Name – Sanjay Raghuwanshi

Email – raghu1c.sanjay@gmail.com

Docker Jenkins Pipeline to Implement CI/CD Workflow

DESCRIPTION

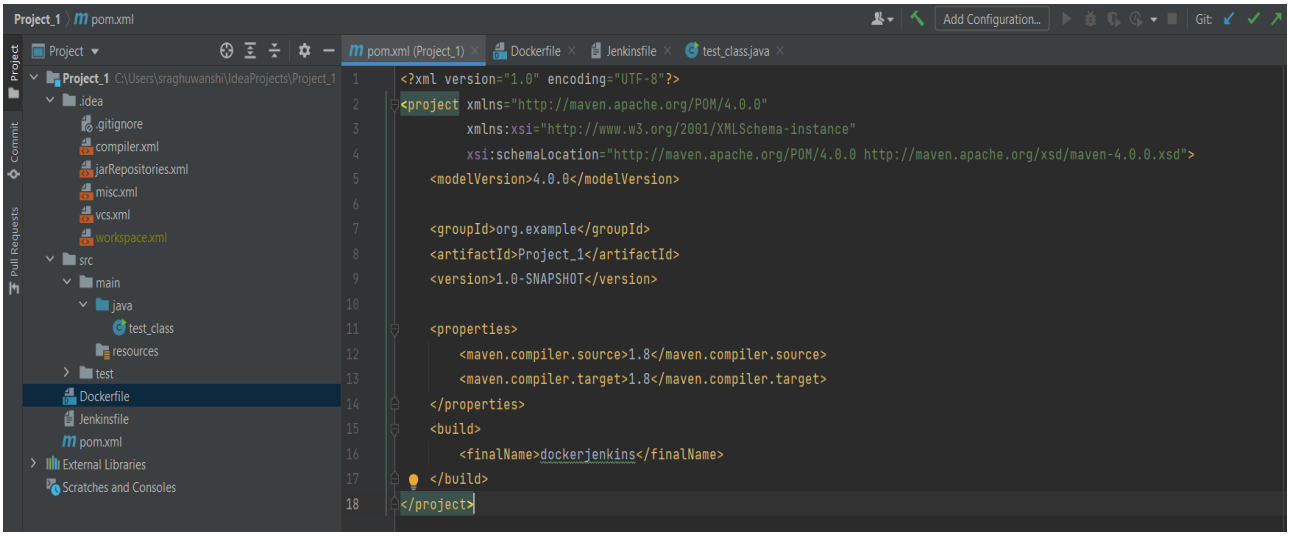
Demonstrate the continuous integration and delivery by building a Docker Jenkins Pipeline.

CONTENTS

1. Availability of the application and its versions in the GitHub
    1.1 Track their versions every time a code is committed to the repository
2. Create a Docker Jenkins Pipeline that will create a Docker image from the Dockerfile and host it on Docker Hub
3. It should also pull the Docker image and run it as a Docker container
4. Build the Docker Jenkins Pipeline to demonstrate the continuous integration and continuous delivery workflow

1. Availability of the application and its versions in the GitHub

1.1 Prepared a maven project in IntelliJ



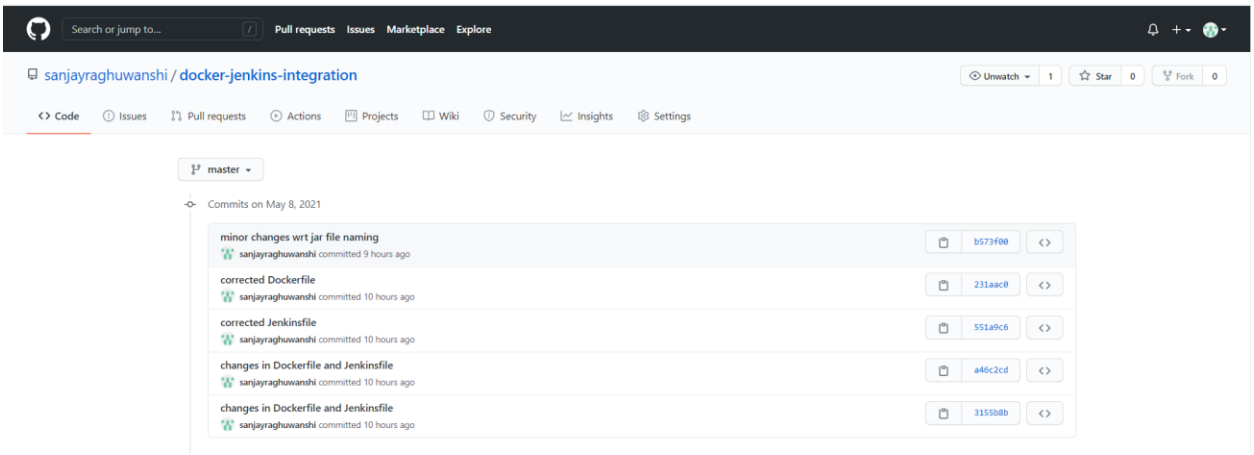
1.2 Initiated git and checked-out code to GitHub –

```
VMWAREM+sraghuwanshi@sraghuwansh-z01 MINGW64 ~/IdeaProjects/Project_1
$ git init
Initialized empty Git repository in C:/Users/sraghuwanshi/IdeaProjects/Project_1
/.git/

VMWAREM+sraghuwanshi@sraghuwansh-z01 MINGW64 ~/IdeaProjects/Project_1 (master)
$ git status
On branch master

No commits yet

Untracked files:
  (use "git add <file>..." to include in what will be committed)
        .idea/
        pom.xml

nothing added to commit but untracked files present (use "git add" to track)

VMWAREM+sraghuwanshi@sraghuwansh-z01 MINGW64 ~/IdeaProjects/Project_1 (master)
$ git add .
warning: LF will be replaced by CRLF in pom.xml.
The file will have its original line endings in your working directory

VMWAREM+sraghuwanshi@sraghuwansh-z01 MINGW64 ~/IdeaProjects/Project_1 (master)
$ git commit -m "first commit"
[master (root-commit) b861cb4] first commit
 5 files changed, 73 insertions(+)
 create mode 100644 .idea/.gitignore
 create mode 100644 .idea/compiler.xml
 create mode 100644 .idea/jarRepositories.xml
 create mode 100644 .idea/misc.xml
 create mode 100644 pom.xml

VMWAREM+sraghuwanshi@sraghuwansh-z01 MINGW64 ~/IdeaProjects/Project_1 (master)
$ git status
On branch master
nothing to commit, working tree clean

VMWAREM+sraghuwanshi@sraghuwansh-z01 MINGW64 ~/IdeaProjects/Project_1 (master)
$ git remote add origin https://github.com/sanjayraghuwanshi/docker-jenkins-integration.git
```

1.3 Pushed the changes to git hub –

```
VMWAREM+sraghuwanshi@sraghuwansh-z01 MINGW64 ~/IdeaProjects/Project_1 (master)
$ git push -u origin master
Enumerating objects: 8, done.
Counting objects: 100% (8/8), done.
Delta compression using up to 8 threads
Compressing objects: 100% (8/8), done.
Writing objects: 100% (8/8), 1.65 KiB | 561.00 KiB/s, done.
Total 8 (delta 0), reused 0 (delta 0), pack-reused 0
To https://github.com/sanjayraghuwanshi/docker-jenkins-integration.git
 * [new branch]      master -> master
Branch 'master' set up to track remote branch 'master' from 'origin'.

VMWAREM+sraghuwanshi@sraghuwansh-z01 MINGW64 ~/IdeaProjects/Project_1 (master)
$
```

1.4 Changes reflecting to GitHub

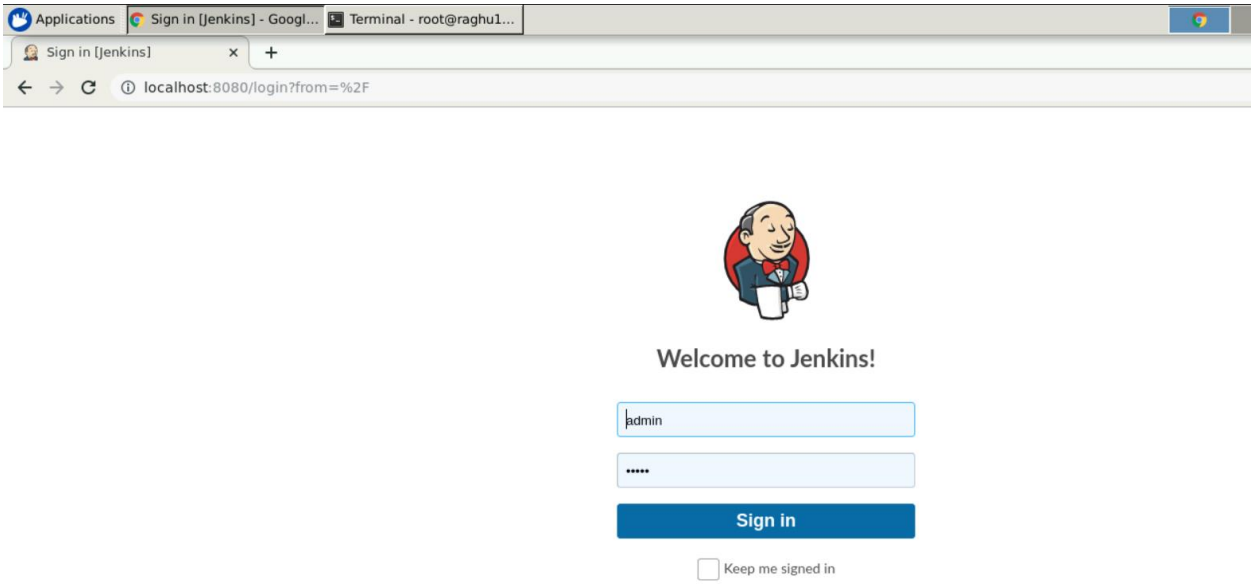


1.5 Prepare a Jenkins pipeline to checkout the code and prepare a build –

- Check if Jenkins is running –

```
root@raghu1csanjaygm:~/project#
root@raghu1csanjaygm:~/project# systemctl status jenkins
● jenkins.service - LSB: Start Jenkins at boot time
   Loaded: loaded (/etc/init.d/jenkins; bad; vendor preset: enabled)
   Active: active (exited) since Fri 2021-05-07 12:26:59 UTC; 57min ago
     Docs: man:systemd-sysv-generator(8)
  Process: 1801 ExecStart=/etc/init.d/jenkins start (code=exited, status=0/SUCCESS)
    Tasks: 0
   Memory: 0B
      CPU: 0

May 07 12:26:51 raghu1csanjaygm systemd[1]: Starting LSB: Start Jenkins at boot time...
May 07 12:26:54 raghu1csanjaygm jenkins[1801]: Correct java version found
May 07 12:26:54 raghu1csanjaygm jenkins[1801]:  * Starting Jenkins Automation Server jenkins
May 07 12:26:54 raghu1csanjaygm su[2291]: Successful su for jenkins by root
May 07 12:26:54 raghu1csanjaygm su[2291]: + ??? root:jenkins
May 07 12:26:54 raghu1csanjaygm su[2291]: pam_unix(su:session): session opened for user jenkins by (uid=0)
May 07 12:26:59 raghu1csanjaygm jenkins[1801]:    ...done.
May 07 12:26:59 raghu1csanjaygm systemd[1]: Started LSB: Start Jenkins at boot time.
root@raghu1csanjaygm:~/project#
```

- Login to Jenkins



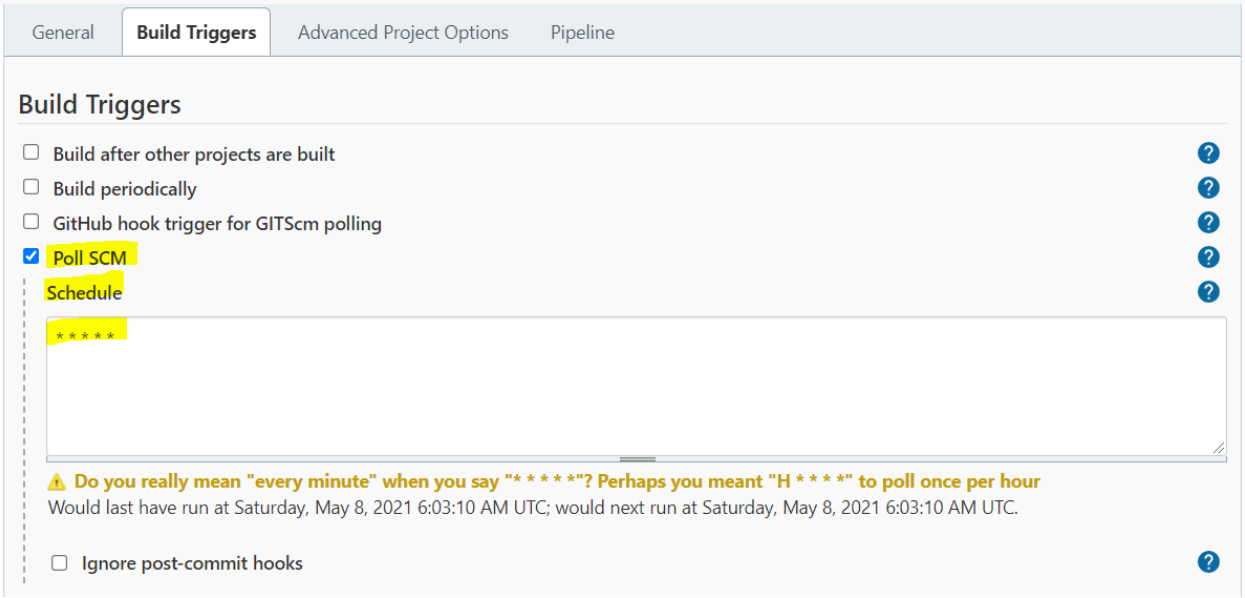
- **Prepare initial pipeline script to perform build on each commit –**
- Pipeline Syntax -

Main Script

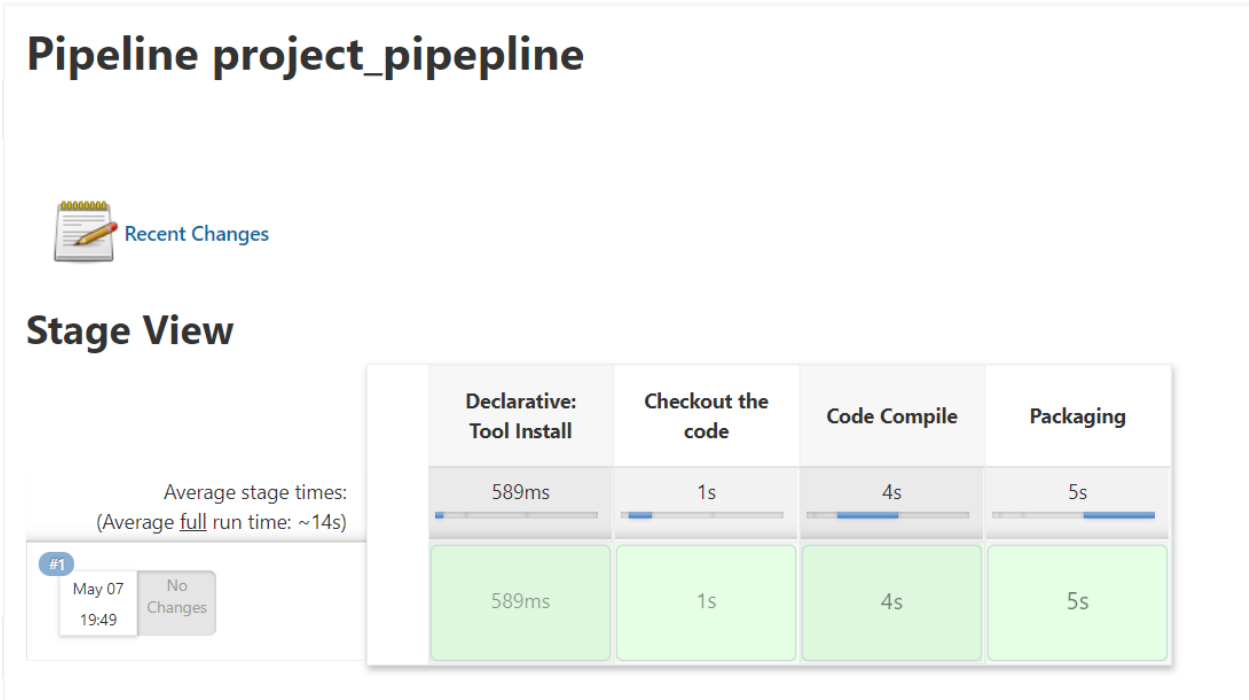
```
pipeline {
        agent {
            label 'master'
        }
        tools {
            maven 'mymaven'
            jdk 'myjava'
        }
    stages {

        stage ('Checkout the code') {
            steps{
                git branch: 'master', url: 'https://github.com/sanjayraghuwanshi/docker-jenkins-integration.git'
            }
        }
        stage ('Code Compile') {
            steps{
                sh """
                mvn compile
                """
            }
        }
        stage ('Packaging') {
            steps {
                sh """
                mvn package
                """
            }
        }
      }
}
```

Pipeline Syntax

- **Configure Poll SCM to execute the build on each commit –**



- **Execute pipeline –**

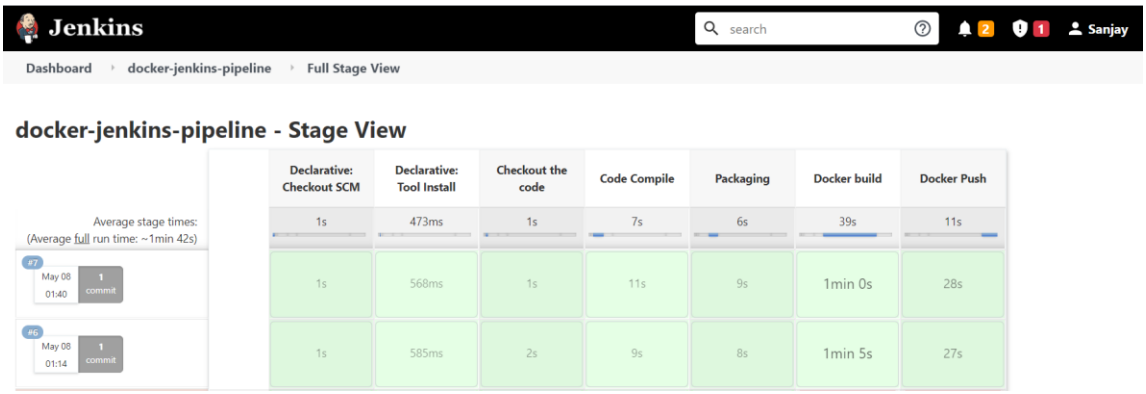


2. Create a Docker Jenkins Pipeline that will create a Docker image from the Dockerfile and host it on Docker Hub

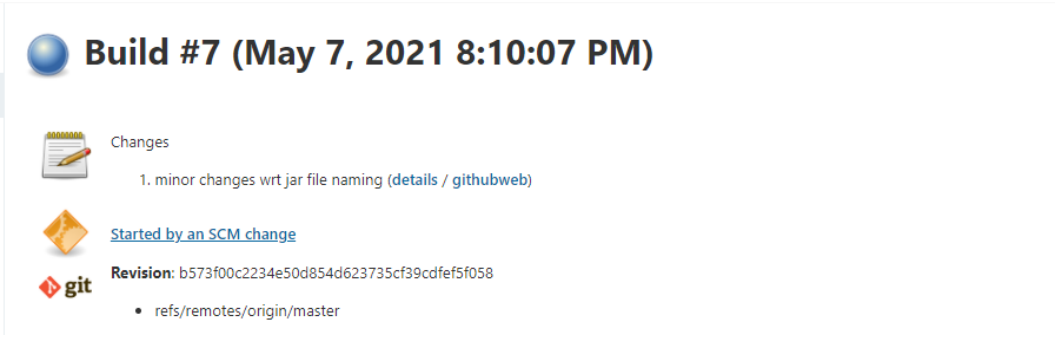
2.1 Jenkinsfile having docker related changes – https://tinyurl.com/mjjujntx

2.2 Dockerfile used to create the Docker Image – https://tinyurl.com/2capr2hj

2.3 Pipeline execution –



2.4 Pipeline execution results –



2.4.1 Code checkout –

```
Checking out Revision b573f00c2234e50d854d623735cf39cdfef5f058 (refs/remotes/origin/master)
 > /usr/bin/git config core.sparsecheckout # timeout=10
 > /usr/bin/git checkout -f b573f00c2234e50d854d623735cf39cdfef5f058 # timeout=10
 > /usr/bin/git branch -a -v --no-abbrev # timeout=10
 > /usr/bin/git branch -D master # timeout=10
 > /usr/bin/git checkout -b master b573f00c2234e50d854d623735cf39cdfef5f058 # timeout=10
Commit message: "minor changes wrt jar file naming"
```

2.4.2 Code Compile –

```
+ mvn compile
[INFO] Scanning for projects...
[INFO]
[INFO] ------------------------------------------------------------------------
[INFO] Building Project_1 1.0-SNAPSHOT
[INFO] ------------------------------------------------------------------------
[INFO]
[INFO] --- maven-resources-plugin:2.6:resources (default-resources) @ Project_1 ---
[WARNING] Using platform encoding (UTF-8 actually) to copy filtered resources, i.e. build is platform dependent!
[INFO] skip non existing resourceDirectory /var/lib/jenkins/workspace/docker-jenkins-pipeline/src/main/resources
[INFO]
[INFO] --- maven-compiler-plugin:3.2:compile (default-compile) @ Project_1 ---
[INFO] Changes detected - recompiling the module!
[WARNING] File encoding has not been set, using platform encoding UTF-8, i.e. build is platform dependent!
[INFO] Compiling 1 source file to /var/lib/jenkins/workspace/docker-jenkins-pipeline/target/classes
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time: 3.592 s
[INFO] Finished at: 2021-05-07T20:10:24+00:00
[INFO] Final Memory: 12M/127M
[INFO] ------------------------------------------------------------------------
```

2.4.3 Preparing build –

```
+ mvn package
[INFO] Scanning for projects...
[INFO]
[INFO] ------------------------------------------------------------------------
[INFO] Building Project_1 1.0-SNAPSHOT
[INFO] ------------------------------------------------------------------------
[INFO]
[INFO] --- maven-resources-plugin:2.6:resources (default-resources) @ Project_1 ---
[WARNING] Using platform encoding (UTF-8 actually) to copy filtered resources, i.e. build is platform dependent!
[INFO] skip non existing resourceDirectory /var/lib/jenkins/workspace/docker-jenkins-pipeline/src/main/resources
[INFO]
[INFO] --- maven-compiler-plugin:3.2:compile (default-compile) @ Project_1 ---
[INFO] Nothing to compile - all classes are up to date
[INFO]
[INFO] --- maven-resources-plugin:2.6:testResources (default-testResources) @ Project_1 ---
[WARNING] Using platform encoding (UTF-8 actually) to copy filtered resources, i.e. build is platform dependent!
[INFO] skip non existing resourceDirectory /var/lib/jenkins/workspace/docker-jenkins-pipeline/src/test/resources
[INFO]
[INFO] --- maven-compiler-plugin:3.2:testCompile (default-testCompile) @ Project_1 ---
[INFO] No sources to compile
[INFO]
[INFO] --- maven-surefire-plugin:2.17:test (default-test) @ Project_1 ---
[INFO] No tests to run.
[INFO]
[INFO] --- maven-jar-plugin:2.4:jar (default-jar) @ Project_1 ---
[INFO] Building jar: /var/lib/jenkins/workspace/docker-jenkins-pipeline/target/dockerjenkins.jar
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time: 3.519 s
[INFO] Finished at: 2021-05-07T20:10:33+00:00
[INFO] Final Memory: 12M/221M
[INFO] ------------------------------------------------------------------------
```

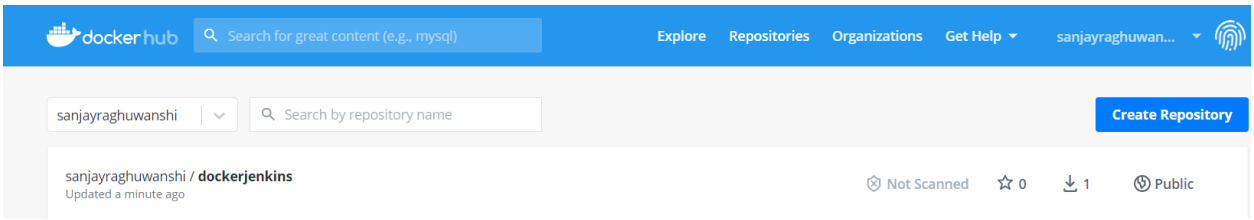
2.4.4 Building docker image –

```
+ docker build -t sanjayraghuwanshi/dockerjenkins:latest .
Sending build context to Docker daemon  160.3kB

Step 1/5 : FROM ubuntu:latest
latest: Pulling from library/ubuntu
345e3491a907: Pulling fs layer
57671312ef6f: Pulling fs layer
5e9250ddb7d0: Pulling fs layer
5e9250ddb7d0: Verifying Checksum
5e9250ddb7d0: Download complete
57671312ef6f: Verifying Checksum
57671312ef6f: Download complete
345e3491a907: Verifying Checksum
345e3491a907: Download complete
345e3491a907: Pull complete
57671312ef6f: Pull complete
5e9250ddb7d0: Pull complete
Digest: sha256:cf31af331f38d1d7158470e095b132acd126a7180a54f263d386da88eb681d93
Status: Downloaded newer image for ubuntu:latest
 ---> 7e0aa2d69a15
Step 2/5 : RUN apt-get update
```

```
raghu1csanjaygm@raghu1csanjaygm:~/dockerfile_demo$
raghu1csanjaygm@raghu1csanjaygm:~/dockerfile_demo$
raghu1csanjaygm@raghu1csanjaygm:~/dockerfile_demo$ docker images
REPOSITORY                          TAG                 IMAGE ID            CREATED             SIZE
sanjayraghuwanshi/dockerjenkins     latest              61fe8ce7b48b        6 minutes ago       169MB
ubuntu                              latest              7e0aa2d69a15        13 days ago         72.7MB
raghu1csanjaygm@raghu1csanjaygm:~/dockerfile_demo$
raghu1csanjaygm@raghu1csanjaygm:~/dockerfile_demo$
```

2.4.5 Pushed the image to DockerHub –

```

Login Succeeded
+ docker push ****/dockerjenkins:latest
The push refers to repository [docker.io/****/dockerjenkins]
3366720c1c76: Preparing
5228be4edd75: Preparing
a95339ca6e43: Preparing
2f140462f3bc: Preparing
63c99163f472: Preparing
ccdbb80308cc: Preparing
ccdbb80308cc: Waiting
63c99163f472: Layer already exists
2f140462f3bc: Layer already exists
ccdbb80308cc: Layer already exists
3366720c1c76: Pushed
a95339ca6e43: Pushed
5228be4edd75: Pushed
latest: digest: sha256:919d5aebdf144a668975e7f67cb62ca585731d35fcc8f849325732897a8048cb size: 1575
```



3. Pull the Docker image and run it as a Docker container

3.1 Running a container from the image each time build is executed –

```
+ docker run ****/dockerjenkins:latest
[Pipeline] }
[Pipeline] // withCredentials
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // stage
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // node
[Pipeline] End of Pipeline
Finished: SUCCESS
```

```
raghulcsanjaygm@raghulcsanjaygm:~/dockerfile_demo$
raghulcsanjaygm@raghulcsanjaygm:~/dockerfile_demo$ docker ps -a
CONTAINER ID        IMAGE                                        COMMAND                  CREATED             STATUS                     PORTS               NAMES
c76768047051        sanjayraghuwanshi/dockerjenkins:latest   "/bin/sh -c \"/bin/ba…"   6 minutes ago       Exited (0) 6 minutes ago                       unruffled_elion
raghulcsanjaygm@raghulcsanjaygm:~/dockerfile_demo$
raghulcsanjaygm@raghulcsanjaygm:~/dockerfile_demo$
```

```
root@raghulcsanjaygm:~#
root@raghulcsanjaygm:~# docker ps -a
CONTAINER ID        IMAGE                                        COMMAND                  CREATED             STATUS                      PORTS               NAMES
99425cc716ab        sanjayraghuwanshi/dockerjenkins:latest   "/bin/sh -c \"/bin/ba…"   30 seconds ago      Exited (0) 28 seconds ago                       xenodochial_bardeen
ea6cb9aca651        sanjayraghuwanshi/dockerjenkins:latest   "/bin/bash"              10 hours ago        Exited (0) 10 hours ago                         gallant_ritchie
84a541c2b8f5        sanjayraghuwanshi/dockerjenkins:latest   "/bin/sh -c \"/bin/ba…"   10 hours ago        Exited (0) 10 hours ago                         hardcore_dijkstra
root@raghulcsanjaygm:~#
root@raghulcsanjaygm:~#
```

4. Build the Docker Jenkins Pipeline to demonstrate the continuous integration and continuous delivery workflow

4.1 Added below command in Dockerfile to deploy the prepared build –

```
FROM ubuntu:latest
RUN apt-get update
RUN apt install -y vim
ADD target/dockerjenkins.jar dockerjenkins.jar
CMD "/bin/bash"
```

4.2 Prepared build copied to docker container as part of CI/CD pipeline –

```
raghulcsanjaygm@raghulcsanjaygm:~/dockerfile_demo$
raghulcsanjaygm@raghulcsanjaygm:~/dockerfile_demo$ docker run -it sanjayraghuwanshi/dockerjenkins:latest /bin/bash
root@ea6cb9aca651:/#
root@ea6cb9aca651:/# ls -ltrh
total 52K
drwxr-xr-x   2 root root 4.0K Apr 15  2020 home
drwxr-xr-x   2 root root 4.0K Apr 15  2020 boot
lrwxrwxrwx   1 root root    8 Apr 16 05:11 sbin -> usr/sbin
lrwxrwxrwx   1 root root   10 Apr 16 05:11 libx32 -> usr/libx32
lrwxrwxrwx   1 root root    9 Apr 16 05:11 lib64 -> usr/lib64
lrwxrwxrwx   1 root root    9 Apr 16 05:11 lib32 -> usr/lib32
lrwxrwxrwx   1 root root    7 Apr 16 05:11 lib -> usr/lib
lrwxrwxrwx   1 root root    7 Apr 16 05:11 bin -> usr/bin
drwxr-xr-x   1 root root 4.0K Apr 16 05:11 usr
drwxr-xr-x   2 root root 4.0K Apr 16 05:11 srv
drwxr-xr-x   2 root root 4.0K Apr 16 05:11 opt
drwxr-xr-x   2 root root 4.0K Apr 16 05:11 mnt
drwxr-xr-x   2 root root 4.0K Apr 16 05:11 media
drwx------   2 root root 4.0K Apr 16 05:32 root
drwxr-xr-x   1 root root 4.0K Apr 16 05:32 var
drwxrwxrwt   2 root root 4.0K Apr 16 05:33 tmp
drwxr-xr-x   1 root root 4.0K Apr 23 22:21 run
dr-xr-xr-x  12 root root    0 May  7 18:59 sys
-rw-r--r--   1 root root 1.9K May  7 20:10 dockerjenkins.jar
drwxr-xr-x   1 root root 4.0K May  7 20:12 etc
dr-xr-xr-x 208 root root    0 May  7 20:12 proc
drwxr-xr-x   5 root root  360 May  7 20:12 dev
root@ea6cb9aca651:/#
root@ea6cb9aca651:/#
```

4.3 Build execution logs - https://tinyurl.com/we3p42ev