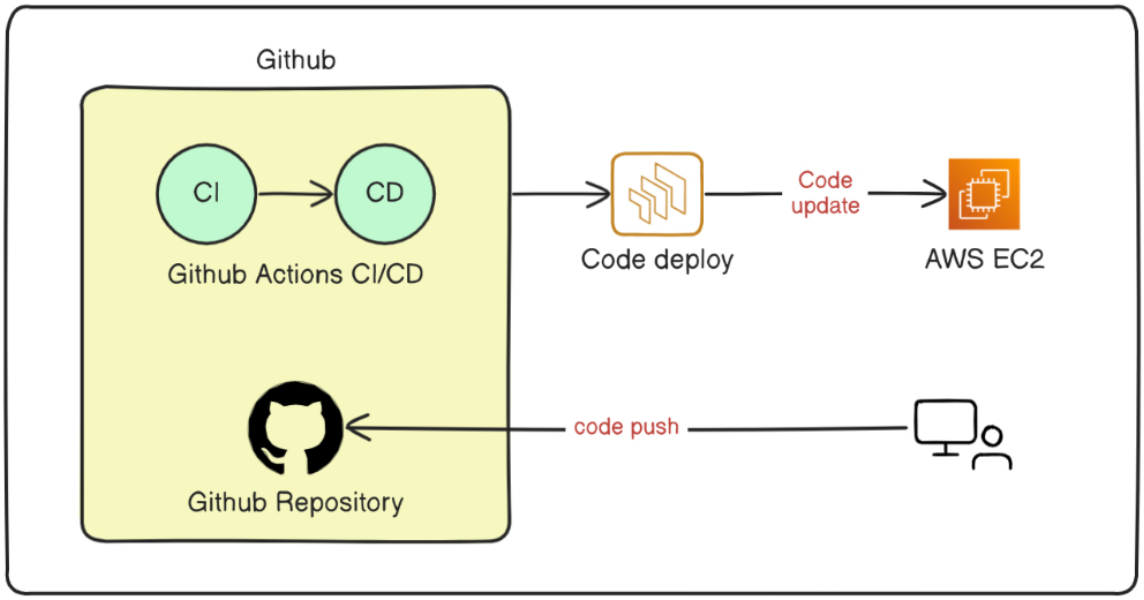
Task

# Deploy Express App On EC2 Using Github Actions

In this guide, we'll walk you through the process of setting up automatic deployment for a Node.js REST API on an AWS EC2 instance using a CI/CD pipeline with GitHub Actions. You'll learn how to configure your EC2 instance, set up your GitHub repository, and create workflows that ensure your app is deployed seamlessly whenever you push changes to your main branch. Let's get started!




## Prerequisites

**AWS Account**: Ensure you have an AWS account and proper permissions to create and manage EC2 instances.

**GitHub Account**: Ensure you have a GitHub account and a repository for your Node.js project.

**Node.js and NPM**: Ensure you have Node.js and NPM installed on your local machine.

## Setup Local Node.js Project

### Initialize Node.js Project

Init your nodejs app and install its dependencies using the following command:

```
npm init -y
npm install express dotenv
```

Create a `.env` file in your project with the port number specified:

```
PORT = 5000
```

Create `index.js` file and setup a basic express web server:

```
require('dotenv').config();
const express = require('express');
const app = express();
const port = process.env.PORT;

app.get('/', (req, res) => {
res.status(200).send(`Hello, from Node App on PORT: ${port}!`);
});

app.listen(port, () => {
console.log(`App running on http://localhost:${port}`);
});
```

This Node.js script creates a simple Express server that listens on a port specified in a `.env` file. When accessed at the root URL (`/`), it responds with a message showing the port number. The server starts and logs a message indicating it's running and the port it's using.

### Upload it in a GitHub Repository

**Create GitHub Repository**: Create a new repository for your Node.js project on GitHub. In our case, we named it `NodeJS-App-in-EC2`.

**Push Code to GitHub**: Initialize git, add remote origin, and push your code to the GitHub repository.

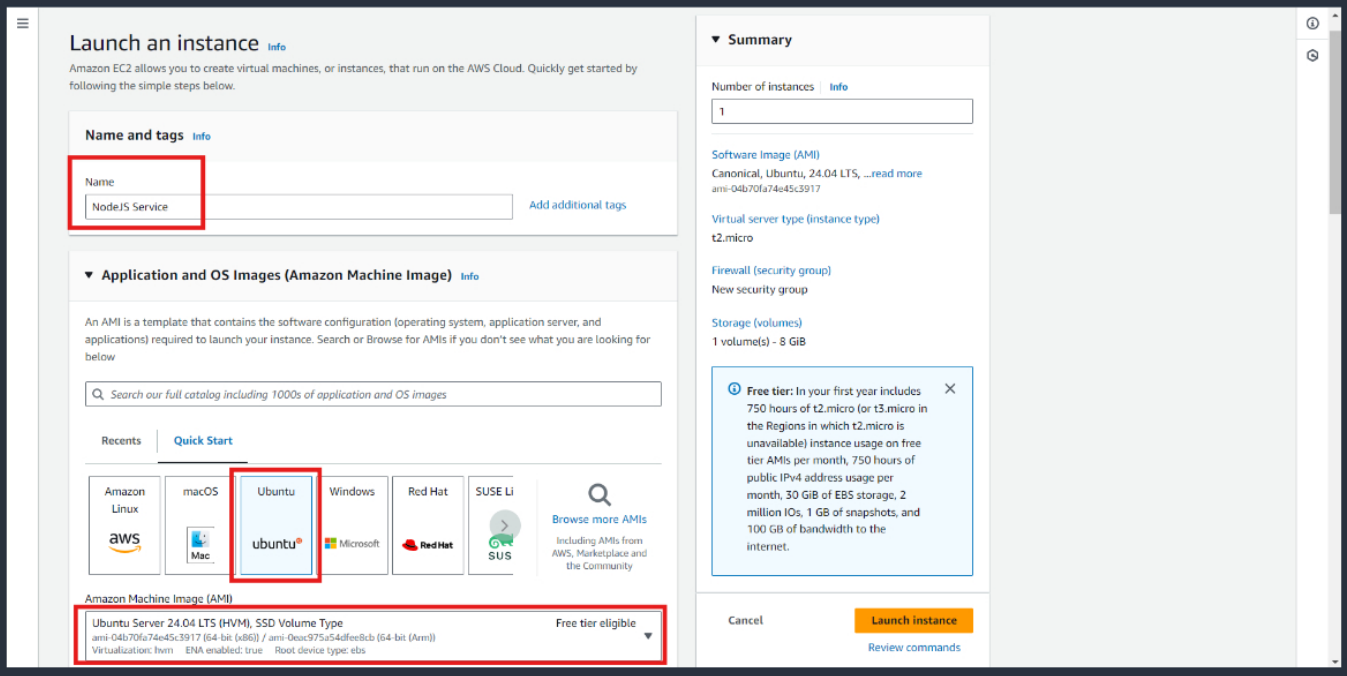
## Setup AWS EC2 Instance

**Login to AWS Console**: Login to your AWS account.

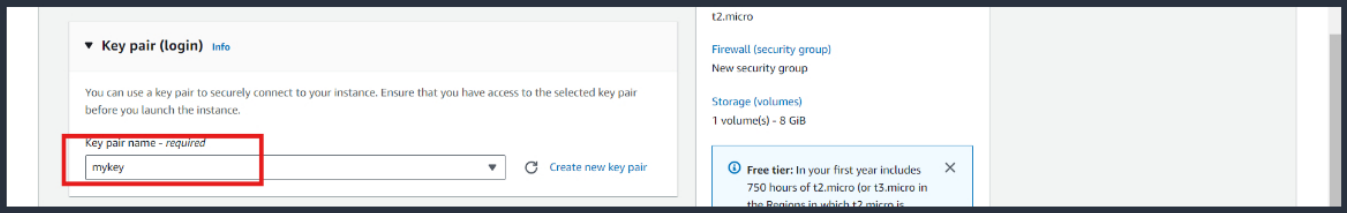
**Launch EC2 Instance**:

Choose "Ubuntu" as the operating system.

Ensure it's a free-tier eligible instance type.




Create a new key pair or use an existing one.

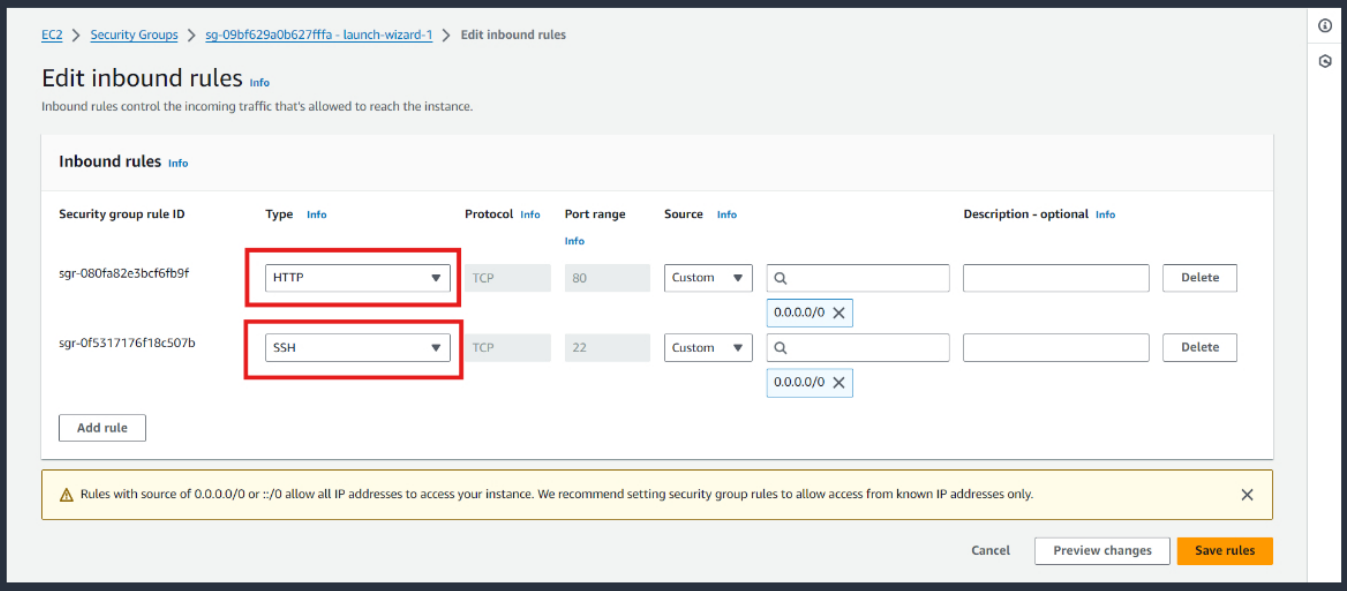



**Configure Security Group**:

Go to security group > select the one for our instance > Edit inbound rules.

Allow SSH (port 22) from your IP.

Allow HTTP (port 80) from anywhere.



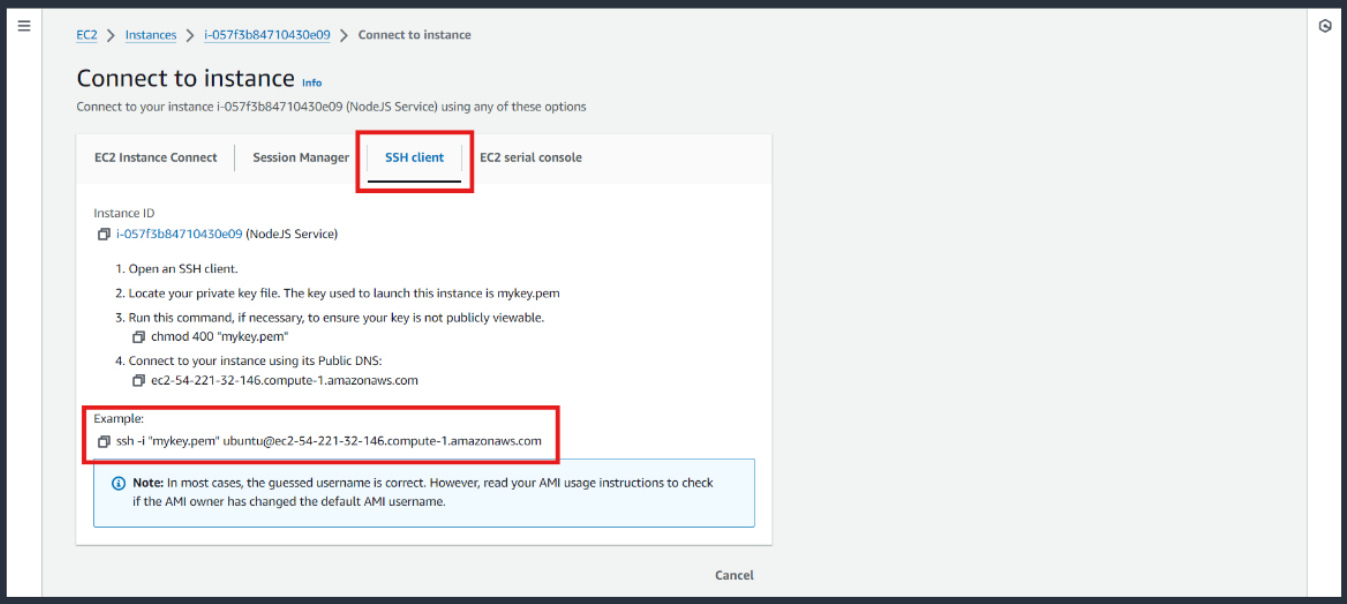

## Connect to EC2 Instance

**SSH into EC2 Instance**:

Go to your instance and click on `connect`.

Open terminal and navigate to the directory with your PEM file.

Use the SSH command provided by AWS to connect. We used windows powershell to SSH into EC2 Instance.

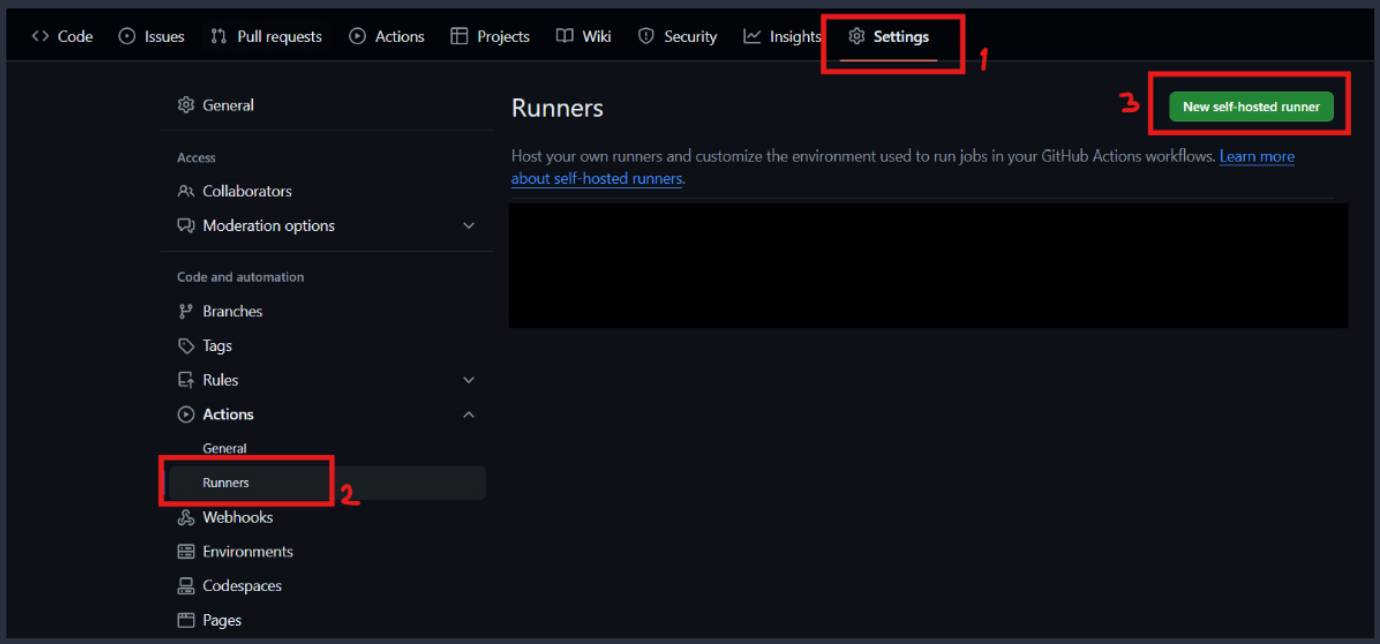



## Setup GitHub Actions Runner on EC2

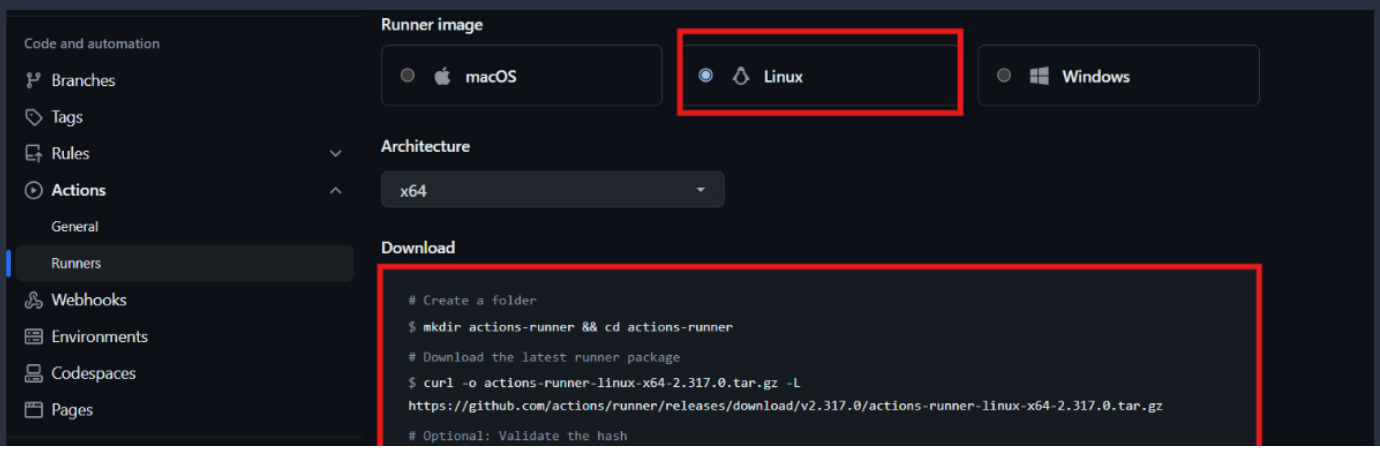
### Setup GitHub Actions:

Go to your repository's settings on GitHub.

Under "Actions", click "Runners" and add a new self-hosted runner for Linux.

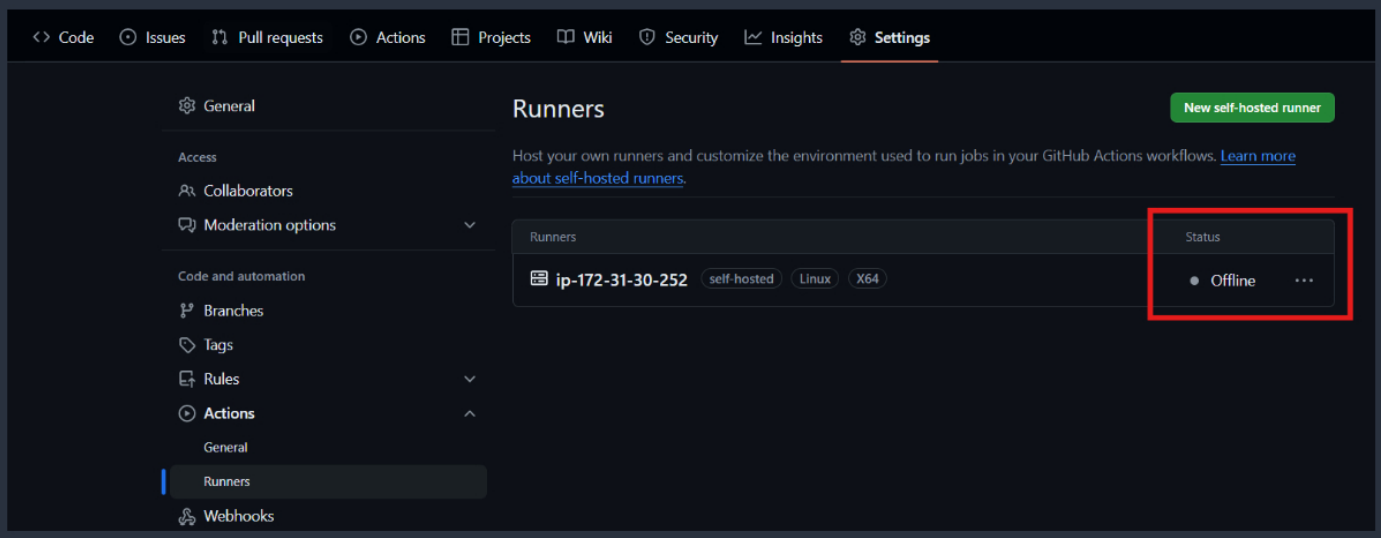



Follow the commands provided to set up the runner on your EC2 instance.




You will get something like this after the final command (marked portion):

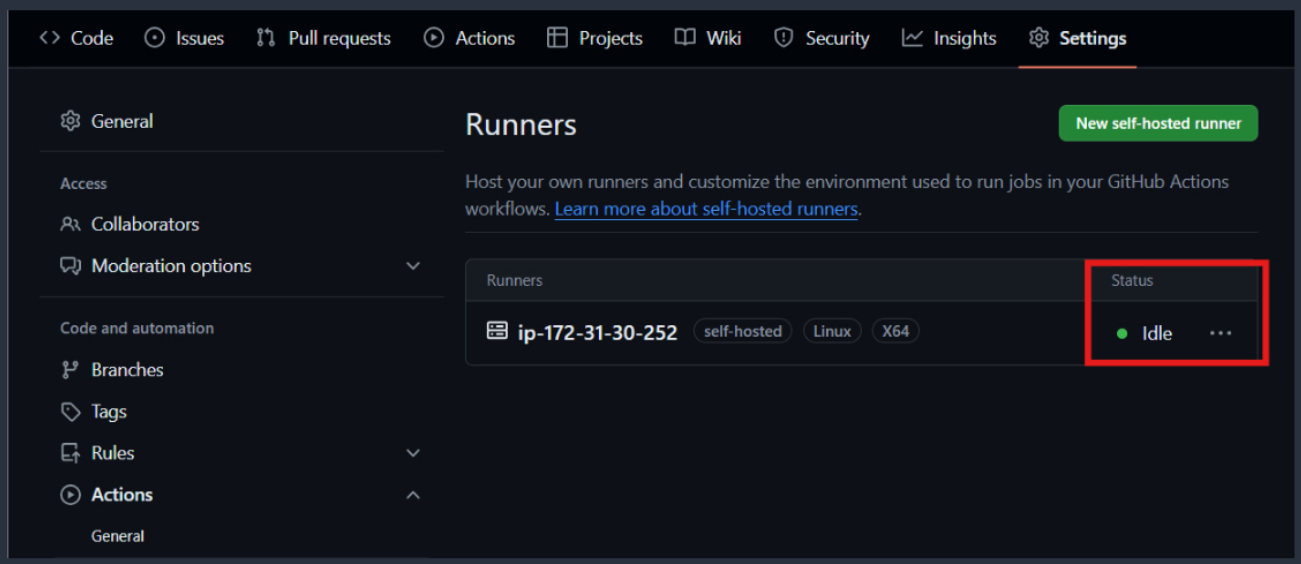

After that, keep hitting `Enter` to continue with the default settings. Now if you go to the **github repository** > **settings** > **runners**, you will get something like this:




It is in offline state. Go to the SSH PowerShell and use the following command:

```
sudo ./svc.sh install
sudo ./svc.sh start
```

Now the runner in the github repository is no more in Offline state:



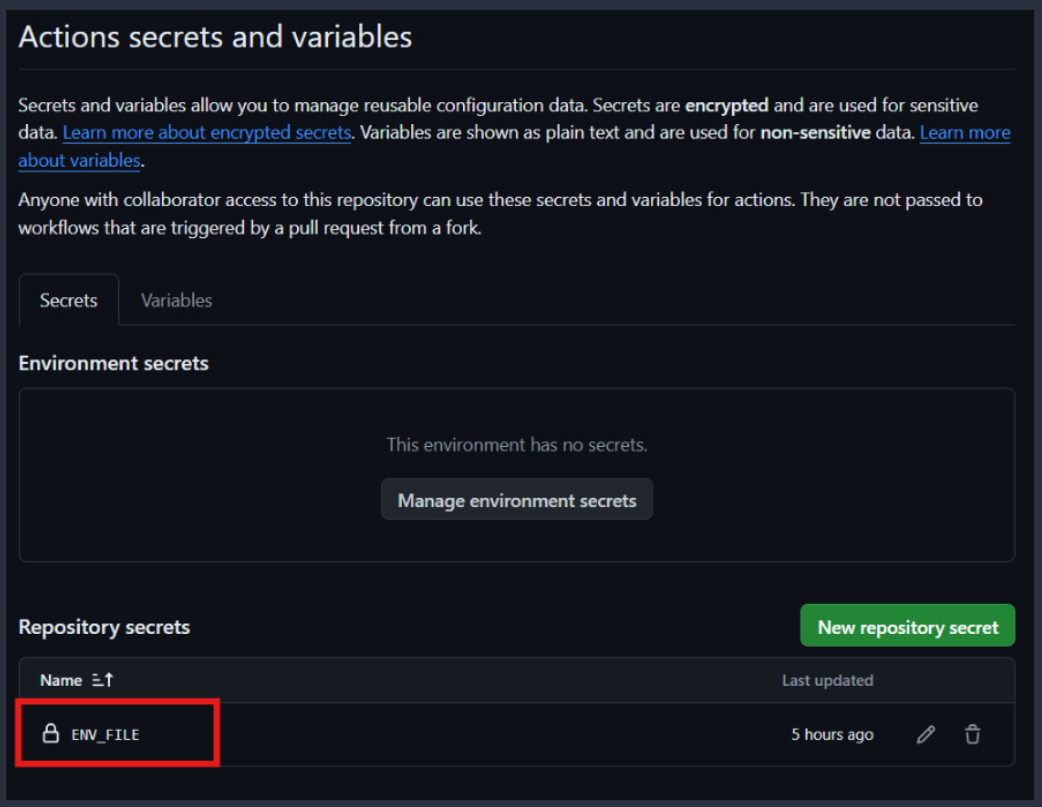

## Create GitHub Secrets

Go to your repository's settings.

Under "Secrets and variables" > "Actions", create a `New repository secret` with your `.env` variables. In our case, we named it `ENV_FILE`. File Content:

```
PORT = 5000
```

Save the secret.

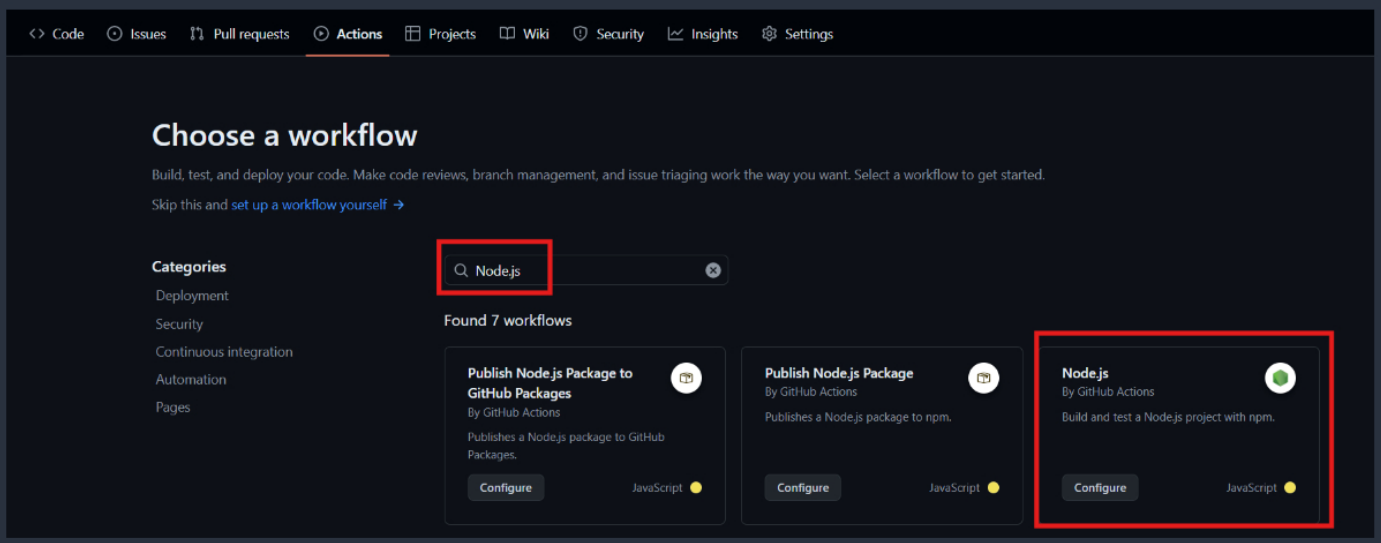



## Setup CI/CD Pipeline with GitHub Actions

### Create GitHub Actions Workflow

In your repository, go to the "Actions" tab.

Choose the Node.js workflow template.




Configure/Change it as follows:

```
name: Node.js CI/CD

on:
push:
    branches: [ "main" ]

jobs:
build:
    runs-on: self-hosted
    strategy:
```

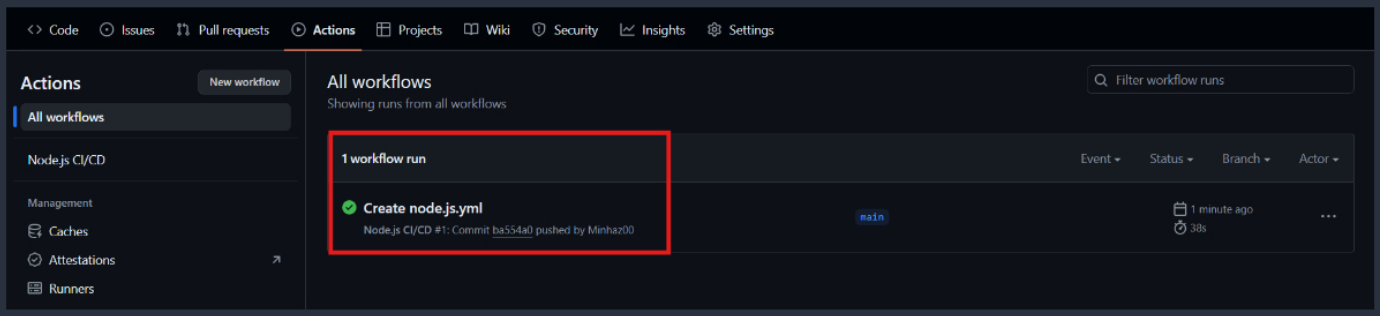
```
    matrix:
        node-version: [18.x]

    steps:
    - uses: actions/checkout@v4
    - name: Use Node.js ${{ matrix.node-version }}
    uses: actions/setup-node@v3
    with:
        node-version: ${{ matrix.node-version }}
        cache: 'npm'

    - run: npm ci
    - run: |
        touch .env
        echo "${{ secrets.ENV_FILE }}" > .env
```

This GitHub Actions configuration sets up a CI/CD pipeline for a Node.js application. The workflow triggers on a push to the `main` branch. It runs on a `self-hosted` runner and uses Node.js version `18.x`. The steps include checking out the code, setting up Node.js, installing dependencies using `npm ci`, and creating a `.env` file from a secret stored in GitHub (`ENV_FILE` that we've created).

### Deploy and Verify

**Push Changes to GitHub**: Commit and push changes to your GitHub repository.

**Check GitHub Actions**: Ensure the workflow runs successfully and deploys the updated code to your EC2 instance.




If you go to the SSH terminal, you can see `_work` directory. Now go to `_work` folder. In this folder you will see your Nodejs app directory from github. Therefore code updated to your EC2 instance.

## Install Node.js and Nginx on EC2

Now go to `_work` folder. In this folder you will see your Nodejs app directory from github. Navigate to that directory. Use `ls` to see you app files.

**Update Packages**:

```
sudo apt-get update
```

**Install Node.js and NPM**:

```
sudo apt-get install -y nodejs
sudo apt install -y npm
```

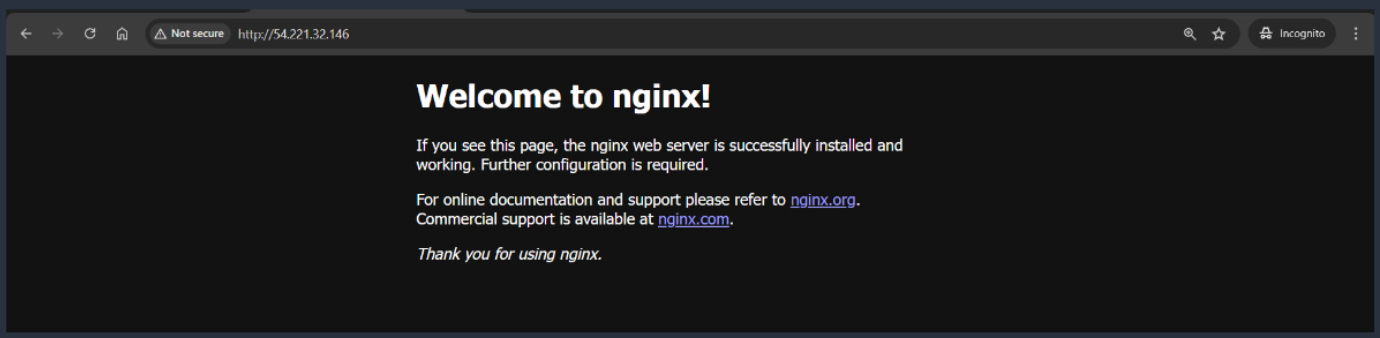
**Check Node and NPM version**:

```
node -v
npm -v
```

**Install Nginx**:

```
sudo apt-get install -y nginx
```

If you visit `http://<ec2-instance-public-ip>` you will see:




**Install pm2**:

```
sudo npm i -g pm2
```

The command installs PM2 globally on your system with superuser (root) privileges. PM2 is a popular process manager for Node.js applications, which helps manage and run applications.

**Verify pm2 installation**:

```
pm2
```

## Configure Nginx

**Edit Nginx Config**:

```
cd /etc/nginx/sites-available
sudo nano default
```

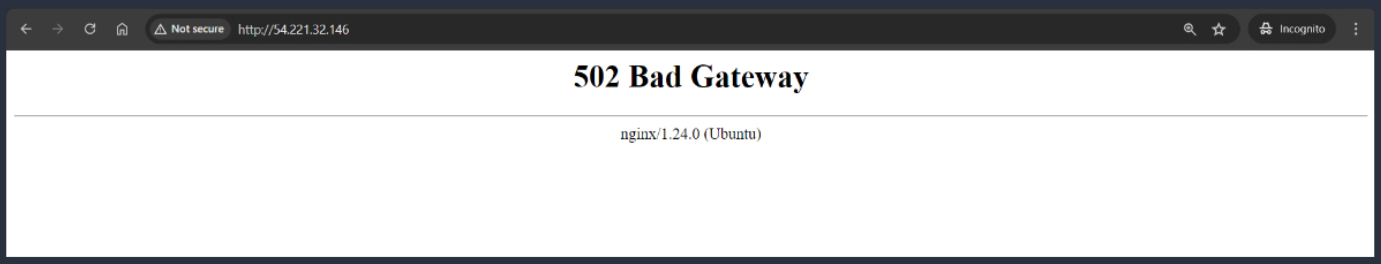
**Add Reverse Proxy Configuration**: Set the `server` block as follows.

```
server {
    listen 80;
    server_name _;

    location / {
     proxy_pass http://localhost:5000;
     proxy_http_version 1.1;
     proxy_set_header Upgrade $http_upgrade;
     proxy_set_header Connection 'upgrade';
     proxy_set_header Host $host;
     proxy_cache_bypass $http_upgrade;

     # Additional headers for proper proxying
     proxy_set_header X-Real-IP $remote_addr;
     proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
     proxy_set_header X-Forwarded-Proto $scheme;
 }
}
```

**Restart Nginx**:

```
sudo systemctl restart nginx
```

If you visit `http://<ec2-instance-public-ip>` you will see:




It gives error because our nodejs app in ec2 is not running.

**Start the nodejs server**:

Let's navigate to the nodejs app directory and run the server using the following command:

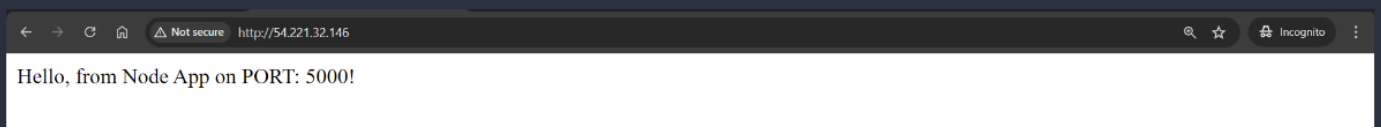
```
pm2 start index.js
```

Expected output:

```
ubuntu@ip-172-31-30-252:~/actions-runner/_work/Github-Actions-NodeJS-App/Github-Actions-NodeJS-App$ pm2 start index.js
[PM2] Spawning PM2 daemon with pm2_home=/home/ubuntu/.pm2
[PM2] PM2 Successfully daemonized
[PM2] Starting /home/ubuntu/actions-runner/_work/Github-Actions-NodeJS-App/Github-Actions-NodeJS-App/index.js in fork_mode (1 instance)
[PM2] Done.
┌────┬─────────┬─────────────┬─────────┬─────────┬──────────┬────────┬──────┬───────────┬──────────┬──────────┬──────────┬──────────┐
│ id │ name    │ namespace   │ version │ mode    │ pid      │ uptime │ ↺    │ status    │ cpu      │ mem      │ user     │ watching │
├────┼─────────┼─────────────┼─────────┼─────────┼──────────┼────────┼──────┼───────────┼──────────┼──────────┼──────────┼──────────┤
│ 0  │ index   │ default     │ 1.0.0   │ fork    │ 8843     │ 0s     │ 0    │ online    │ 0%       │ 39.0mb   │ ubuntu   │ disabled │
└────┴─────────┴─────────────┴─────────┴─────────┴──────────┴────────┴──────┴───────────┴──────────┴──────────┴──────────┴──────────┘
```

Note that the process name is `index` which can be different in your case.

Now, if you visit `http://<ec2-instance-public-ip>` you will see:



Our App has been successfully deployed to AWS and Nginx is serving our nodejs app properly.

## Add/Verify Continuous Deployment

### Update the Workflow manifest

Go to your github repository. From the `workflows` directory open the `node.js.yml` and start editing. Add `- run: pm2 restart index` at the end so that our nodejs app restarts automatically whenever there is new deployment. Here `index` is the process name we saw erlier which can be different in your case. Final node.js.yml will be:

```
name: Node.js CI/CD

on:
  push:
    branches: [ "main" ]

jobs:
  build:
    runs-on: self-hosted
    strategy:
      matrix:
        node-version: [18.x]

    steps:
    - uses: actions/checkout@v4
    - name: Use Node.js ${{ matrix.node-version }}
      uses: actions/setup-node@v3
      with:
        node-version: ${{ matrix.node-version }}
        cache: 'npm'

    - run: npm ci
    - run: |
        touch .env
        echo "${{ secrets.ENV_FILE }}" > .env
    - run: pm2 restart index
```

### Deploy and Verify

**Push Changes to GitHub**: Commit and push changes to your GitHub repository.

**Check GitHub Actions**: Ensure the workflow runs successfully and deploys the updated code to your EC2 instance.

### Update Nodejs app to see the CI/CD

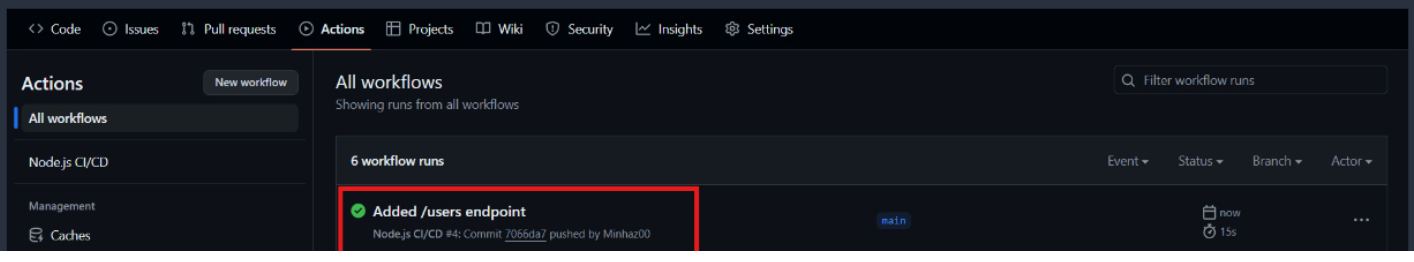
Update the index.js of your app locally:

```
require('dotenv').config();
const express = require('express');
const app = express();
const port = process.env.PORT;


app.get('/', (req, res) => {
  res.status(200).send(`Hello, from Node App on PORT: ${port}!`);
});

app.get('/users', (req, res) => {
    res.status(200).send(`Congratulations! You have reached the users endpoint!`);
});

app.listen(port, () => {
  console.log(`App running on http://localhost:${port}`);
});
```

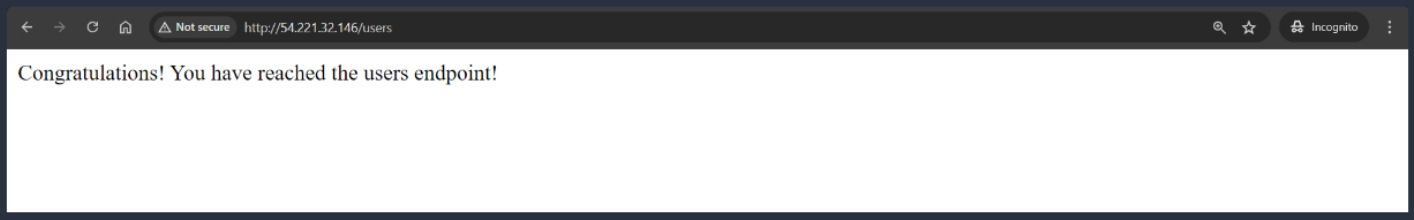
Here we have added new `/users` endpoint. Let's push the code in github to see the updated app in our aws ec2 instance. We need to pull first. Use the following command:

```
git pull
git add .
git commit -m "Added /users endpoint"
git push
```

Now if we go to the github action tab we will see new workflow triggered by our new commit with same name as our commit message.



Now, if you visit `http://<ec2-instance-public-ip>/users` you will see:




So the new endpoint has been automatically added to our AWS deployment.

## Additional Tips

- **Environment Variables**: Use GitHub secrets to securely manage environment variables.
- **Security**: Ensure your EC2 instance is secure and only accessible from necessary IPs.
- **Monitoring**: Use tools like PM2 for process management and monitoring.

## Conclusion

This guide covers the setup of a CI/CD pipeline to automatically deploy a Node.js application on an AWS EC2 instance using GitHub Actions. By following these steps, you can automate your deployment process, ensuring consistent and reliable updates to your application.