

# **CI/CD Pipeline using Jenkins, AWS & Docker**

## **Brief Overview of the Project:**

- Creating EC2 Instance using Ubuntu as the platform
- Installing Java on the instance
- Installing Jenkins on the instance
- Setting Inbound rules for EC2 to enable accessibility of Jenkins through port 8080
- Connecting to Jenkins
- Dockerfile is added to the GitHub repository for the project code.
- Linking GitHub repository to Jenkins and enabling webhooks.
- Building Docker Image for the project using Dockerfile and Running it in container.

Any change made further on from here in the code (GitHub repo will trigger automatic build of the Jenkins pipeline)

- Creating EC2 Instance:

Launch an instance | EC2 | ap-sou-1

https://ap-south-1.console.aws.amazon.com/ec2/home?region=ap-south-1#LaunchInstances:

A complete web en... Saved Gmail YouTube Maps Python for Data Sci... Online Courses - Le... Indian Stock Screen... Data Structures what is a trap in or... Count Masters - St...

aws Services Search [Alt+S]

EC2 > Instances > Launch an instance

## Launch an instance Info

Amazon EC2 allows you to create virtual machines, or instances, that run on the AWS Cloud. Quickly get started by following the simple steps below.

### Name and tags Info

Name

CICD

Add additional tags

### ▼ Application and OS Images (Amazon Machine Image) Info

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below

Search our full catalog including 1000s of application and OS images

Quick Start

Amazon Linux

aws

macOS

Mac

Ubuntu

ubuntu

Windows

Microsoft

Red Hat

Red Hat

SUSE Li

SUS

Browse more AMIs

Including AMIs from AWS, Marketplace and the Community

Amazon Machine Image (AMI)

Ubuntu Server 22.04 LTS (HVM), SSD Volume Type

Free tier eligible

### ▼ Summary

Number of instances Info

1

Software Image (AMI)

Canonical, Ubuntu, 22.04 LTS, ...read more

ami-0287a05f0ef0e9d9a

Virtual server type (instance type)

t2.micro

Firewall (security group)

New security group

Storage (volumes)

1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 30 GiB of EBS storage, 2 million IOs, 1 GB of snapshots, and 100 GB of bandwidth to the internet.

Cancel

Launch instance

Review commands

aws Services Search [Alt+S]

Instances > Launch an instance

### ▼ Instance type Info

Instance type

t2.micro

Family: t2 1 vCPU 1 GiB Memory Current generation: true

On-Demand Linux base pricing: 0.0124 USD per Hour

On-Demand Windows base pricing: 0.017 USD per Hour

On-Demand RHEL base pricing: 0.0724 USD per Hour

On-Demand SUSE base pricing: 0.0124 USD per Hour

Free tier eligible

All generations

Compare instance types

Additional costs apply for AMIs with pre-installed software

### ▼ Key pair (login) Info

You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

Key pair name - required

agastyKey

Create new key pair

### ▼ Network settings Info

Network Info

vpc-022d6a9072e1d70b9

Subnet Info

No preference (Default subnet in any availability zone)

Auto-assign public IP Info

Enable

Firewall (security groups) Info

A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your

### ▼ Summary

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Cancel

Launch instance

Review commands

- Installing Java and Jenkins on the instance once it is set up and running:

```
Expanded Security Maintenance for Applications is not enabled.
34 updates can be applied immediately.
23 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

Last login: Fri Oct 27 05:44:43 2023 from 13.233.177.3
ubuntu@ip-172-31-13-63:~$ curl -fsSL https://pkg.jenkins.io/debian-stable/jenkins.io.key | sudo tee /usr/share/keyrings/jenkins-keyring.asc > /dev/null
ubuntu@ip-172-31-13-63:~$ echo deb [signed-by=/usr/share/keyrings/jenkins-keyring.asc] https://pkg.jenkins.io/debian-stable binary/ | sudo tee /etc/apt/sources.list.d/jenkins.list > /dev/null
ubuntu@ip-172-31-13-63:~$ sudo apt update
Hit:1 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy InRelease
Hit:2 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy-updates InRelease
Hit:3 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy-backports InRelease
Ign:4 https://pkg.jenkins.io/debian-stable binary/ InRelease
Get:5 https://pkg.jenkins.io/debian-stable binary/ Release [2044 B]
Get:6 https://pkg.jenkins.io/debian-stable binary/ Release.gpg [833 B]
Hit:7 http://security.ubuntu.com/ubuntu jammy-security InRelease
Ign:6 https://pkg.jenkins.io/debian-stable binary/ Release.gpg
Reading package lists... Done
W: GPG error: https://pkg.jenkins.io/debian-stable binary/ Release: The following signatures couldn't be verified because the public key is not available: NO_PUBKEY 5BA31D57E5975CA
E: The repository 'https://pkg.jenkins.io/debian-stable binary/ Release' is not signed.
N: Updating from such a repository can't be done securely, and is therefore disabled by default.
N: See apt-get(8) manpage for repository creation and user configuration details.
ubuntu@ip-172-31-13-63:~$ sudo apt install jenkins
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Package jenkins is not available, but is referred to by another package.
This may mean that the package is missing, has been obsoleted, or
is only available from another source

E: Package 'jenkins' has no installation candidate
ubuntu@ip-172-31-13-63:~$ sudo wget -O /usr/share/keyrings/jenkins-keyring.asc \
https://pkg.jenkins.io/debian-stable/jenkins.io-2023.key
echo deb [signed-by=/usr/share/keyrings/jenkins-keyring.asc] \
https://pkg.jenkins.io/debian-stable binary/ | sudo tee \
/etc/apt/sources.list.d/jenkins.list > /dev/null

i-00c76dda48ebd8d08 (CICD)
PublicIPs: 3.111.52.182 PrivateIPs: 172.31.13.65
```

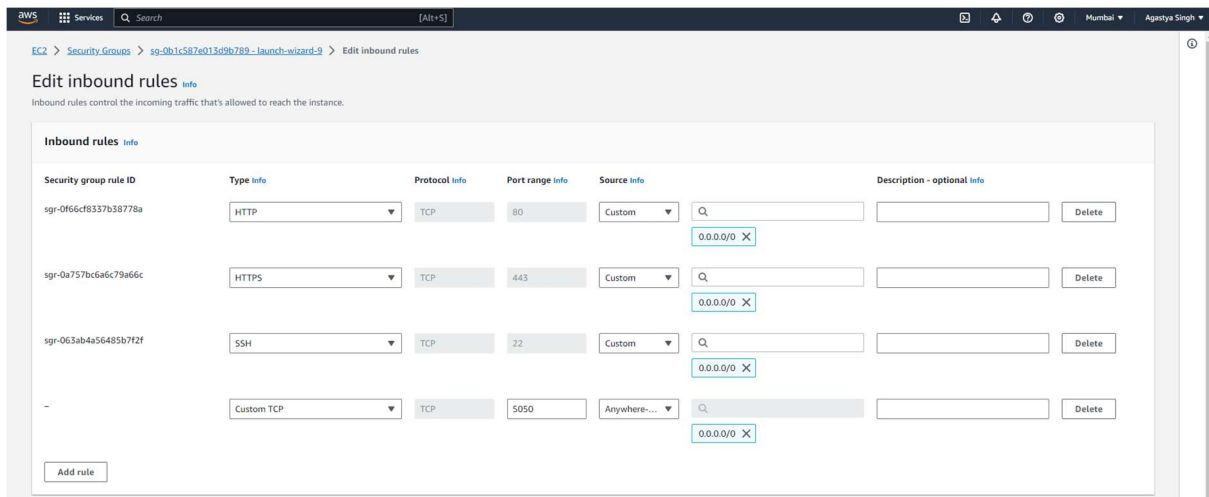
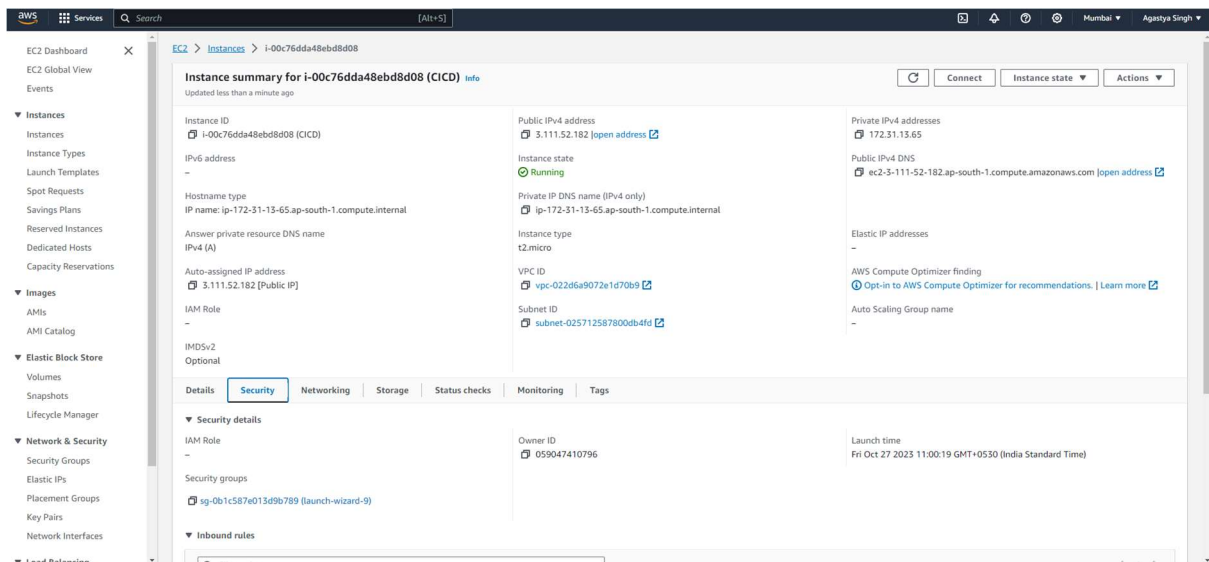
```
ubuntu@ip-172-31-13-63:~$ sudo wget -O /usr/share/keyrings/jenkins-keyring.asc \
https://pkg.jenkins.io/debian-stable/jenkins.io-2023.key
echo deb [signed-by=/usr/share/keyrings/jenkins-keyring.asc] \
https://pkg.jenkins.io/debian-stable binary/ | sudo tee \
/etc/apt/sources.list.d/jenkins.list > /dev/null
sudo apt-get update
sudo apt-get install jenkins
--2023-10-27 05:53:10-- https://pkg.jenkins.io/debian-stable/jenkins.io-2023.key
Resolving pkg.jenkins.io (pkg.jenkins.io)... 151.101.154.133, 2a04:4e42:24::645
Connecting to pkg.jenkins.io (pkg.jenkins.io)|151.101.154.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 3175 (3.1K) [application/pgp-keys]
Saving to: '/usr/share/keyrings/jenkins-keyring.asc'

/usr/share/keyrings/jenkins-keyring.asc 100%[=====] 3.10K --.-KB/s in 0s

2023-10-27 05:53:10 (32.7 MB/s) - '/usr/share/keyrings/jenkins-keyring.asc' saved [3175/3175]

Hit:1 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy InRelease
Hit:2 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy-updates InRelease
Hit:3 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy-backports InRelease
Ign:4 https://pkg.jenkins.io/debian-stable binary/ InRelease
Get:5 https://pkg.jenkins.io/debian-stable binary/ Release [2044 B]
Get:6 https://pkg.jenkins.io/debian-stable binary/ Release.gpg [833 B]
Hit:7 http://security.ubuntu.com/ubuntu jammy-security InRelease
Get:8 https://pkg.jenkins.io/debian-stable binary/ Packages [25.8 kB]
Fetched 28.7 kB in 1s (36.6 kB/s)
Reading package lists... Done
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  net-tools
The following NEW packages will be installed:
  jenkins net-tools
0 upgraded, 2 newly installed, 0 to remove and 40 not upgraded.
Need to get 89.1 MB of archives.
After this operation, 90.4 MB of additional disk space will be used.
```

- Changing Inbound Rules(adding port 8080-custom TCP) for the instance :



- Checking Status of Jenkins:

```
System load: 0.0          Processes: 99
Usage of /: 31.4% of 7.57GB Users logged in: 0
Memory usage: 52%        IPv4 address for eth0: 172.31.13.65
Swap usage: 0%

Expanded Security Maintenance for Applications is not enabled.

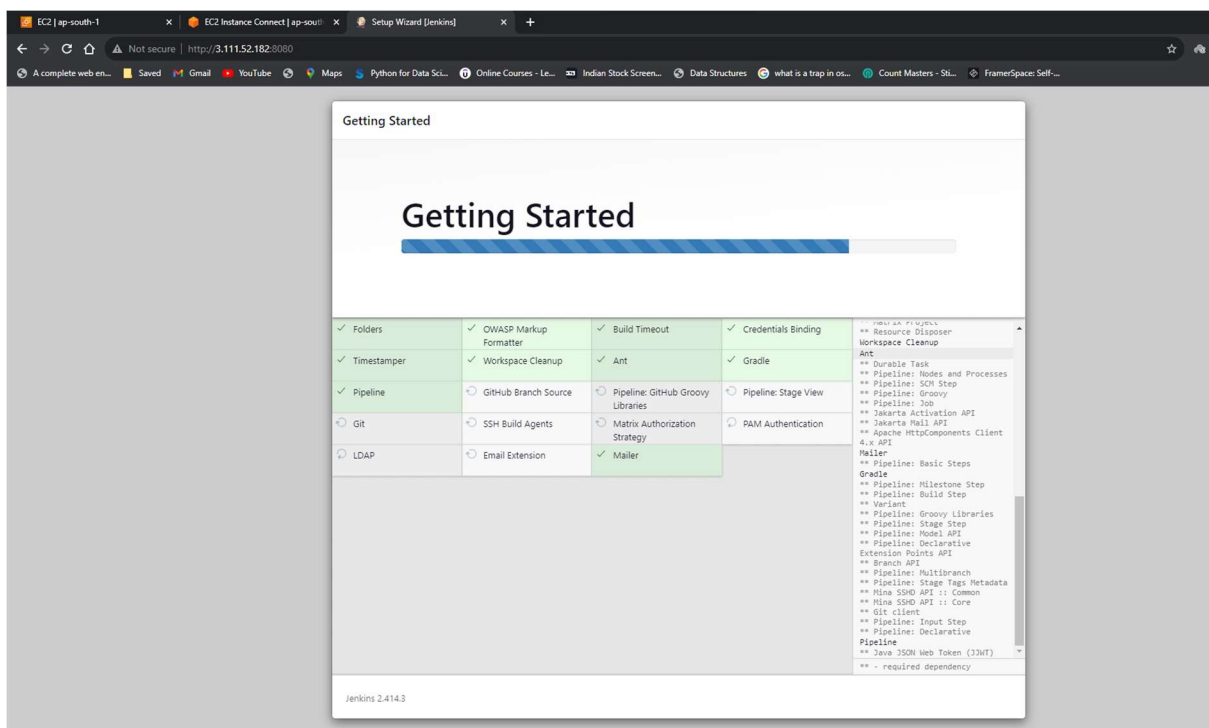
34 updates can be applied immediately.
23 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

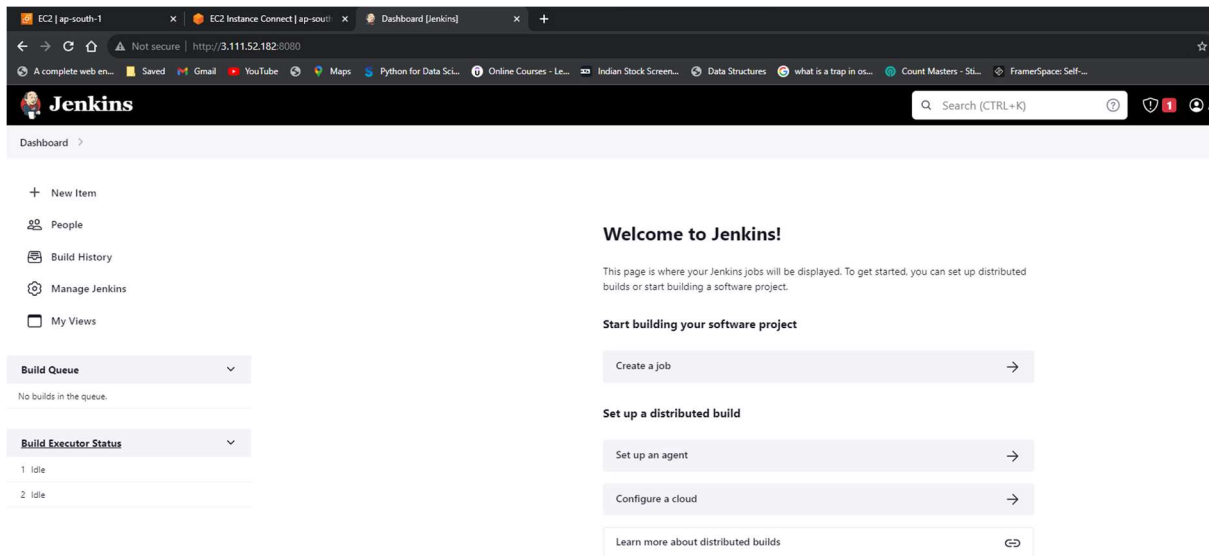
Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

Last login: Fri Oct 27 05:50:47 2023 from 13.233.177.5
ubuntu@ip-172-31-13-65:~$ sudo systemctl status jenkins
jenkins.service - Jenkins Continuous Integration Server
Loaded: loaded (/lib/systemd/system/jenkins.service; enabled; vendor preset: enabled)
Active: active (running) since Fri 2023-10-27 05:54:08 UTC; 10min ago
Main PID: 7967 (java)
Tasks: 38 (limit: 1121)
Memory: 316.9M
CPU: 46.514s
CGroup: /system.slice/jenkins.service
└─7967 /usr/bin/java -Djava.awt.headless=true -jar /usr/share/java/jenkins.war --webroot=/var/cache/jenkins/war --httpPort=8080

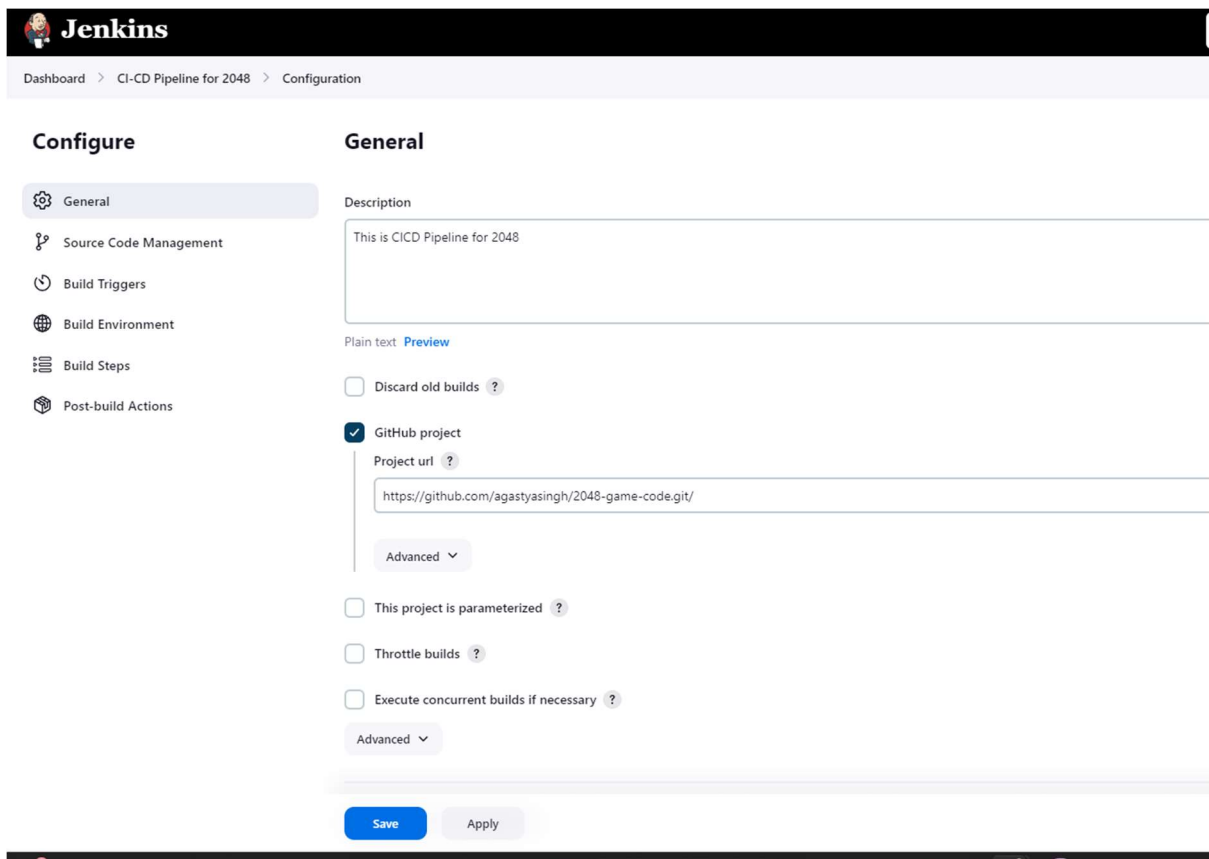
Oct 27 05:53:34 ip-172-31-13-65 jenkins[7967]: 5703b007c6fa4bbab2f0aba907edd910
Oct 27 05:53:34 ip-172-31-13-65 jenkins[7967]: This may also be found at: /var/lib/jenkins/secrets/initialAdminPassword
Oct 27 05:53:34 ip-172-31-13-65 jenkins[7967]: *****
Oct 27 05:53:34 ip-172-31-13-65 jenkins[7967]: *****
Oct 27 05:53:34 ip-172-31-13-65 jenkins[7967]: *****
Oct 27 05:54:08 ip-172-31-13-65 jenkins[7967]: 2023-10-27 05:54:08.905+0000 [id=29] INFO jenkins.InitReactorRunner$1:onAttained: Completed initialization
Oct 27 05:54:08 ip-172-31-13-65 jenkins[7967]: 2023-10-27 05:54:08.928+0000 [id=22] INFO hudson.lifecycle.Lifecycle$onReady: Jenkins is fully up and running
Oct 27 05:54:08 ip-172-31-13-65 systemd[1]: Started Jenkins Continuous Integration Server.
Oct 27 05:54:09 ip-172-31-13-65 jenkins[7967]: 2023-10-27 05:54:09.784+0000 [id=44] INFO h.m.DownloadService$Downloadable$load: Obtained the updated data file for hudson.tasks.h
Oct 27 05:54:09 ip-172-31-13-65 jenkins[7967]: 2023-10-27 05:54:09.786+0000 [id=44] INFO hudson.util.Retrier$start: Performed the action check updates server successfully at the
lines 1-40/23 (END)
```

- Connecting to Jenkins through IP address of the instance and port 8080 ( in this case: 3.111.52.182:8080)





- Setting up the pipeline:



## Configure

- General
- Source Code Management
- Build Triggers
- Build Environment
- Build Steps
- Post-build Actions

### Source Code Management

☐ None

☒ Git ?

Repositories ?

Repository URL ?

https://github.com/agastyasingh/2048-game-code.git

Credentials ?

ubuntu (This is github-credential for jenkins)

+ Add

Advanced

Add Repository

Branches to build ?

Branch Specifier (blank for 'any') ?

\*/main

Add Branch

Save

Apply

## Configure

- General
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### Source Code Management

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\*/main

Add Branch

Save

Apply

- Build Steps to build docker image when pipeline is triggered:

Dashboard > CI-CD Pipeline for 2048 > Configuration

### Configure

- General
- Source Code Management
- Build Triggers
- Build Environment**
- Build Steps
- Post-build Actions

☐ Inspect build log for previous build steps

☐ Terminate a build if it's stuck

☐ With Ant ?

#### Build Steps

**Execute shell** ?

Command

See [the list of available environment variables](#)

```
docker build -t 2048-image .
docker run -d --name 2048-container -p 8000:8000 2048-image
```

Advanced ▾

Add build step ▾

#### Post-build Actions

Add post-build action ▾

**Save** **Apply**

- Adding conf file will automatically trigger the build of pipeline:

agastyasingh / 2048-game-code

<> Code Issues Pull requests Actions Projects Wiki Security Insights Settings

**2048-game-code** Public Pin Unwatch 1

main 1 branch 0 tags Go to file Add file ▾ <> Code ▾

agastyasingh Merge branch 'main' of <https://github.com/agastyasingh/2048-game-code> a15f6d5 10 minutes ago 15 commits

2048-nginx.conf	adding config file for the pipeline automatic build	10 minutes ago
Dockerfile	Pushing code to github	45 minutes ago
README.md	Pushing code to github	45 minutes ago

README.md ✎



Status

Changes

Console Output

View as plain text

Edit Build Information

Delete build '#16'

Polling Log

Git Build Data

Previous Build

## Console Output

```
Started by GitHub push by agastyasingh
Running as SYSTEM
Building in workspace /var/lib/jenkins/workspace/CI-CD Pipeline for 2048
The recommended git tool is: NONE
using credential github-jenkins
> git rev-parse --resolve-git-dir /var/lib/jenkins/workspace/CI-CD Pipeline for 2048/.git # timeout=10
Fetching changes from the remote Git repository
> git config remote.origin.url https://github.com/agastyasingh/2048-game-code.git # timeout=10
Fetching upstream changes from https://github.com/agastyasingh/2048-game-code.git
> git --version # timeout=10
> git --version # 'git version 2.34.1'
using GIT_SSH to set credentials This is github-credential for jenkins
Verifying host key using known hosts file
You're using 'Known hosts file' strategy to verify ssh host keys, but your known_hosts file does not exist, please go to 'Manage Jenkins'
configure host key verification.
> git fetch --tags --force --progress -- https://github.com/agastyasingh/2048-game-code.git +refs/heads/*:refs/remotes/origin/* # timeout=10
> git rev-parse refs/remotes/origin/main^{commit} # timeout=10
Checking out Revision a15fd5a730d9f280f225316a6c76d4a6344bed3 (refs/remotes/origin/main)
> git config core.sparsecheckout # timeout=10
> git checkout -f a15fd5a730d9f280f225316a6c76d4a6344bed3 # timeout=10
Commit message: "Merge branch 'main' of https://github.com/agastyasingh/2048-game-code"
> git rev-list --no-walk 9210f08bff320fe1382c1f9dc48b35b5f3dfd6a7 # timeout=10
[CI-CD Pipeline for 2048] $ /bin/sh -xe /tmp/jenkins2023122748322976421.sh
+ docker build -t 2048-image .
DEPRECATED: The legacy builder is deprecated and will be removed in a future release.
Install the buildx component to build images with BuildKit:
https://docs.docker.com/go/buildx/

Sending build context to Docker daemon 506.4kB

Step 1/7 : FROM ubuntu:latest
--> e4c58958181a
Step 2/7 : RUN apt-get update && apt-get install -y git nginx
--> Using cache
--> fab95063083f
```

## Build number 16:

Connect to instance | EC2 | ap-...

EC2 Instance Connect | ap-sou...

CI-CD Pipeline for 2048 #16 [J...

← → ↻ ⚠ Not secure | http://52.66.245.188:8080/job/CI-CD%20Pipeline%20for%202048/16/

A complete web en... Saved Gmail YouTube Maps Python for Data Sci... Online Courses - Le... Indian Stock Screen... Data Structures what is a trap in os... Count Masters - Sh... FramersSpace: Self...

Jenkins

Search (CTRL+K)

Agastya Singh log out

Dashboard > CI-CD Pipeline for 2048 > #16

Status

Changes

Console Output

Edit Build Information

Delete build '#16'

Polling Log

Git Build Data

Previous Build

#16 (Oct 28, 2023, 5:49:44 AM)

Keep this build forever

Add description Started 51 sec ago Took 1.6 sec

Changes

1. adding config file for the pipeline automatic build (commit: 1ee5969) (details / githubweb)

Started by GitHub push by agastyasingh

git

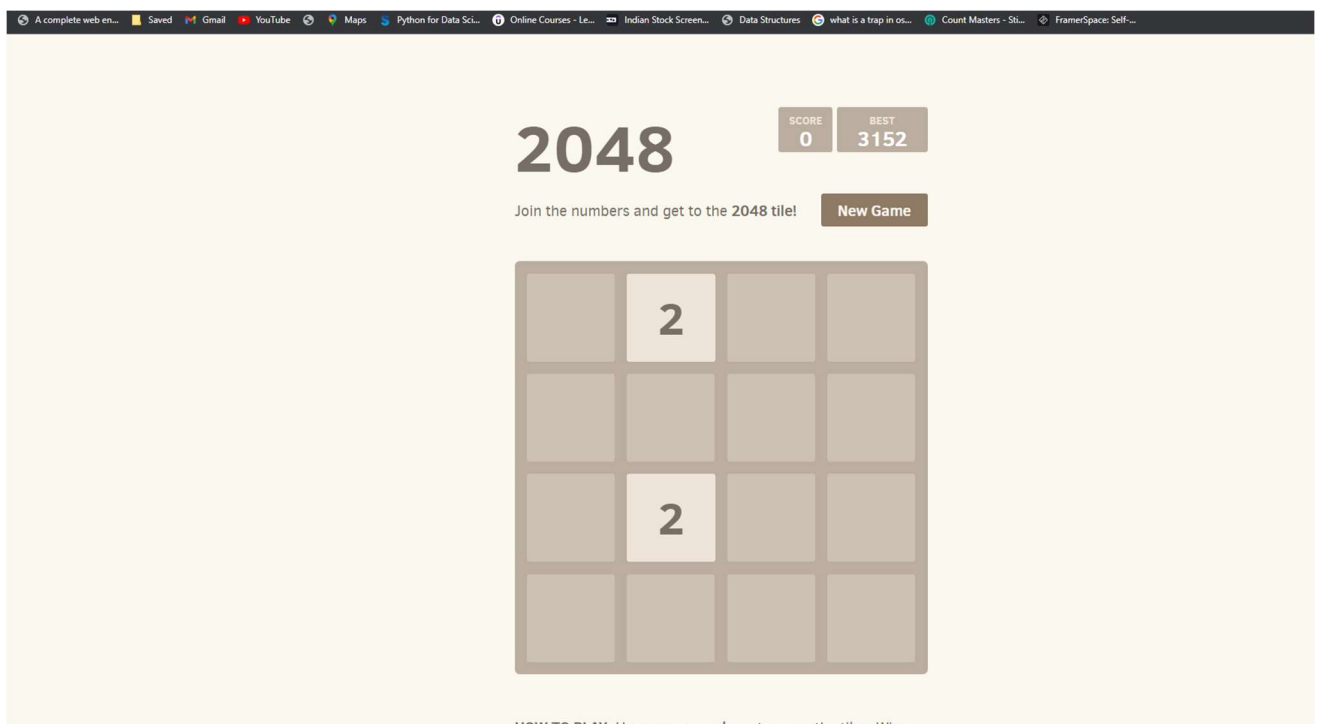
Revision a15fd5a730d9f280f225316a6c76d4a6344bed3  
Repository: https://github.com/agastyasingh/2048-game-code.git  
• refs/remotes/origin/main

So the build is successfully completed, hence the docker image is built and our project is up and running.

History of all the commands executed in the EC2 Shell:

```
aws  Services  Search  [Alt+S]
ubuntu@ip-172-31-8-220:~$ history
1  sudo apt-get update
2  sudo apt install openjdk-11-jre
3  java -version
4  curl -fsSL https://pkg.jenkins.io/debian/jenkins.io.key | sudo tee \
5  echo deb [signed-by=/usr/share/keyrings/jenkins-keyring.asc] \
6  sudo apt-get update
7  sudo apt-get install jenkins
8  systemctl jenkins
9  sudo systemctl enable jenkins
10 systemctl status jenkins
11 sudo systemctl start jenkins
12 systemctl status jenkins
13 sudo systemctl start jenkins
14 sudo cat /var/lib/jenkins/secrets/initialAdminPassword
15 ssh-keygen
16 ls
17 cd .ssh
18 ls
19 sudo cat id_rsa.pub
20 cat id_rsa
21 cd ..
22 sudo systemctl stop jenkins
23 systemctl status jenkins
24 sudo systemctl start jenkins
25 systemctl status jenkins
26 sudo apt-get install docker.io
27 systemctl status docker
28 history
29 sudo usermod -a -G $USER
30 sudo usermod -a -G docker $USER
31 sudo reboot
32 history
33 sudo chmod 777 jenkins
34 sudo usermod -aG docker jenkins
35 sudo usermod -a -G docker jenkins
36 sudo systemctl status docker
37 sudo systemctl restart jenkins
38 docker ps
39 history
ubuntu@ip-172-31-8-220:~$
```

## 2048-Game:



**All the project goals have been completed and CI/CD Pipeline was successfully set-up and running.**