Complete CI/CD Pipeline - Jenkins Container, SonarQube Container, Docker, Trivy, Aws ECR, ECS & ALB

Note : for installation sonarqube must be cpu 2 core et ram 4 gb minimum

1. Install docker

1.1:

# Add Docker's official GPG key:

sudo apt-get update

sudo apt-get install ca-certificates curl

sudo install -m 0755 -d /etc/apt/keyrings

sudo curl -fsSL https://download.docker.com/linux/ubuntu/gpg -o /etc/apt/keyrings/docker.asc

sudo chmod a+r /etc/apt/keyrings/docker.asc

# Add the repository to Apt sources:

echo \

"deb [arch=$(dpkg --print-architecture) signed-by=/etc/apt/keyrings/docker.asc] https://download.docker.com/linux/ubuntu \

$(. /etc/os-release && echo "$VERSION\_CODENAME") stable" | \

sudo tee /etc/apt/sources.list.d/docker.list > /dev/null

sudo apt-get update

1.2:

sudo apt-get install docker-ce docker-ce-cli containerd.io docker-buildx-plugin docker-compose-plugin

1. Create Dockerfile

FROM jenkins/jenkins:2.479.2-jdk17

USER root

RUN apt-get update && apt-get install -y lsb-release

RUN curl -fsSLo /usr/share/keyrings/docker-archive-keyring.asc \

https://download.docker.com/linux/debian/gpg

RUN echo "deb [arch=$(dpkg --print-architecture) \

signed-by=/usr/share/keyrings/docker-archive-keyring.asc] \

https://download.docker.com/linux/debian \

$(lsb\_release -cs) stable" > /etc/apt/sources.list.d/docker.list

RUN apt-get update && apt-get install -y docker-ce-cli

USER jenkins

RUN jenkins-plugin-cli --plugins "blueocean docker-workflow"

1. Build Docker images

docker build -t myjenkins-blueocean:2.479.2-1 .

1. Create a [bridge network](https://docs.docker.com/network/bridge/) in Docker using the following [docker network create](https://docs.docker.com/engine/reference/commandline/network_create/) command:

docker network create jenkins

1. Run Docker images

docker run \

--name jenkins-blueocean \

--restart=on-failure \

--detach \

--network jenkins \

--env DOCKER\_HOST=tcp://docker:2376 \

--env DOCKER\_CERT\_PATH=/certs/client \

--env DOCKER\_TLS\_VERIFY=1 \

--publish 8080:8080 \

--publish 50000:50000 \

--volume jenkins-data:/var/jenkins\_home \

--volume jenkins-docker-certs:/certs/client:ro \

myjenkins-blueocean:2.479.2-1

1. Access jenkins on port 8080 and create admin account and install plagin
2. Now create a token on github to create credential in jenkins server(plugin credentail)
3. Create jenkins file and install plugin Node JS on jenkins server because it is node js applicaiton. Install NodeJS tool from(administrer admin->tool->add->NodeJs)
4. Now insall sonarqube as root from docker hub(https://hub.docker.com/\_/sonarqube):

sysctl -w vm.max\_map\_count=524288

sysctl -w fs.file-max=131072

ulimit -n 131072

ulimit -u 8192

1. Run sonarqube container(https://docs.sonarsource.com/sonarqube-server/latest/try-out-sonarqube/): docker run -d --name sonarqube -e SONAR\_ES\_BOOTSTRAP\_CHECKS\_DISABLE=true -p 9000:9000 sonarqube:latest
2. Run sonarqube form browser with port 9000. By default id: admin and password: admin.
3. Then install plugin on jenkins server pipeline groovy libraries
4. And install plugin for sonarqube: **sonarqube scanner et sonar quality gates**
5. Create a local project on sonarqube( on option: global setting)
6. Now create another credeintial like secret text for sonarqube(go to Admin->account->security...)
7. Select environnemental variable: Administrer jenkins->Systeme->sonarqube service->sleect environmental variable, url=http://ip\_addresse:9000, token=sonar\_token
8. Administre jenkins->tools->Add sonarqube scanner
9. Configure jenkins file: stage(‘sonarqube analysis’)

Now ping each container (jenins and sonarqube)

See network list: docker network ls

Create a network: docker network create network\_name

Connect with network: docker net work connect network\_name container\_name(both container)

After enter into jenkins interactive termianl and ping another\_conatainer

Change root for install ping plugin: docker exec -u 0 -it <container\_name> bash

Install plugin for ping: apt-get update

apt-get install iputils-ping

Finally , ping another\_conatainer

https://www.youtube.com/watch?v=E5hMOGeBT-o&list=PLxzKY3wu0\_FL3TzBnBeBoIMoRkXmYe3VB

What is sonarqube ?

It is quality management tool. It does static code analyser like other tools: coverty,raxis, veracode, codescence etc.

The major advantage of Sonarqube: It provide code test reports, cover coverage.

Component of sonarqube server:

1. Rules (instruction to write code, best practice)
2. Database: all report of code qualities store into database
3. Web interface: acces database (reports) via interface

Sonarqube on local machine

Sonarscanner is service agent where execute in system and scann code

1. Communication between sonarqube and sonarscanner:

- sonarscanner must be installed where code exist

- then it will be apply the rusles

- after it will create report and store into database

Insallation Sonarqube on aws:

### Step 1: Update and Upgrade  
sudo apt-get update  
sudo apt-get upgrade -y

### Step 2: Install OpenJDK 17  
sudo apt install openjdk-17-jdk -y

### Step 3: Install wget and unzip  
sudo apt-get install wget unzip -y

### step4 : download

Installation steps

Download SonarQube [latest verions](https://www.sonarqube.org/downloads/) on to EC2 instace

cd /opt

wget https://binaries.sonarsource.com/Distribution/sonarqube/sonarqube-x.x.zip

extract packages

unzip /opt/sonarqube-x.x.zip

Change ownershipt to the user and Switch to Linux binaries directory to start service

chown -R <sonar\_user>:<sonar\_user\_group> /opt/sonarqube-x.x cd /opt/sonarqube-x.x/bin/linux-x86-64

./sonar.sh start

Connect to the SonarQube server through the browser. It uses port 9000.  
Note: Port should be opened in the Security group

http://<Public-IP>:9000

🧹 CleanUp

Stop SonarQube server

cd /opt/sonarqube-x.x/bin/linux-x86-64

./sonar.sh stop

### enter file then list of file with command: ll ,

To see configuration of sonarqube server: cd Conf ->sonar.property

### To see which operating system can execute

Cd file ->then ll ->cd bin->ll then->linux->ll = execute file (sonar.sh\*)

To start Sonarque server command: ./sonar.sh start (error because sonarqube start as non root)

To see details of error enter into logs file( log file are situated in download file)

Command to see log file: more sonar.logs

Solution: Change propritaire non root:

Create user: useradd sonaradmin

Change propritaire: chown -R sonaradmin:sonaradmin /opt/sonara\_download\_file

Note: Sonarqube not start as root, so need to chagne oweneras non root user.

Install Sonarscanner on Local machine (not in server sonarqube). path(c/windonws/tools/sonar-scanner

Then configure sonnar-configure.properties (path sonar-scanner/conf/sonar-configure.properties)

Now clone project on local machine and create file sonar-project.properties and configure that file.

And then execute scanner by the command line: enter into project and run sacanner execute bat file(path: project path: sonar-scanner path/bin/sonar-scanner.bat)

Note: There is some defults rules in sonarqube server according language , but if we want to add more rules we can add by installing plugins( search plugin sonarqube plugin index)

Install plugin: sonarqube server->administration->marketplace->i understand risk->serach plugin and install(exemple plugin checksytle)accully checksytle plugin for java rules.

To check plugin installed or not( go to rules->repository->checkstyle)

Do I need to use all rules of plugin ?

Answer: Non, I can defined (go to quality profile->create profile ->Activate more -> can active one by one or bulk change(all apply at same time)

We can also add custom rules and deactive rule.

Quality Gates: setting parameters and command differents types needs, like as duplicate 10%, vulnerabilty 10%, issue 0 etc

Then create gate quality and assign condition and gate quality assign do desire project and execute.

Authentication

1. Crate user (administrator->security->user)
2. Create group as same way and assign user as group.
3. Then create database postgresql (mysql is depcreated) go to Système(but here already a database H2 so need to migrate H2 to Postgresql.)link: <https://www.devopsschool.com/blog/how-to-migrate-sonarqube-from-h2-to-postgresql/>
4. For install postgrelsql need to install docker on local machine.

Step 1 – Run Postgresql using docker command

$ docker run --name postgres -p 5432:5432 -e POSTGRES\_PASSWORD=mysecretpassword -d postgres

Step 2 – Modify sonar.properties

sonar.jdbc.username=postgres

sonar.jdbc.password=mysecretpassword

sonar.jdbc.url=jdbc:postgresql://172.31.13.0:5432/postgres?currentSchema=public

Migration database H2 to Postgresql is complete

Now source code analysing by using jenkins CICD

1. First install plugin on jenkins server sonarqube scanner
2. Configure the sonnarqube(manage system from jenkins administrator)
3. Add sonarqube server and configuration with token sonarqube user as secret type text on jenkins server (step2)
4. Now add sonarqube-scanner from jenkins server jenkins adminstration->global tool/tool

## **STEP 2: Install database dependencies: PostgreSQL**

Install on ubuntu:

sudo sh -c 'echo "deb https://apt.postgresql.org/pub/repos/apt $(lsb\_release -cs)-pgdg main" > /etc/apt/sources.list.d/pgdg.list'  
wget --quiet -O - https://www.postgresql.org/media/keys/ACCC4CF8.asc | sudo apt-key add -  
sudo apt-get update  
sudo apt-get -y install postgresql

Start and enable postgresql using the code below

sudo systemctl start postgresql  
sudo systemctl enable postgresql

CONFIGURE

change default for postgres user using:

sudo passwd postgres

switch to postgres user from your cli

su - postgres

Copy this lines of codes one after the other

ALTER USER sonar WITH ENCRYPTED password 'set\_your\_password';  
#set password for sonar user  
CREATE DATABASE sonarqube OWNER sonar;  
#create db  
GRANT ALL PRIVILEGES ON DATABASE sonarqube to sonar;  
#grant privleges

once we are done we will quit the postgresql dashboard

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Note: Sonarqube scanner plugin Does?

* Anaylise code source
* Integrate with sonarqube
* Support multiple language
* Detect code qullite issue
* Integrate into CI/CD pipeline

Sonarqube qulity gates plugin?

* are a feature of SonarQube
* Define aceptance criteria
* Evaluate code against condition
* Provide pass/fall status