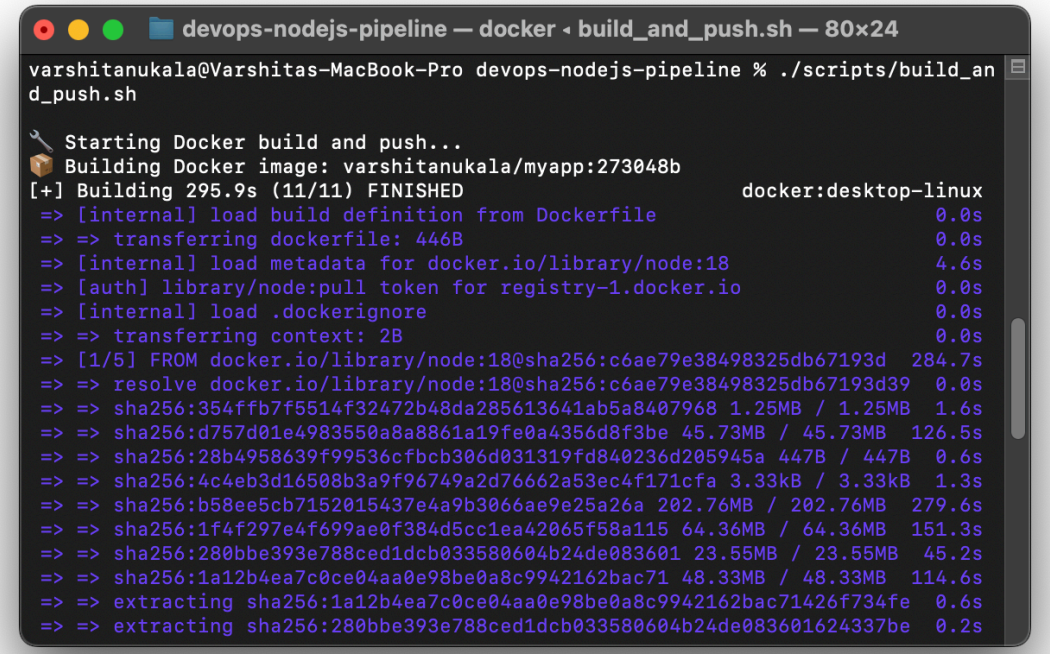
devops-nodejs-pipeline — -zsh — 80×24

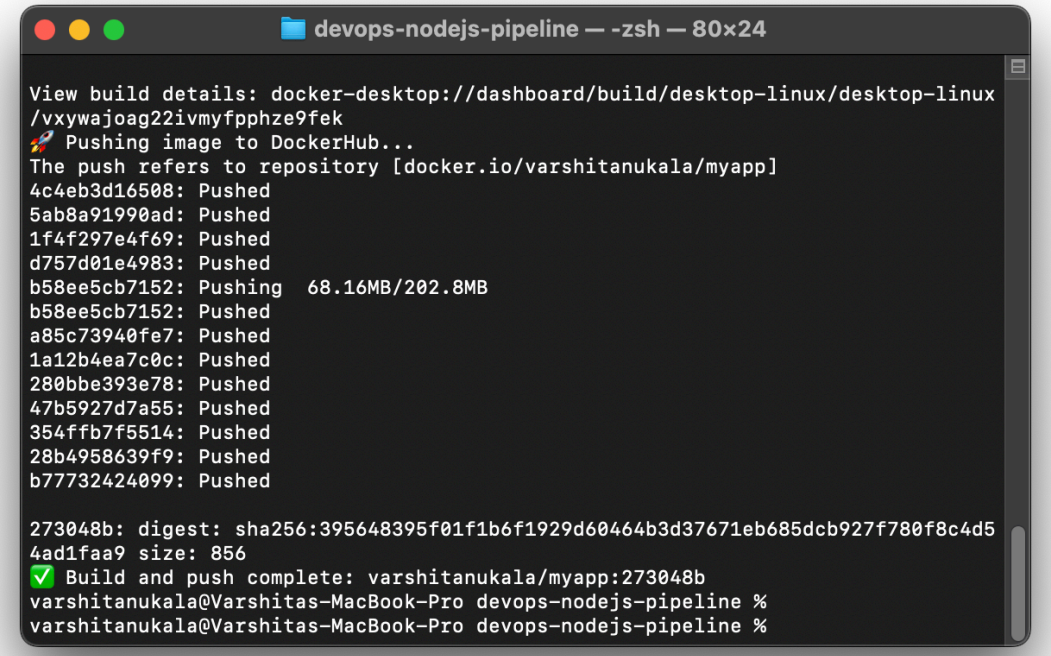
```
s-pipeline
[varshitanukala@Varshitas-MacBook-Pro devops-nodejs-pipeline % ls                ]
 ansible         infra           myapp           REPORT.md       scripts
[varshitanukala@Varshitas-MacBook-Pro devops-nodejs-pipeline % cd scripts        ]
[varshitanukala@Varshitas-MacBook-Pro scripts % ls                               ]
 build_and_push.sh       cleanup.sh
[varshitanukala@Varshitas-MacBook-Pro scripts % open -a TextEdit -a build_and_pus]
 h.sh
 Unable to find application named 'build_and_push.sh'
[varshitanukala@Varshitas-MacBook-Pro scripts % open -a TextEdit build_and_push.s]
 h
 varshitanukala@Varshitas-MacBook-Pro scripts % chmod +x scripts/build_and_push.s
 h

 chmod: scripts/build_and_push.sh: No such file or directory
 varshitanukala@Varshitas-MacBook-Pro scripts % chmod +x scripts/build_and_push.s
 h
 chmod: scripts/build_and_push.sh: No such file or directory
[varshitanukala@Varshitas-MacBook-Pro scripts % cd ..                            ]
[varshitanukala@Varshitas-MacBook-Pro devops-nodejs-pipeline % ls                ]
 ansible         infra           myapp           REPORT.md       scripts
[varshitanukala@Varshitas-MacBook-Pro devops-nodejs-pipeline % chmod +x scripts/b]
 uild_and_push.sh
 varshitanukala@Varshitas-MacBook-Pro devops-nodejs-pipeline %
```

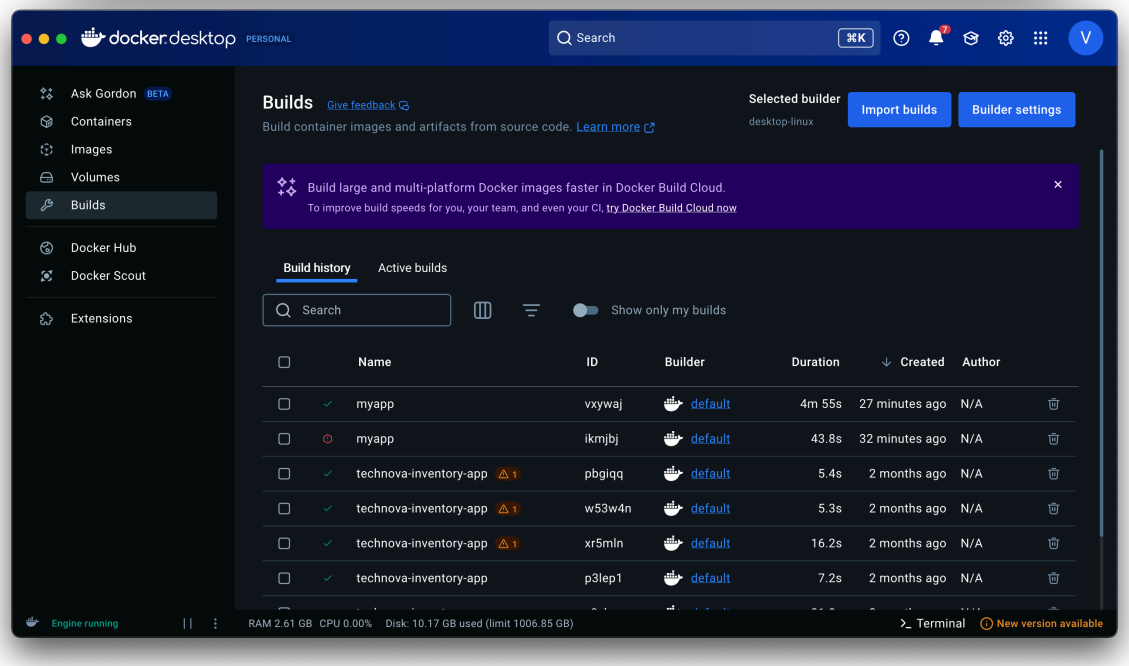

devops-nodejs-pipeline — docker-buildx ◂ build_and_push.sh — 80×24
varshitanukala@Varshitas-MacBook-Pro devops-nodejs-pipeline % ls
ansible infra myapp REPORT.md scripts
varshitanukala@Varshitas-MacBook-Pro devops-nodejs-pipeline % cd scripts
varshitanukala@Varshitas-MacBook-Pro scripts % ls
build_and_push.sh cleanup.sh
varshitanukala@Varshitas-MacBook-Pro scripts % cd..
zsh: command not found: cd..
varshitanukala@Varshitas-MacBook-Pro scripts % cd my
cd: no such file or directory: my
varshitanukala@Varshitas-MacBook-Pro scripts % cd ..
varshitanukala@Varshitas-MacBook-Pro devops-nodejs-pipeline % ls
ansible infra myapp REPORT.md scripts
varshitanukala@Varshitas-MacBook-Pro devops-nodejs-pipeline % cd myapp
varshitanukala@Varshitas-MacBook-Pro myapp % ls
Dockerfile package-lock.json src
Jenkinsfile package.json
varshitanukala@Varshitas-MacBook-Pro myapp % open -a TextEdit Dockerfile
varshitanukala@Varshitas-MacBook-Pro myapp % ./scripts/build_and_push.sh
zsh: no such file or directory: ./scripts/build_and_push.sh
varshitanukala@Varshitas-MacBook-Pro myapp % cd ..
varshitanukala@Varshitas-MacBook-Pro devops-nodejs-pipeline % ./scripts/build_and_push.sh

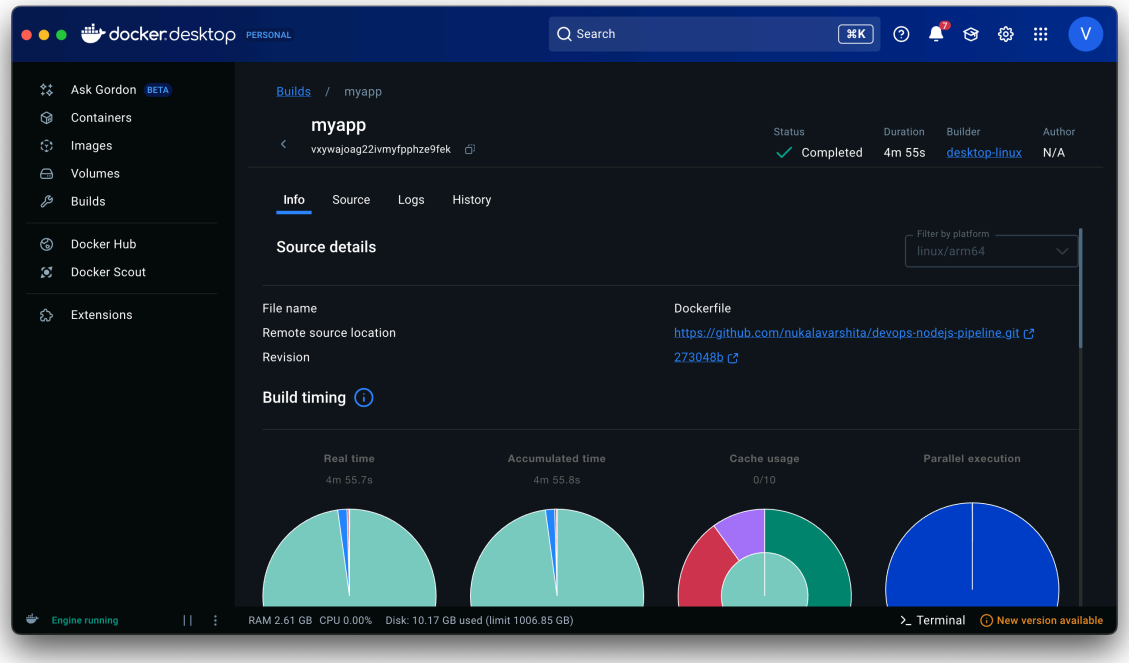

devops-nodejs-pipeline — docker-buildx ◂ build_and_push.sh — 80×24
🔧 Starting Docker build and push...
📦 Building Docker image: varshitanukala/myapp:273048b
[+] Building 254.5s (5/10) docker:desktop-linux
=> [internal] load build definition from Dockerfile 0.0s
=> => transferring dockerfile: 446B 0.0s
=> [internal] load metadata for docker.io/library/node:18 4.6s
=> [auth] library/node:pull token for registry-1.docker.io 0.0s
=> [internal] load .dockerignore 0.0s
=> => transferring context: 2B 0.0s
=> [1/5] FROM docker.io/library/node:18@sha256:c6ae79e38498325db67193d 249.8s
=> => resolve docker.io/library/node:18@sha256:c6ae79e38498325db67193d39 0.0s
=> => sha256:354ffb7f5514f32472b48da285613641ab5a8407968 1.25MB / 1.25MB 1.6s
=> => sha256:d757d01e4983550a8a8861a19fe0a4356d8f3be 45.73MB / 45.73MB 126.5s
=> => sha256:28b4958639f99536cfbcb306d031319fd840236d205945a 447B / 447B 0.6s
=> => sha256:4c4eb3d16508b3a9f96749a2d76662a53ec4f171cfa 3.33kB / 3.33kB 1.3s
=> => sha256:b58ee5cb7152015437e4a9b3066ae9e25a26a 164.63MB / 202.76MB 249.2s
=> => sha256:1f4f297e4f699ae0f384d5cc1ea42065f58a115 64.36MB / 64.36MB 151.3s
=> => sha256:280bbe393e788ced1dcb033580604b24de083601 23.55MB / 23.55MB 45.2s
=> => sha256:1a12b4ea7c0ce04aa0e98be0a8c9942162bac71 48.33MB / 48.33MB 114.6s
=> => extracting sha256:1a12b4ea7c0ce04aa0e98be0a8c9942162bac71426f734fe 0.6s
=> => extracting sha256:280bbe393e788ced1dcb033580604b24de083601624337be 0.2s
=> => extracting sha256:1f4f297e4f699ae0f384d5cc1ea42065f58a115aa0a634d4 1.1s
=> [internal] load build context 0.1s


docker desktop
PERSONAL
Search
⌘K
Ask Gordon
BETA
Containers
Images
Volumes
Builds
Docker Hub
Docker Scout
Extensions
Builds
Give feedback
Build container images and artifacts from source code.
Build large and multi-platform Docker images faste
To improve build speeds for you, your team, and even your
Build history
Active builds
Search
Name
devops-nodejs-pipeline — docker ◂ build_and_push.sh — 80×24
=> => exporting config sha256:bfd1cfbb0686e2893eb7c460693ad2e2d243ae01f6 0.0s
=> => exporting attestation manifest sha256:e44be8058750cbe85a8671f734ab37 0.0s
=> => exporting manifest list sha256:3956483951f01f1b6f1929d60464b3d37671 0.0s
=> => naming to docker.io/varshitanukala/myapp:273048b 0.0s
=> => unpacking to docker.io/varshitanukala/myapp:273048b 0.1s
View build details: docker-desktop://dashboard/build/desktop-linux/desktop-linux/vxywajoag22ivmyfpphze9fek
Pushing image to DockerHub...
The push refers to repository [docker.io/varshitanukala/myapp]
4c4eb3d16508: Pushed
5ab8a91990ad: Pushed
1f4f297e4f69: Pushing 13.63MB/64.36MB
d757d01e4983: Pushing 17.83MB/45.73MB
b58ee5cb7152: Pushing 8.389MB/202.8MB
7b2c6264217c: Pushed
a85c73940fe7: Pushed
1a12b4ea7c0c: Pushing 12.58MB/48.33MB
280bbe393e78: Pushing 12.58MB/23.55MB
47b5927d7a55: Pushed
354ffb7f5514: Pushed
28b4958639f9: Pushed
b77732424099: Pushed
myapp vxywaj default 4m 55s 6 minutes ago N/A
myapp ikmjbj default 43.8s 10 minutes ago N/A
technova-inventory-app pbgiqq default 5.4s 2 months ago N/A
technova-inventory-app w53w4n default 5.3s 2 months ago N/A
technova-inventory-app xr5mln default 16.2s 2 months ago N/A
technova-inventory-app p3lep1 default 7.2s 2 months ago N/A
Engine running
RAM 2.73 GB CPU 1.25% Disk: 10.17 GB used (limit 1006.85 GB)
Terminal
New version available


devops-nodejs-pipeline — docker ◂ build_and_push.sh — 80×24
varshitanukala@Varshitas-MacBook-Pro devops-nodejs-pipeline % ./scripts/build_and_push.sh
🔧 Starting Docker build and push...
📦 Building Docker image: varshitanukala/myapp:273048b
[+] Building 295.9s (11/11) FINISHED docker:desktop-linux
=> [internal] load build definition from Dockerfile 0.0s
=> => transferring dockerfile: 446B 0.0s
=> [internal] load metadata for docker.io/library/node:18 4.6s
=> [auth] library/node:pull token for registry-1.docker.io 0.0s
=> [internal] load .dockerignore 0.0s
=> => transferring context: 2B 0.0s
=> [1/5] FROM docker.io/library/node:18@sha256:c6ae79e38498325db67193d 284.7s
=> => resolve docker.io/library/node:18@sha256:c6ae79e38498325db67193d39 0.0s
=> => sha256:354ffb7f5514f32472b48da285613641ab5a8407968 1.25MB / 1.25MB 1.6s
=> => sha256:d757d01e4983550a8a8861a19fe0a4356d8f3be 45.73MB / 45.73MB 126.5s
=> => sha256:28b4958639f99536cfbcb306d031319fd840236d205945a 447B / 447B 0.6s
=> => sha256:4c4eb3d16508b3a9f96749a2d76662a53ec4f171cfa 3.33kB / 3.33kB 1.3s
=> => sha256:b58ee5cb7152015437e4a9b3066ae9e25a26a 202.76MB / 202.76MB 279.6s
=> => sha256:1f4f297e4f699ae0f384d5cc1ea42065f58a115 64.36MB / 64.36MB 151.3s
=> => sha256:280bbe393e788ced1dcb033580604b24de083601 23.55MB / 23.55MB 45.2s
=> => sha256:1a12b4ea7c0ce04aa0e98be0a8c9942162bac71 48.33MB / 48.33MB 114.6s
=> => extracting sha256:1a12b4ea7c0ce04aa0e98be0a8c9942162bac71426f734fe 0.6s
=> => extracting sha256:280bbe393e788ced1dcb033580604b24de083601624337be 0.2s


devops-nodejs-pipeline — -zsh — 80×24
View build details: docker-desktop:///dashboard/build/desktop-linux/desktop-linux
/vxywajoag22ivmyfpphze9fek
🚀 Pushing image to DockerHub...
The push refers to repository [docker.io/varshitanukala/myapp]
4c4eb3d16508: Pushed
5ab8a91990ad: Pushed
1f4f297e4f69: Pushed
d757d01e4983: Pushed
b58ee5cb7152: Pushing 68.16MB/202.8MB
b58ee5cb7152: Pushed
a85c73940fe7: Pushed
1a12b4ea7c0c: Pushed
280bbe393e78: Pushed
47b5927d7a55: Pushed
354ffb7f5514: Pushed
28b4958639f9: Pushed
b77732424099: Pushed
273048b: digest: sha256:395648395f01f1b6f1929d60464b3d37671eb685dcb927f780f8c4d5
4ad1faa9 size: 856
✅ Build and push complete: varshitanukala/myapp:273048b
varshitanukala@Varshitas-MacBook-Pro devops-nodejs-pipeline %
varshitanukala@Varshitas-MacBook-Pro devops-nodejs-pipeline %


docker desktop
PERSONAL
Search
Ask Gordon BETA
Containers
Images
Volumes
Builds
Docker Hub
Docker Scout
Extensions
Builds
Give feedback
Build container images and artifacts from source code. Learn more
Selected builder
desktop-linux
Import builds
Builder settings
Build large and multi-platform Docker images faster in Docker Build Cloud.
To improve build speeds for you, your team, and even your CI, try Docker Build Cloud now
Build history
Active builds
Search
Show only my builds
Name
ID
Builder
Duration
Created
Author
myapp vxywaj default 4m 55s 27 minutes ago N/A
myapp ikmjbj default 43.8s 32 minutes ago N/A
technova-inventory-app pbgiqq default 5.4s 2 months ago N/A
technova-inventory-app w53w4n default 5.3s 2 months ago N/A
technova-inventory-app xr5mln default 16.2s 2 months ago N/A
technova-inventory-app p3lep1 default 7.2s 2 months ago N/A
Engine running
RAM 2.61 GB CPU 0.00% Disk: 10.17 GB used (limit 1006.85 GB)
Terminal
New version available


docker desktop
PERSONAL
Search
Ask Gordon BETA
Containers
Images
Volumes
Builds
Docker Hub
Docker Scout
Extensions
Builds / myapp
myapp
vxywajoag22ivmyfpphze9fek
Status
Completed
Duration
4m 55s
Builder
desktop-linux
Author
N/A
Info
Source
Logs
History
Source details
Filter by platform
linux/arm64
File name
Dockerfile
Remote source location
https://github.com/nukalavarshita/devops-nodejs-pipeline.git
Revision
273048b
Build timing
Real time
4m 55.7s
Accumulated time
4m 55.8s
Cache usage
0/10
Parallel execution
Engine running
RAM 2.61 GB CPU 0.00% Disk: 10.17 GB used (limit 1006.85 GB)
Terminal
New version available

Phase 4:

Terraform Provisioning

`infra/`

variables.tf

```
variable "region" {
  default = "ap-south-1"
}

variable "instance_type" {
  default = "t2.micro"
}
```

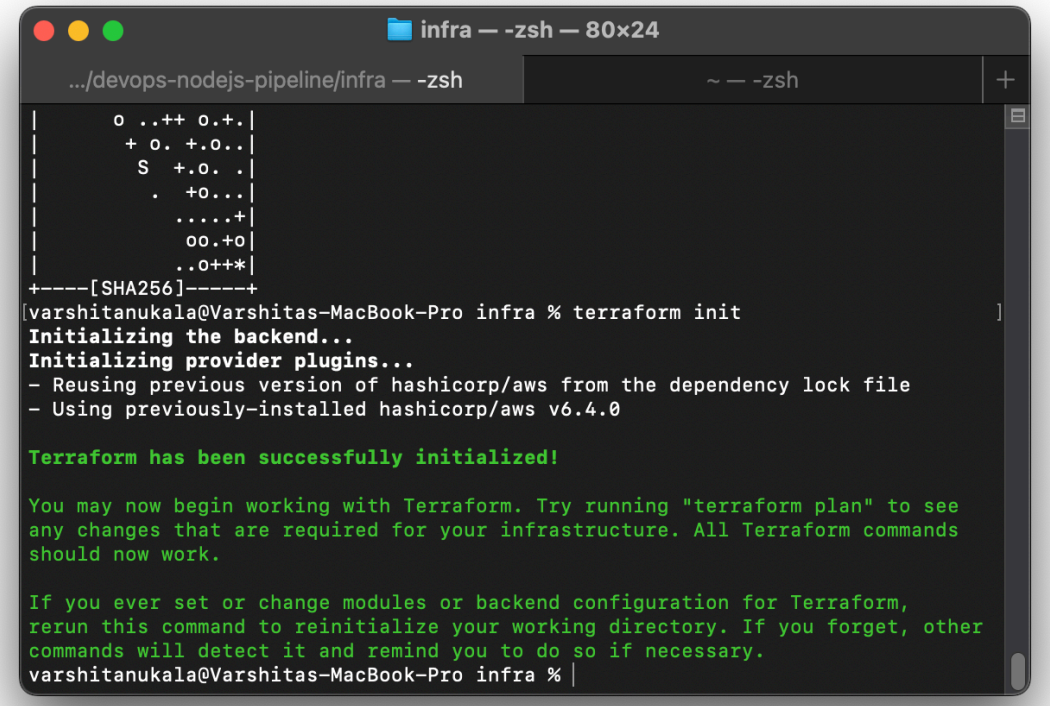
main.tf

```
provider "aws" {
  region = "ap-south-1"
}

# Import key from your local machine
resource "aws_key_pair" "varshita" {
  key_name   = "varshita-key"
  public_key = file("~/.ssh/varshita-key.pub")
}

# Create VPC
resource "aws_vpc" "main_vpc" {
  cidr_block = "10.0.0.0/16"
}

# Internet Gateway
resource "aws_internet_gateway" "gw" {
  vpc_id = aws_vpc.main_vpc.id
}

# Subnet in ap-south-1a
resource "aws_subnet" "main_subnet" {
  vpc_id                  = aws_vpc.main_vpc.id
  cidr_block              = "10.0.1.0/24"
  availability_zone       = "ap-south-1a"
  map_public_ip_on_launch = true
}

# Route Table for outbound internet access
resource "aws_route_table" "rt" {
  vpc_id = aws_vpc.main_vpc.id

  route {
    cidr_block = "0.0.0.0/0"
    gateway_id = aws_internet_gateway.gw.id
  }
}

# Associate route table with subnet
resource "aws_route_table_association" "a" {
  subnet_id      = aws_subnet.main_subnet.id
  route_table_id = aws_route_table.rt.id
}

# Security Group allowing SSH from anywhere
resource "aws_security_group" "ssh_sg" {
  name        = "allow_ssh"
  description = "Allow SSH inbound traffic"
  vpc_id      = aws_vpc.main_vpc.id
```

main.tf

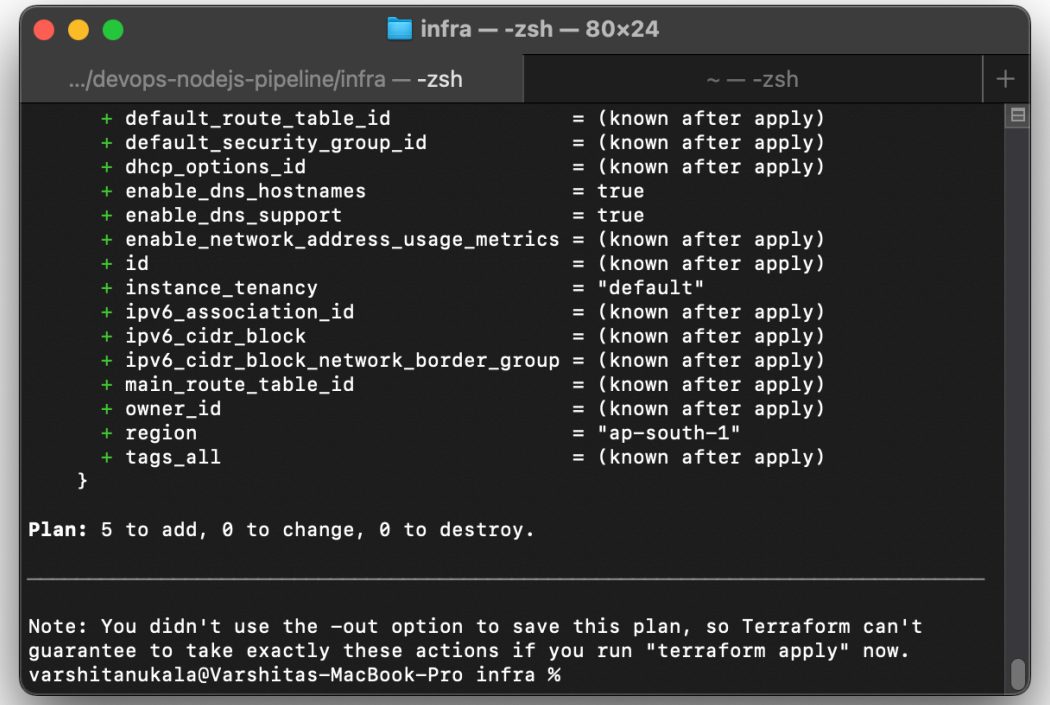
```
}

# Security Group allowing SSH from anywhere
resource "aws_security_group" "ssh_sg" {
  name        = "allow_ssh"
  description = "Allow SSH inbound traffic"
  vpc_id      = aws_vpc.main_vpc.id

  ingress {
    description = "SSH access"
    from_port   = 22
    to_port     = 22
    protocol    = "tcp"
    cidr_blocks = ["0.0.0.0/0"] # Consider restricting this later
  }

  egress {
    from_port   = 0
    to_port     = 0
    protocol    = "-1"
    cidr_blocks = ["0.0.0.0/0"]
  }
}

# EC2 Instance with Node.js pre-installed
resource "aws_instance" "app_server" {
  ami                    = "ami-0a0f1259dd1c90938" # Amazon Linux 2023 (ap-south-1)
  instance_type          = "t2.micro"
  key_name               = aws_key_pair.varshita_key_name
  subnet_id              = aws_subnet.main_subnet.id
  vpc_security_group_ids = [aws_security_group.ssh_sg.id]
  associate_public_ip_address = true

  tags = {
    Name = "NodejsAppServer"
  }

  provisioner "remote-exec" {
    inline = [
      "sudo yum update -y",
      "sudo yum install -y nodejs npm"
    ]

    connection {
      type        = "ssh"
      user        = "ec2-user"
      private_key = file("~/.ssh/varshita-key")
      host        = self.public_ip
      timeout     = "2m"
    }
  }
}
```

```
>> terraform init
```

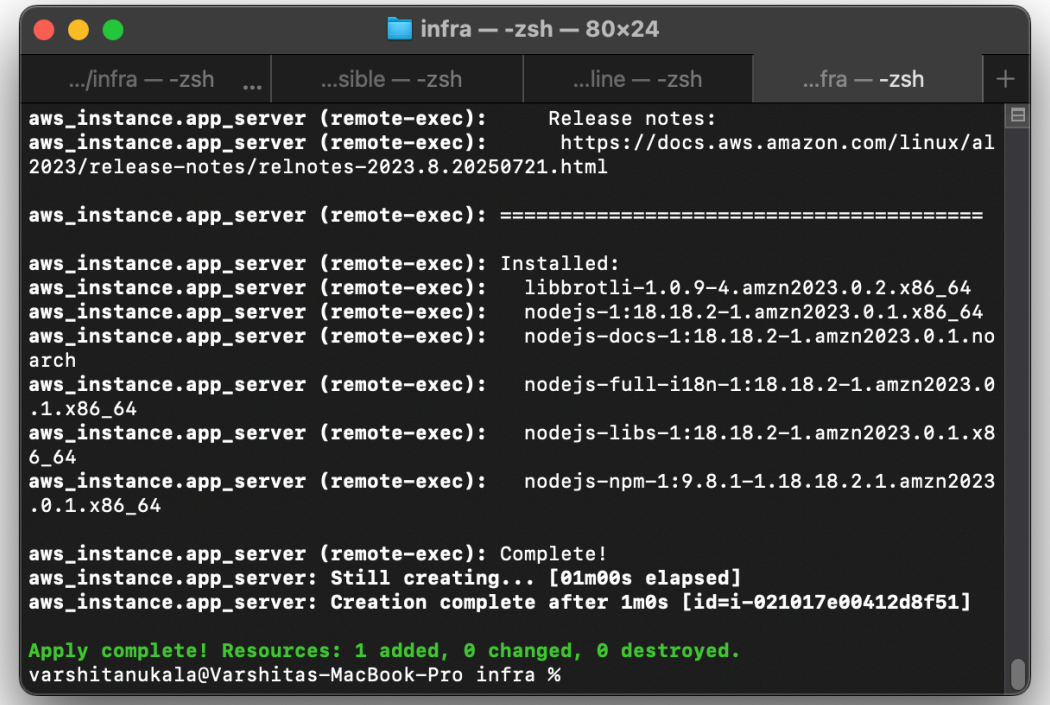


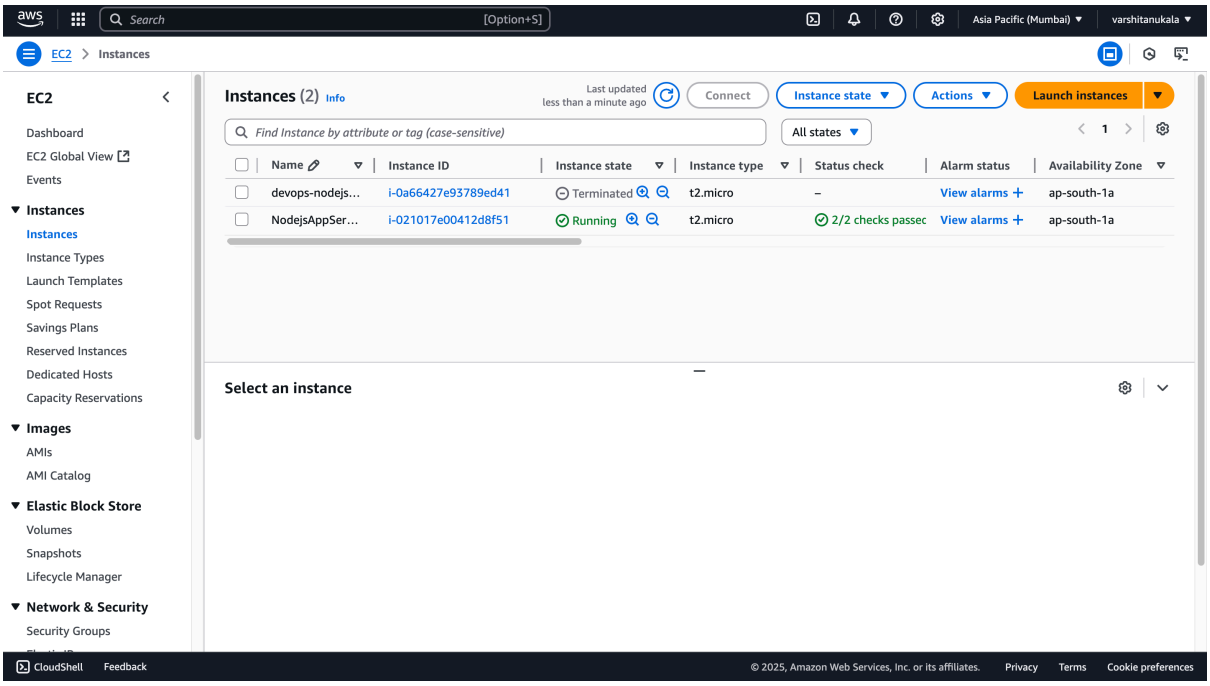

```
>> ssh-keygen -t rsa -b 2048 -f ~/.ssh/id_rsa
```

```
>> terraform plan
```



```
>> terraform apply
>> terraform apply -auto-approve
```





Phase 5

Ansible Setup and App Deployment

hosts.ini

```
[app]
13.126.147.169 ansible_user=ec2-user ansible_ssh_private_key_file=~/.ssh/varshita-key
```

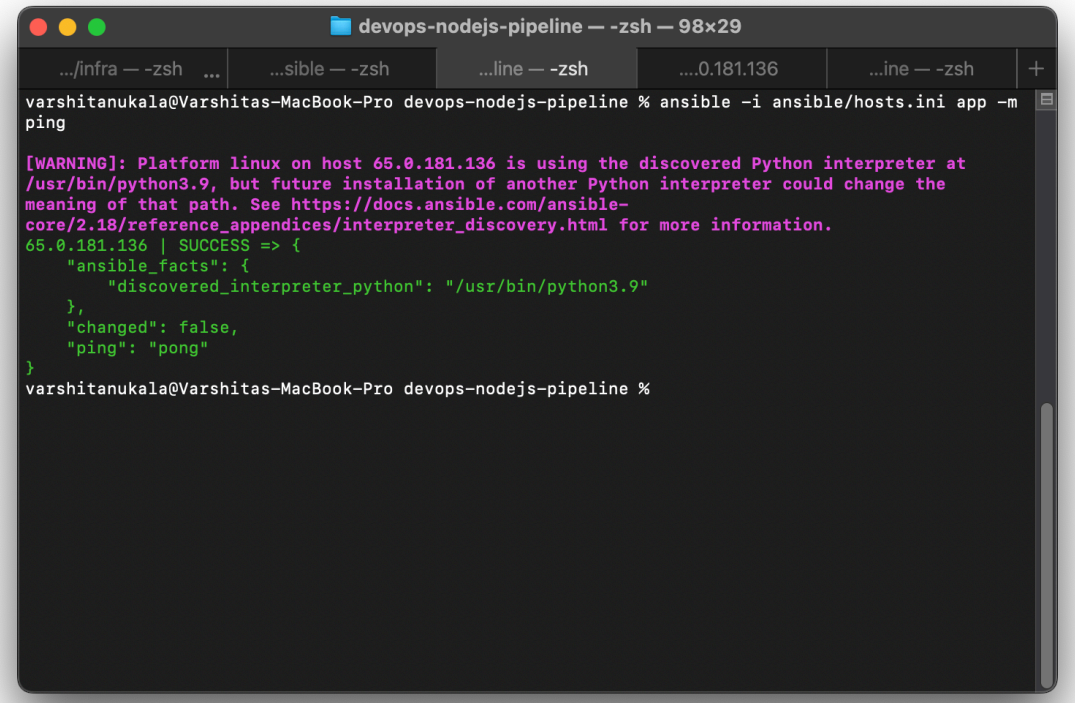
deploy.yml

```
---
- name: Deploy Node.js application
  hosts: app
  become: yes

  tasks:
    - name: Update system packages
      yum:
        name: '*'
        state: latest

    - name: Install required packages
      yum:
        name:
          - nodejs
          - npm
          - rsync
        state: present

    - name: Create app directory on EC2
      file:
        path: /home/ec2-user/myapp
        state: directory
        owner: ec2-user
        group: ec2-user
        mode: '0755'

    - name: Sync application files (excluding node_modules)
      synchronize:
        src: ../myapp/src/
        dest: /home/ec2-user/myapp/
        rsync_opts:
          - "--exclude=node_modules"
      delegate_to: localhost

    - name: Install Node.js dependencies
      shell: npm install
      args:
        chdir: /home/ec2-user/myapp/

    - name: Start the Node.js app
      shell: nohup node index.js > output.log 2>&1 &
      args:
        chdir: /home/ec2-user/myapp/
```

>> ssh -i ~/Downloads/new-varshita-key.pem ec2-user@65.0.181.136

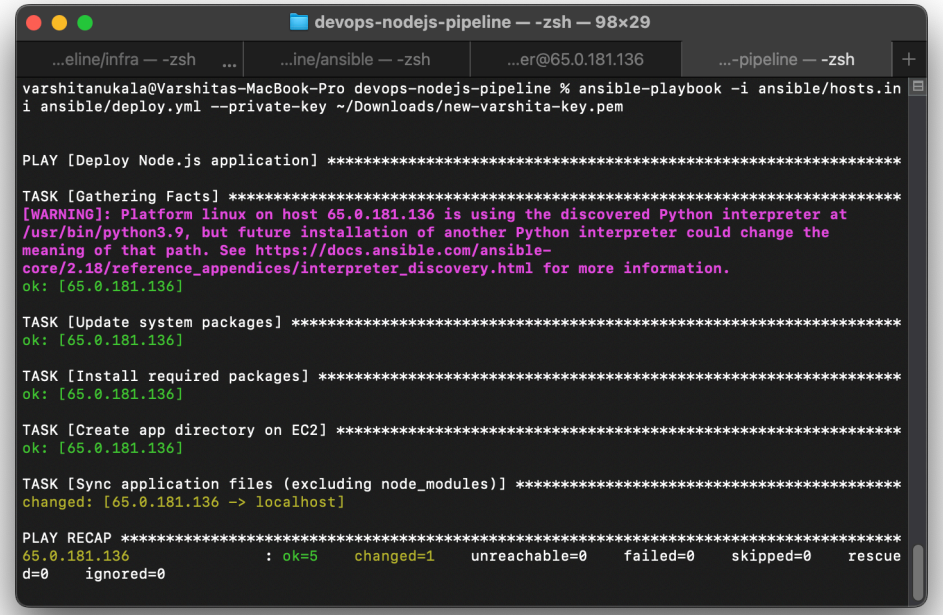
Root ———>

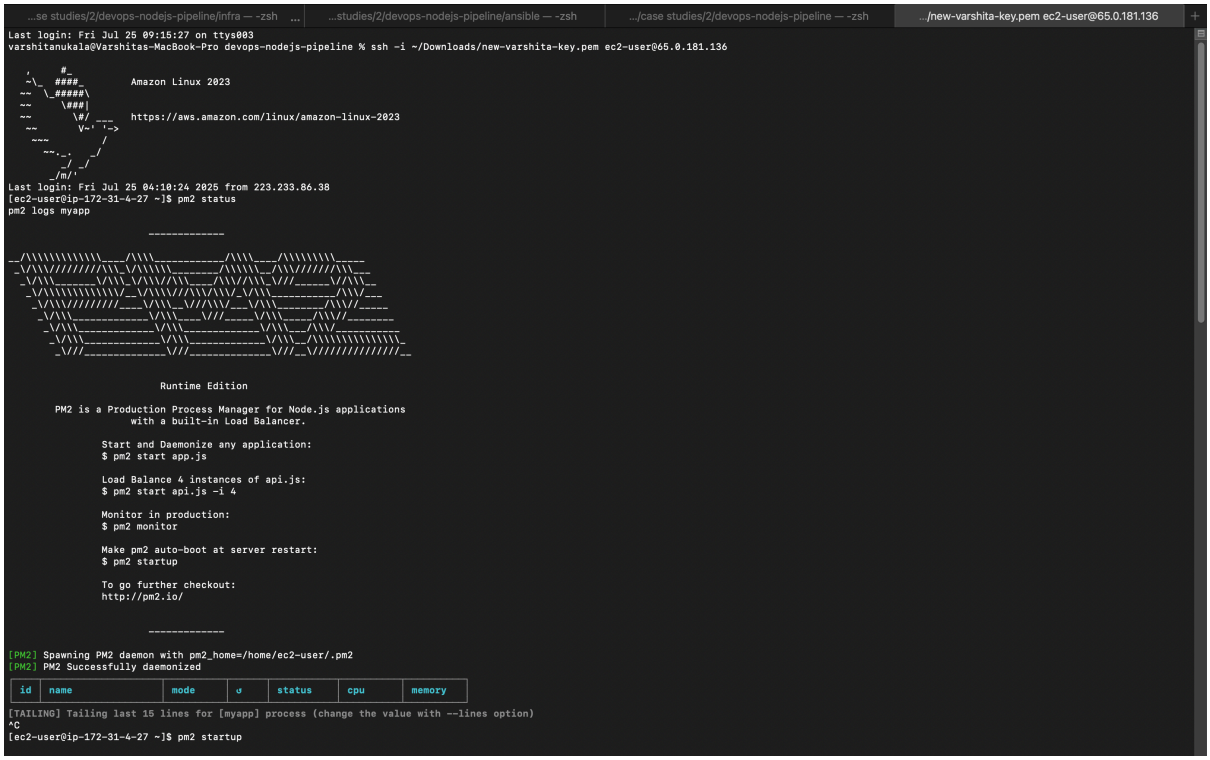
>> testing

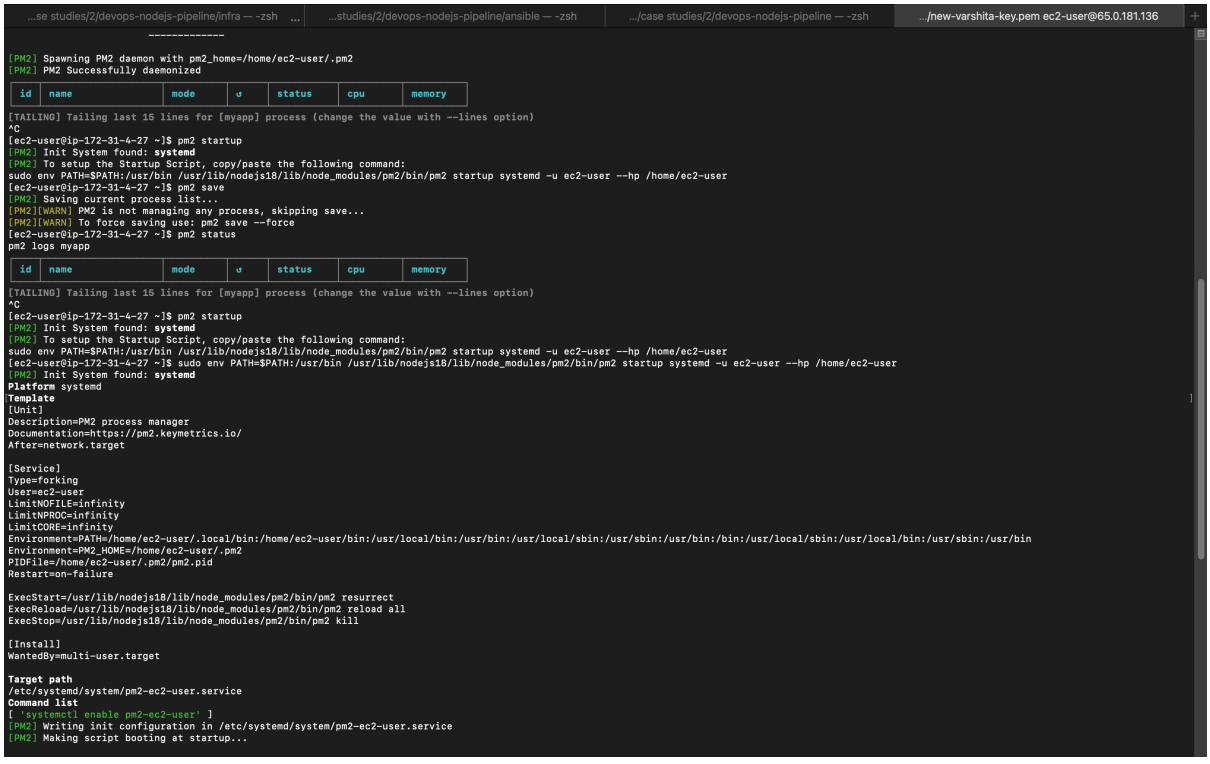


>> ansible-playbook -i ansible/hosts.ini ansible/deploy.yml

OR >>ansible-playbook -i ansible/hosts.ini ansible/deploy.yml --private-key ~/Downloads/new-varshita-key.pem




...se studies/2/devops-nodejs-pipeline/infra — -zsh
...studies/2/devops-nodejs-pipeline/ansible — -zsh
.../case studies/2/devops-nodejs-pipeline — -zsh
.../new-varshita-key.pem ec2-user@65.0.181.136
Last login: Fri Jul 25 09:15:27 on ttys003
varshitanukala@Varshitas-MacBook-Pro devops-nodejs-pipeline % ssh -i ~/Downloads/new-varshita-key.pem ec2-user@65.0.181.136
Amazon Linux 2023
https://aws.amazon.com/linux/amazon-linux-2023
Last login: Fri Jul 25 04:10:24 2025 from 223.233.86.38
[ec2-user@ip-172-31-4-27 ~]$ pm2 status
pm2 logs myapp
Runtime Edition
PM2 is a Production Process Manager for Node.js applications
with a built-in Load Balancer.
Start and Daemonize any application:
$ pm2 start app.js
Load Balance 4 instances of api.js:
$ pm2 start api.js -i 4
Monitor in production:
$ pm2 monitor
Make pm2 auto-boot at server restart:
$ pm2 startup
To go further checkout:
http://pm2.io/
[PM2] Spawning PM2 daemon with pm2_home=/home/ec2-user/.pm2
[PM2] PM2 Successfully daemonized
id
name
mode
↺
status
cpu
memory
[TAILING] Tailing last 15 lines for [myapp] process (change the value with --lines option)
^C
[ec2-user@ip-172-31-4-27 ~]$ pm2 startup


...se studies/2/devops-nodejs-pipeline/infra — -zsh
...studies/2/devops-nodejs-pipeline/ansible — -zsh
.../case studies/2/devops-nodejs-pipeline — -zsh
.../new-varshita-key.pem ec2-user@65.0.181.136
[PM2] Spawning PM2 daemon with pm2_home=/home/ec2-user/.pm2
[PM2] PM2 Successfully daemonized
id
name
mode
↺
status
cpu
memory
[TAILING] Tailing last 15 lines for [myapp] process (change the value with --lines option)
^C
[ec2-user@ip-172-31-4-27 ~]$ pm2 startup
[PM2] Init System found: systemd
[PM2] To setup the Startup Script, copy/paste the following command:
sudo env PATH=$PATH:/usr/bin /usr/lib/nodejs18/lib/node_modules/pm2/bin/pm2 startup systemd -u ec2-user --hp /home/ec2-user
[ec2-user@ip-172-31-4-27 ~]$ pm2 save
[PM2] Saving current process list...
[PM2][WARN] PM2 is not managing any process, skipping save...
[PM2][WARN] To force saving use: pm2 save --force
[ec2-user@ip-172-31-4-27 ~]$ pm2 status
pm2 logs myapp
[TAILING] Tailing last 15 lines for [myapp] process (change the value with --lines option)
^C
[ec2-user@ip-172-31-4-27 ~]$ pm2 startup
[PM2] Init System found: systemd
[PM2] To setup the Startup Script, copy/paste the following command:
sudo env PATH=$PATH:/usr/bin /usr/lib/nodejs18/lib/node_modules/pm2/bin/pm2 startup systemd -u ec2-user --hp /home/ec2-user
[ec2-user@ip-172-31-4-27 ~]$ sudo env PATH=$PATH:/usr/bin /usr/lib/nodejs18/lib/node_modules/pm2/bin/pm2 startup systemd -u ec2-user --hp /home/ec2-user
[PM2] Init System found: systemd
Platform systemd
Template
[Unit]
Description=PM2 process manager
Documentation=https://pm2.keymetrics.io/
After=network.target
[Service]
Type=forking
User=ec2-user
LimitNOFILE=infinity
LimitNPROC=infinity
LimitCORE=infinity
Environment=PATH=/home/ec2-user/.local/bin:/home/ec2-user/bin:/usr/local/bin:/usr/bin:/usr/local/sbin:/usr/sbin:/usr/bin:/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin
Environment=PM2_HOME=/home/ec2-user/.pm2
PIDFile=/home/ec2-user/.pm2/pm2.pid
Restart=on-failure
ExecStart=/usr/lib/nodejs18/lib/node_modules/pm2/bin/pm2 resurrect
ExecReload=/usr/lib/nodejs18/lib/node_modules/pm2/bin/pm2 reload all
ExecStop=/usr/lib/nodejs18/lib/node_modules/pm2/bin/pm2 kill
[Install]
WantedBy=multi-user.target
Target path
/etc/systemd/system/pm2-ec2-user.service
Command list
['systemctl enable pm2-ec2-user']
[PM2] Writing init configuration in /etc/systemd/system/pm2-ec2-user.service
[PM2] Making script booting at startup...

>> # SSH into the server

ssh -i ~/Downloads/new-varshita-key.pem ec2-user@<EC2-IP>

Move to app directory

cd /home/ec2-user/myapp

Install dependencies

npm install

Install PM2 globally

npm install -g pm2

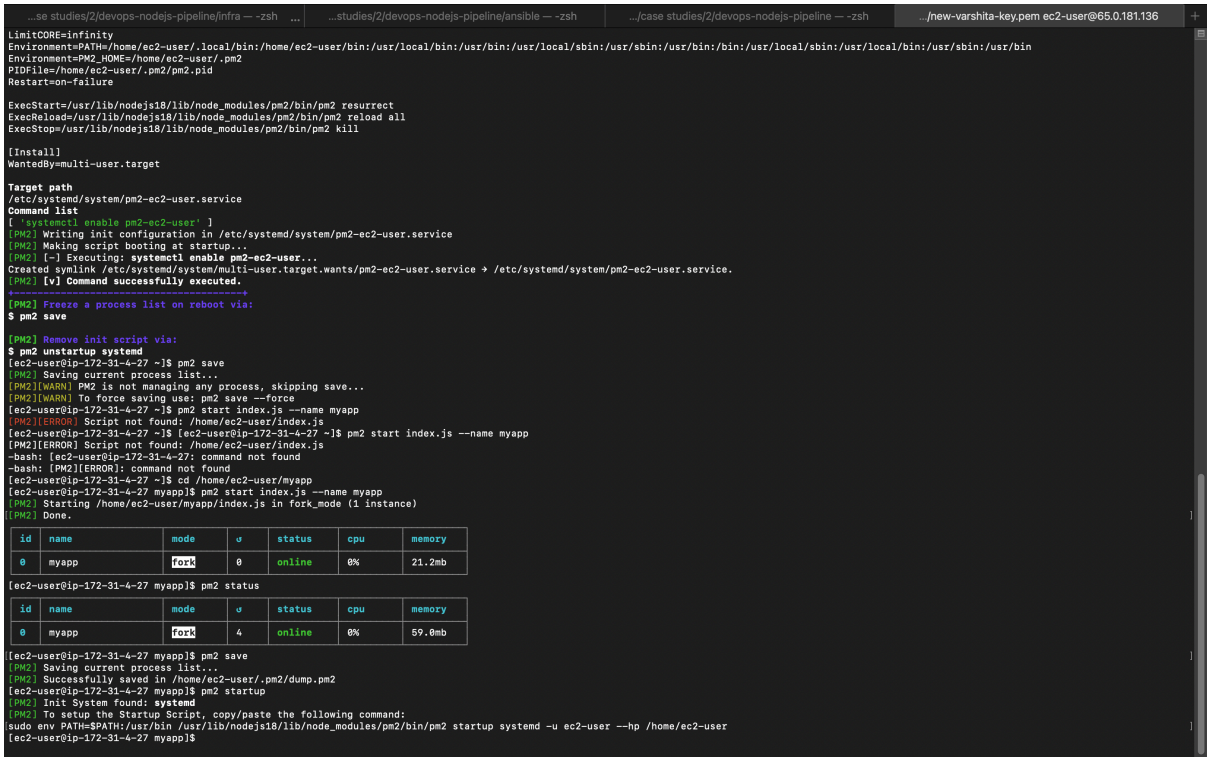
Start app with PM2

pm2 start index.js --name myapp

Setup PM2 to auto-start on reboot

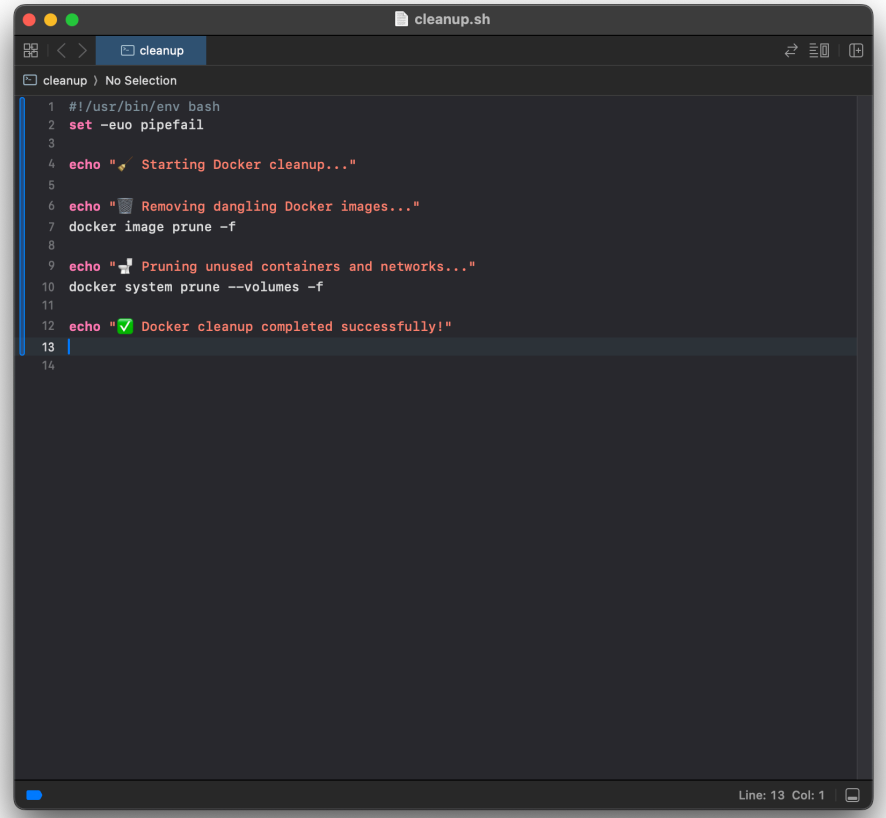
pm2 startup

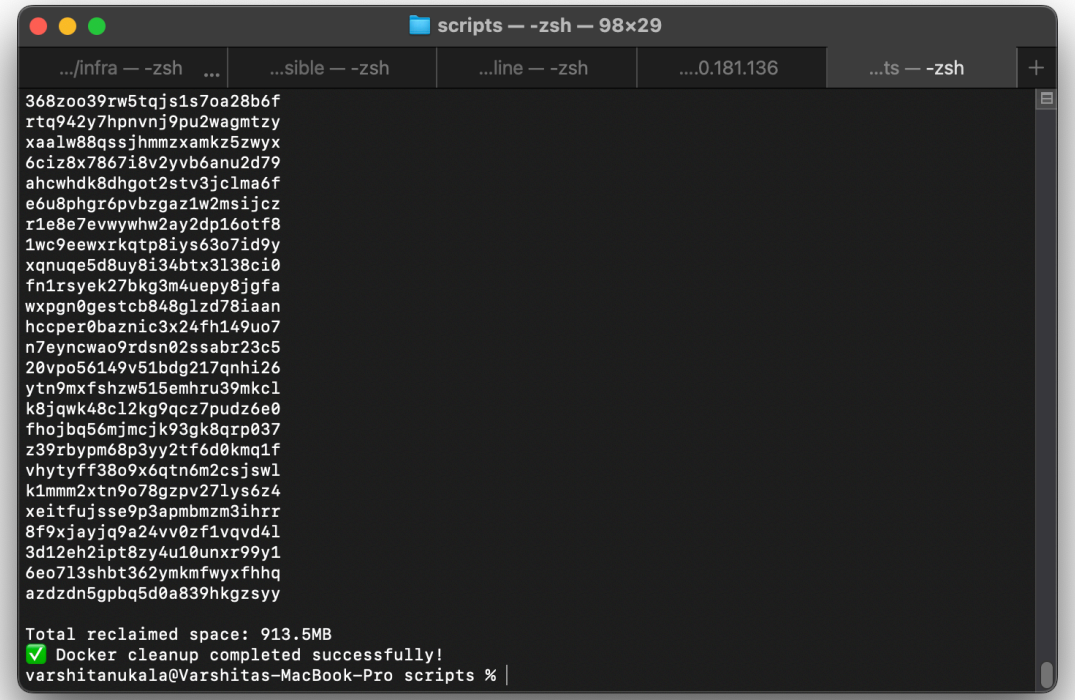
pm2 save


...se studies/2/devops-nodejs-pipeline/infra — -zsh
...studies/2/devops-nodejs-pipeline/ansible — -zsh
.../case studies/2/devops-nodejs-pipeline — -zsh
.../new-varshita-key.pem ec2-user@65.0.181.136
LimitCORE=infinity
Environment=PATH=/home/ec2-user/.local/bin:/home/ec2-user/bin:/usr/local/bin:/usr/bin:/usr/local/sbin:/usr/sbin:/usr/bin:/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin
Environment=PM2_HOME=/home/ec2-user/.pm2
PIDFile=/home/ec2-user/.pm2/pm2.pid
Restart=on-failure
ExecStart=/usr/lib/nodejs18/lib/node_modules/pm2/bin/pm2 resurrect
ExecReload=/usr/lib/nodejs18/lib/node_modules/pm2/bin/pm2 reload all
ExecStop=/usr/lib/nodejs18/lib/node_modules/pm2/bin/pm2 kill
[Install]
WantedBy=multi-user.target
Target path
/etc/systemd/system/pm2-ec2-user.service
Command list
['systemctl enable pm2-ec2-user']
[PM2] Writing init configuration in /etc/systemd/system/pm2-ec2-user.service
[PM2] Making script booting at startup...
[PM2] [-] Executing: systemctl enable pm2-ec2-user...
Created symlink /etc/systemd/system/multi-user.target.wants/pm2-ec2-user.service → /etc/systemd/system/pm2-ec2-user.service.
[PM2] [v] Command successfully executed.
[PM2] Freeze a process list on reboot via:
$ pm2 save
[PM2] Remove init script via:
$ pm2 unstartup systemd
[ec2-user@ip-172-31-4-27 ~]$ pm2 save
[PM2] Saving current process list...
[PM2][WARN] PM2 is not managing any process, skipping save...
[PM2][WARN] To force saving use: pm2 save --force
[ec2-user@ip-172-31-4-27 ~]$ pm2 start index.js --name myapp
[PM2][ERROR] Script not found: /home/ec2-user/index.js
[ec2-user@ip-172-31-4-27 ~]$ [ec2-user@ip-172-31-4-27 ~]$ pm2 start index.js --name myapp
[PM2][ERROR] Script not found: /home/ec2-user/index.js
-bash: [ec2-user@ip-172-31-4-27: command not found
-bash: [PM2][ERROR]: command not found
[ec2-user@ip-172-31-4-27 ~]$ cd /home/ec2-user/myapp
[ec2-user@ip-172-31-4-27 myapp]$ pm2 start index.js --name myapp
[PM2] Starting /home/ec2-user/myapp/index.js in fork_mode (1 instance)
[PM2] Done.
id name mode ↺ status cpu memory
0 myapp fork 0 online 0% 21.2mb
[ec2-user@ip-172-31-4-27 myapp]$ pm2 status
id name mode ↺ status cpu memory
0 myapp fork 4 online 0% 59.0mb
[ec2-user@ip-172-31-4-27 myapp]$ pm2 save
[PM2] Saving current process list...
[PM2] Successfully saved in /home/ec2-user/.pm2/dump.pm2
[ec2-user@ip-172-31-4-27 myapp]$ pm2 startup
[PM2] Init System found: systemd
[PM2] To setup the Startup Script, copy/paste the following command:
sudo env PATH=$PATH:/usr/bin /usr/lib/nodejs18/lib/node_modules/pm2/bin/pm2 startup systemd -u ec2-user --hp /home/ec2-user
[ec2-user@ip-172-31-4-27 myapp]$


Not Secure
65.0.181.136:3000
🚀 Welcome to the DevOps Facts API
Try /api/fact to get a random DevOps fact!

Phase 6


cleanup.sh
cleanup
cleanup 〉 No Selection
1 #!/usr/bin/env bash
2 set -euo pipefail
3
4 echo "🧹 Starting Docker cleanup..."
5
6 echo "🗑️ Removing dangling Docker images..."
7 docker image prune -f
8
9 echo "🧹 Pruning unused containers and networks..."
10 docker system prune --volumes -f
11
12 echo "✅ Docker cleanup completed successfully!"
13
14
Line: 13 Col: 1


scripts — -zsh — 98×29
.../infra — -zsh
...sible — -zsh
...line — -zsh
....0.181.136
...ts — -zsh
368zoo39rw5tqjs1s7oa28b6f
rtq942y7hpnvnj9pu2wagmtzy
xaalw88qssjhmmzxamkz5zwyx
6ciz8x7867i8v2yvb6anu2d79
ahcwhdk8dhgot2stv3jclma6f
e6u8phgr6pvbzgaz1w2msijcz
r1e8e7evwywhw2ay2dp16otf8
1wc9eewxrkqtp8iys63o7id9y
xqnuqe5d8uy8i34btx3l38ci0
fn1rsyek27bkg3m4uepy8jgfa
wxpgn0gestcb848glzd78iaan
hccper0baznic3x24fh149uo7
n7eyncwao9rdsn02ssabr23c5
20vpo56149v51bdg217qnhi26
ytn9mxfshzw515emhru39mkcl
k8jqwk48cl2kg9qcz7pudz6e0
fhojbq56mjmcjk93gk8qrp037
z39rbypm68p3yy2tf6d0kmq1f
vhytyff38o9x6qtn6m2csjswl
k1mmm2xtn9o78gzpv27lys6z4
xeitfujsse9p3apmbmzm3ihrr
8f9xjayjq9a24vv0zf1vqvd4l
3d12eh2ipt8zy4u10unxr99y1
6eo7l3shbt362ymkmfwyxfhhq
azdzdn5gpbq5d0a839hkgzsyy
Total reclaimed space: 913.5MB
✅ Docker cleanup completed successfully!
varshitanukala@Varshitas-MacBook-Pro scripts %

>> ./cleanup.sh

Jenkinsfile

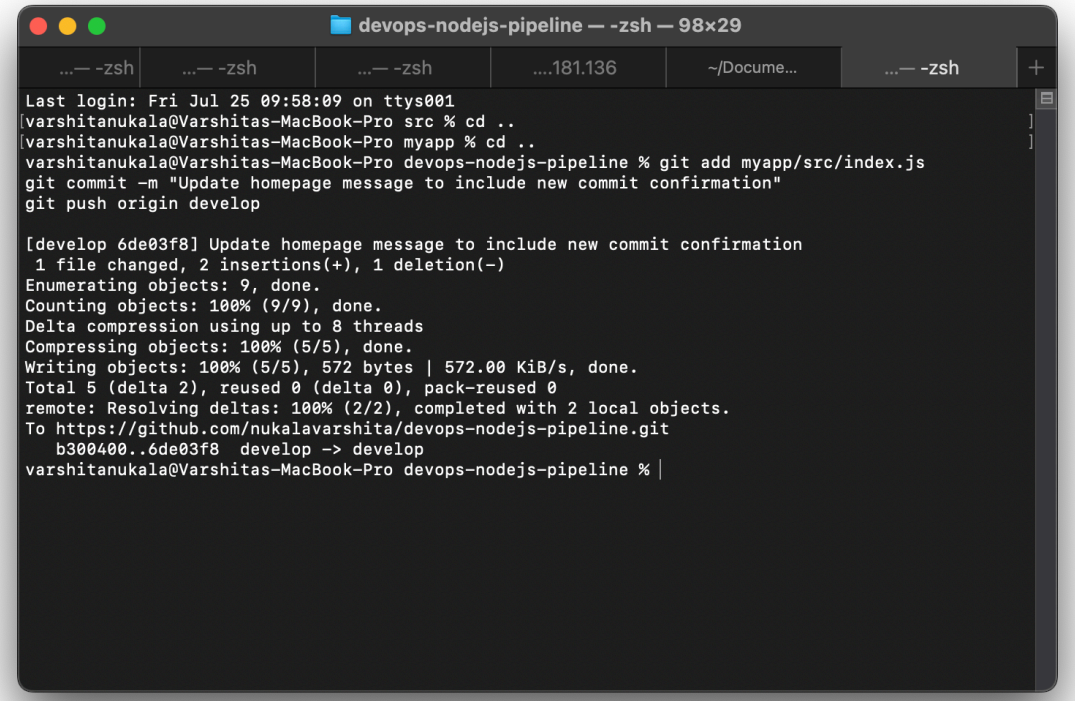
```
pipeline {
    agent any

    environment {
        DOCKER_USER = 'varshitanukala'
    }

    stages {
        stage('Checkout') {
            steps {
                git branch: 'develop', url: 'https://github.com/nukalavarshita/devops-nodejs-
pipeline.git'
            }
        }

        stage('Build and Push Docker Image') {
            steps {
                sh 'chmod +x ./scripts/build_and_push.sh'
                sh './scripts/build_and_push.sh'
            }
        }

        stage('Terraform Apply') {
            steps {
                dir('infra') {
                    sh 'terraform init'
                    sh 'terraform apply -auto-approve'
                }
            }
        }

        stage('Deploy with Ansible') {
            steps {
                sh 'ansible-playbook -i ansible/hosts.ini ansible/deploy.yml'
            }
        }
    }
}
```

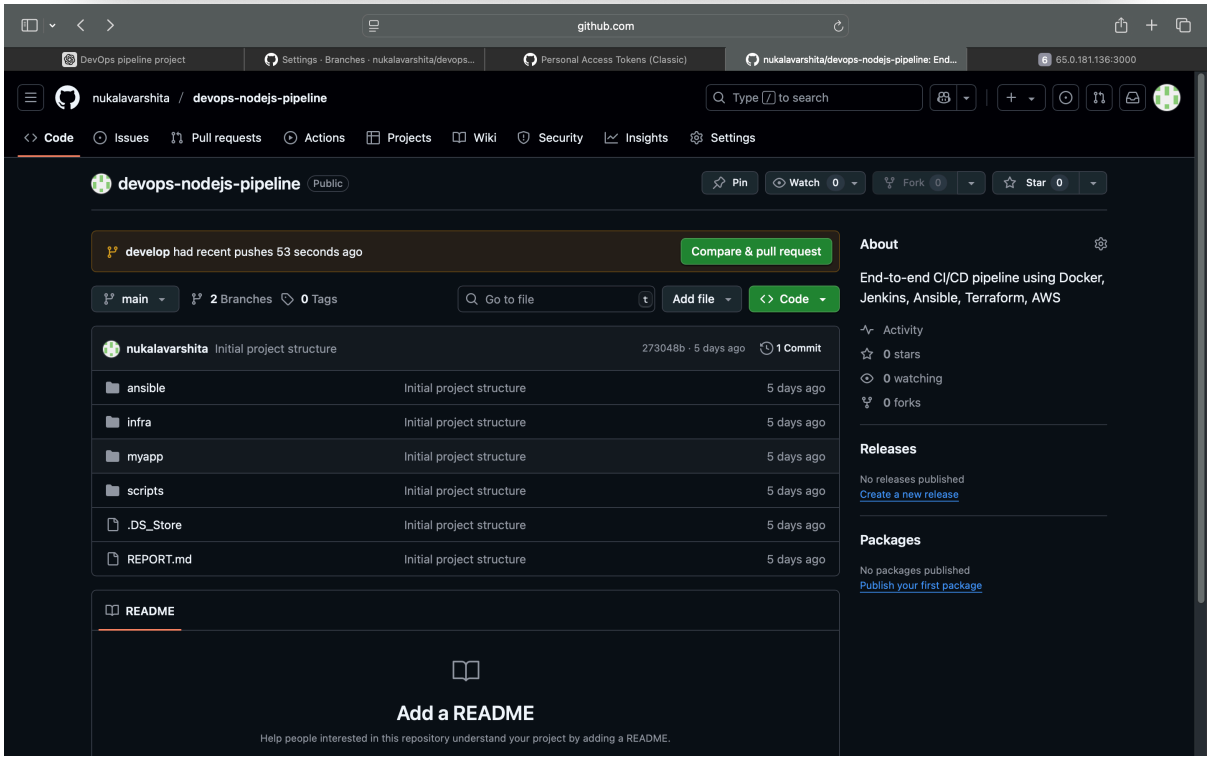
——New commit

index.js

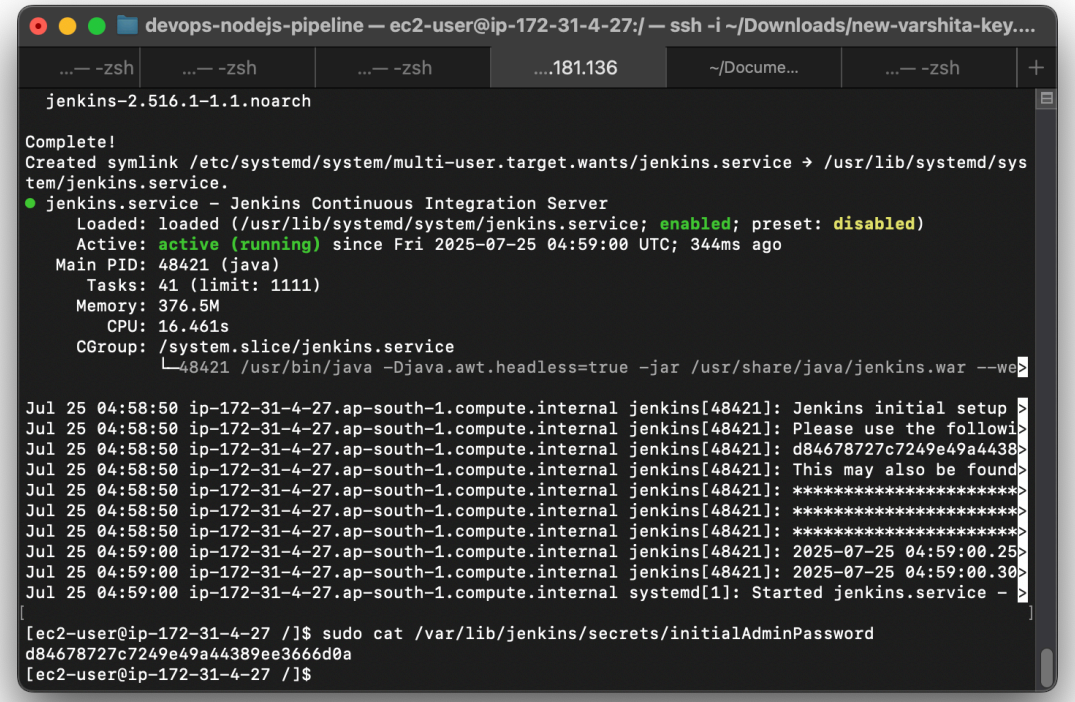
```
  "DevOps is a combination of development and operations.",
  "CI/CD pipelines automate build, test, and deployment stages.",
  "Docker allows apps to run in isolated environments.",
  "Terraform helps manage infrastructure as code.",
  "Ansible uses YAML playbooks to automate server configuration.",
  "Jenkins is a popular open-source CI/CD tool.",
  "DevOps encourages frequent and reliable software releases.",
  "Infrastructure as Code (IaC) enables version control for infrastructure.",
  "Monitoring is essential in every DevOps lifecycle.",
  "DevOps bridges the gap between developers and IT operations."
];

app.get('/', (req, res) => {
  res.send(`<h1>🚀 Welcome to the DevOps Facts API</h1>
            <p>Try <code>/api/fact</code> to get a random DevOps fact!</p>
            <p><strong>New commit deployed successfully!</strong></p>`);
});

app.get('/api/fact', (req, res) => {
  const randomIndex = Math.floor(Math.random() * facts.length);
  res.json({
    fact: facts[randomIndex]
  });
});

const PORT = process.env.PORT || 3000;
app.listen(PORT, () => {
  console.log(`🎉 DevOps Facts API running on http://localhost:${PORT}`);
});
```

>> git add myapp/src/index.js
git commit -m "Update homepage message to include new commit confirmation"
git push origin develop



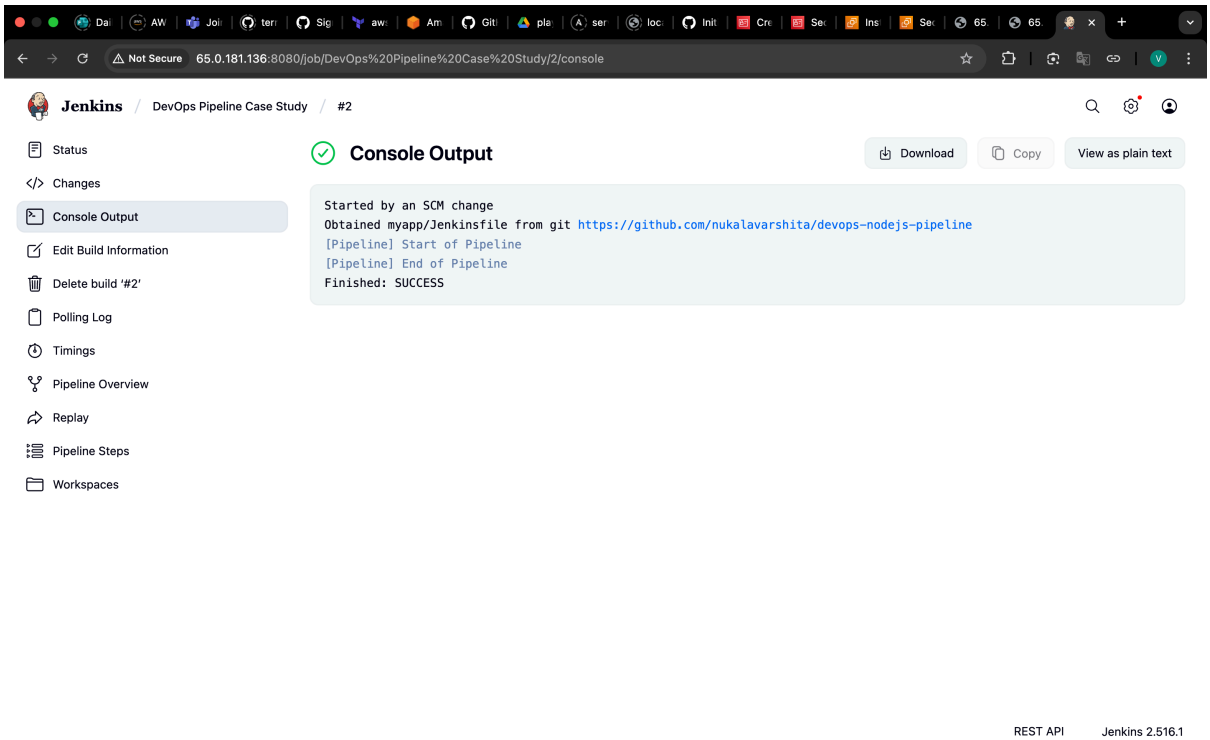


Jenkins setup on instance



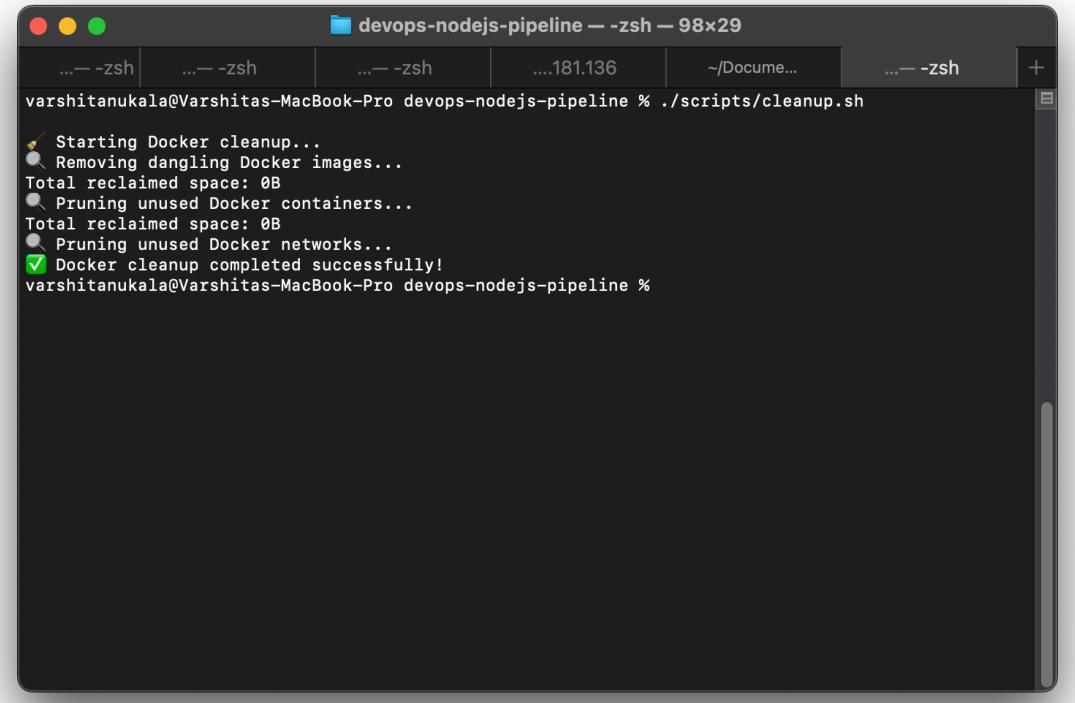
http://65.0.181.136:8080/

*>>> H/2 * * * *



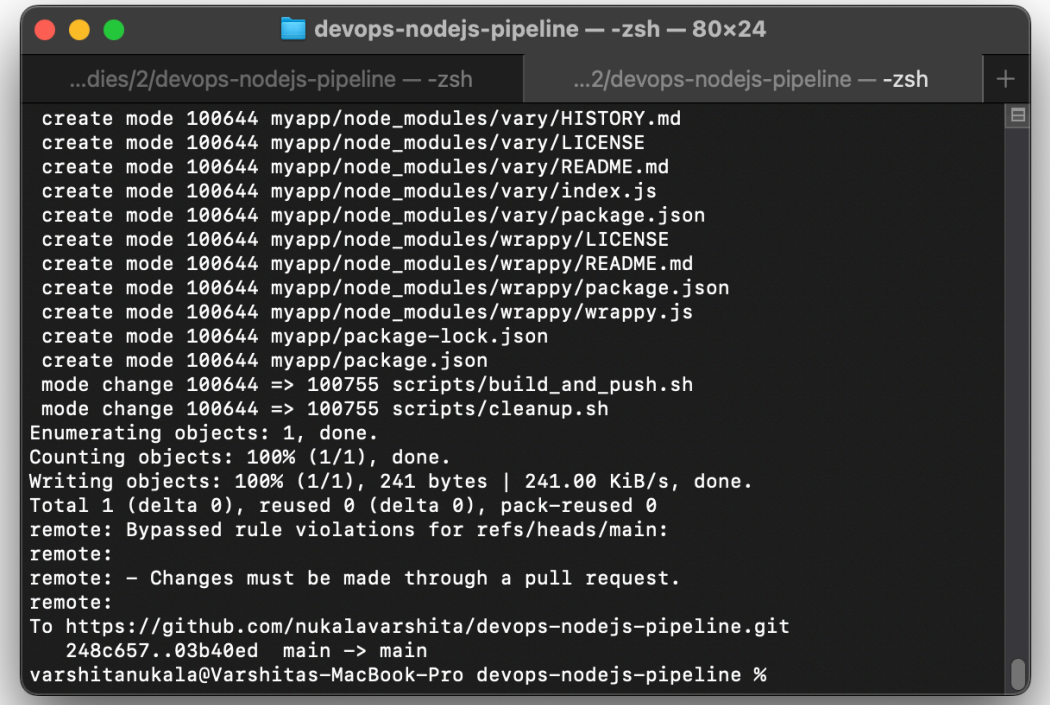
>> chmod +x scripts/cleanup.sh

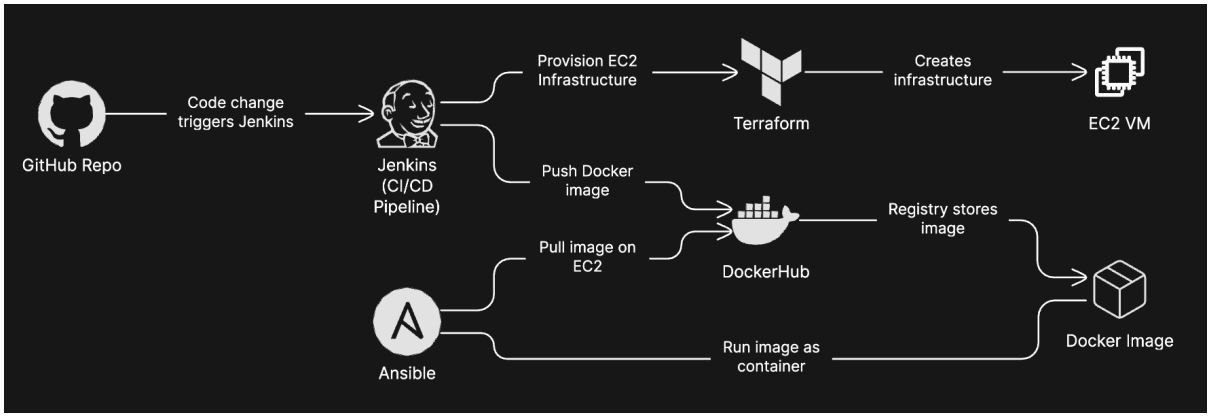
>> ./scripts/cleanup.sh



Syncing Both Main n Develop

git checkout main
git pull origin main
git merge develop
git push origin main




GitHub Repo
Code change triggers Jenkins
Jenkins (CI/CD Pipeline)
Provision EC2 Infrastructure
Terraform
Creates infrastructure
EC2 VM
Push Docker image
DockerHub
Registry stores image
Pull image on EC2
Ansible
Run image as container
Docker Image