

Scientific Calculator Project Report

NEERAJ JETHA MT2020079

Project link :- <https://github.com/njjetha/Calculator>

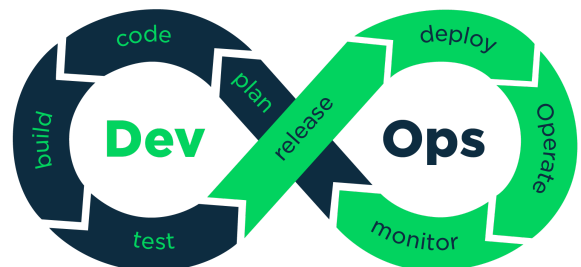
Docker hub :- <https://hub.docker.com/repository/registry-1.docker.io/njjetha/calculator-devops/tags>

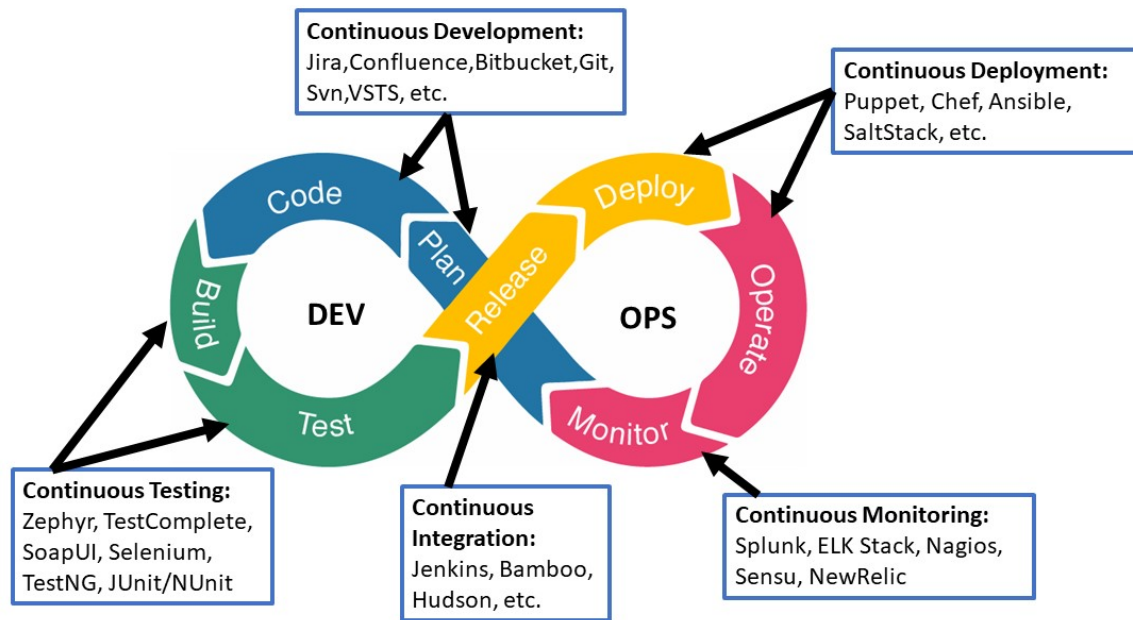
What is DevOps ?

DevOps is the practice of operations and development engineers participating together in the entire service lifecycle, from design through the development process to production support.

There are three primary practice areas that are usually discussed in context of DevOps.

- **Infrastructure Automation** – create your systems, OS configs, and app deployments as code.
- **Continuous Delivery** – build, test, deploy your apps in a fast and automated manner.
- **Site Reliability Engineering** – operate your systems; monitoring and orchestration, sure, but also designing for operability in the first place





Why there is need of DevOps?

The DevOps approach was designed to ensure that high-quality updated software gets into the hands of users more quickly. Though the DevOps is only a few years old, the DevOps movement is so widespread.

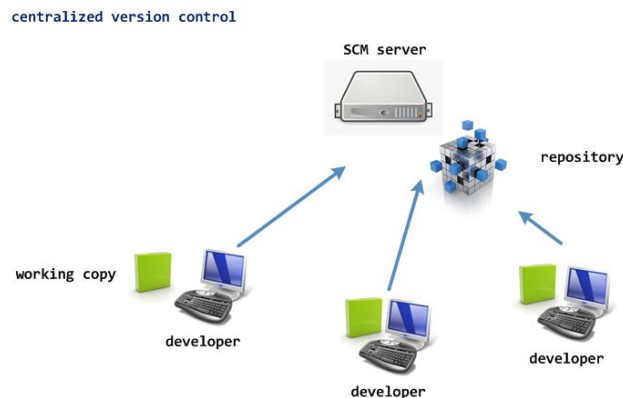
1. **Shorter Development Cycles, Faster Innovation :-** When development and operations teams are in separate silos, it's usually difficult to tell if an application is ready for operations. When development teams simply turn over an application, the operations' cycle times are extended needlessly. With a combined development and operations team, applications are ready for use much more quickly.
2. **Reduced Deployment Failures, Rollbacks, and Time to Recover :-** Part of the reason teams experience deployment failures is due to programming defects. The shorter development cycles with DevOps promote more frequent code releases. This, in turn, makes it easier to spot code defects. Therefore, teams can reduce the number of deployment failures using agile programming principles that call for collaboration and modular programming
3. **Improved Communication and Collaboration :-** DevOps improves the software development culture. Combined teams are happier and more productive. The culture becomes focused on performance rather than

individual goals. When the teams trust each other, they can experiment and innovate more effectively.

4. **Increased Efficiencies** :- Increased efficiency helps to speed the development process and make it less prone to error. There are ways to automate DevOps tasks. Continuous integration servers automate the process of testing code, reducing the amount of manual work required.
5. **Reduced Costs** :- All of the DevOps benefits translate to reduced overall costs and IT headcount requirements.

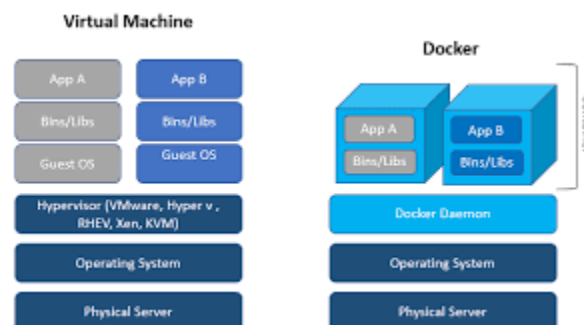
DevOps Toolchain

1. **Source Control Management tool** :- We all know that change is inevitable and we believe that change is a betterment. Thus, changes happen day in and out to everything and anything. So, it is extremely important for a program to maintain the history of these changes to the program artifacts, which is called control. Hence, Version control or Source control is to manage the changes to project, be it code, documents, environment configuration or else.



1. **Testing** :- Testing in DevOps spans the whole software development and delivery lifecycle. Testers are no longer just focusing on functional testing and feature verification. As testers, we should also be involved in operations testing, performance testing, basic security testing, as well as being able to monitor and analyze production data and logs.

2. **Build** :- The build phase of a DevOps pipeline is crucial because it allows developers to detect errors in the code before they make their way down the pipeline and cause a major disaster. After the newly written code has been merged with the shared repository, developers run a series of automated test.
3. **Continuous Integration** :- It is a DevOps software development practice where developers regularly merge their code changes into a central repository, after which automated builds and tests are run. Continuous integration most often refers to the build or integration stage of the software release process and entails both an automation component (e.g. a CI or build service) and a cultural component (e.g. learning to integrate frequently). The key goals of continuous integration are to find and address bugs quicker, improve software quality, and reduce the time it takes to validate and release new software updates.
4. **Containerize** :- Containers, by contrast, isolate applications' execution environments from one another, but share the underlying OS kernel. They're typically measured in megabytes, use far fewer resources than VMs, and start up almost immediately. Containers provide a highly efficient and highly granular mechanism for combining software components into the kinds of application and service stacks needed in a modern enterprise, and for keeping those software components updated and maintained

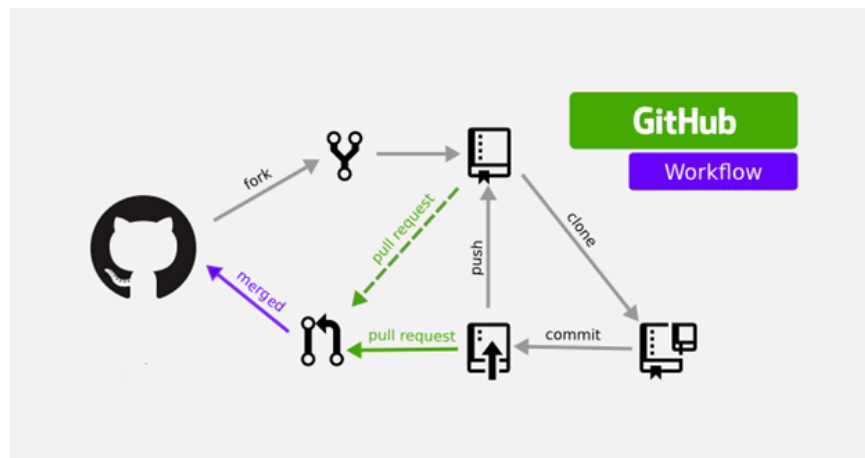


5. **Deployment** :- A Deployment pipeline is the process of taking code from version control and making it readily available to users of your application in an automated fashion. When a team of developers are working on projects or features they need a reliable and efficient way to build, test and deploy their work.

6. Continuous Monitoring :- Continuous Monitoring comes in at the end of the DevOps pipeline. Once the software is released into production, Continuous Monitoring will notify dev and QA teams in the event of specific issues arising in the prod environment. It provides feedback on what is going wrong, which allows the relevant people to work on necessary fixes as soon as possible.

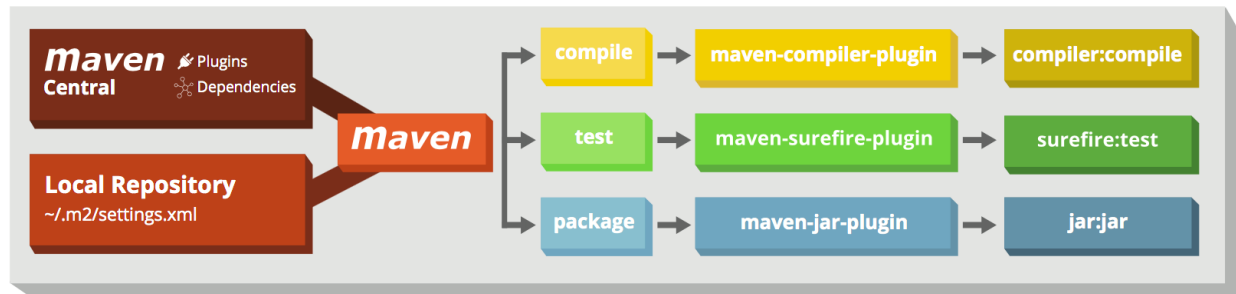
Tools used in Project

GitHub :- GitHub is a Git repository hosting service, but it adds many of its own features. While Git is a command line tool, GitHub provides a Web-based graphical interface. It also provides access control and several collaboration features, such as a wikis and basic task management tools for every project.

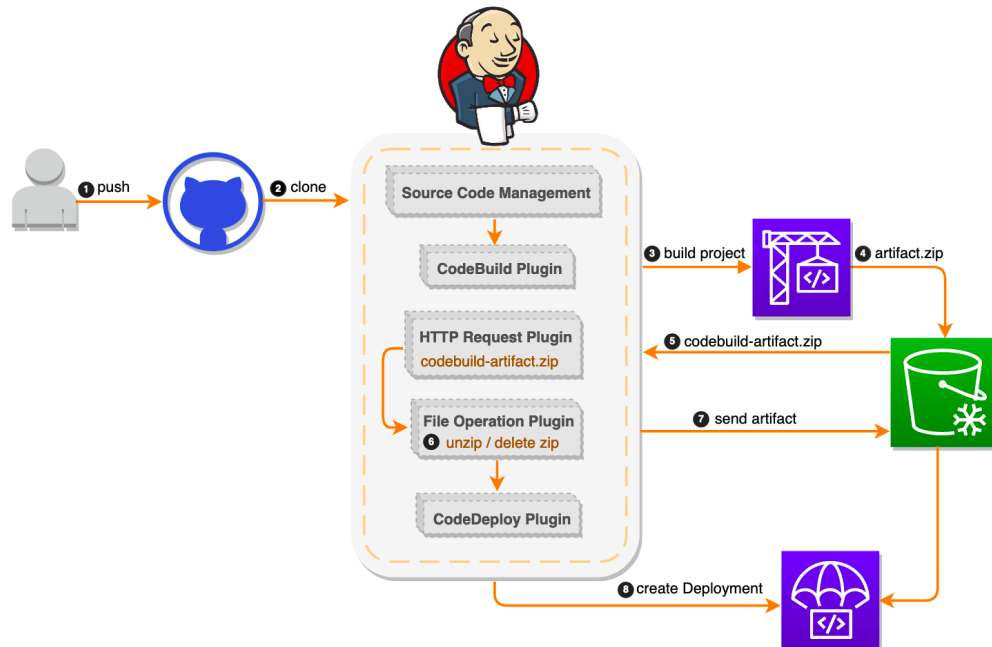


JUnit :- Unit has been important in the development of test-driven development, and is one of a family of unit testing frameworks collectively known as xUnit, that originated with JUnit. Testing is the process of checking the functionality of an application to ensure it runs as per requirements. Unit testing comes into picture at the developers' level; it is the testing of single entity (class or method). Unit testing plays a critical role in helping a software company deliver quality products to its customers

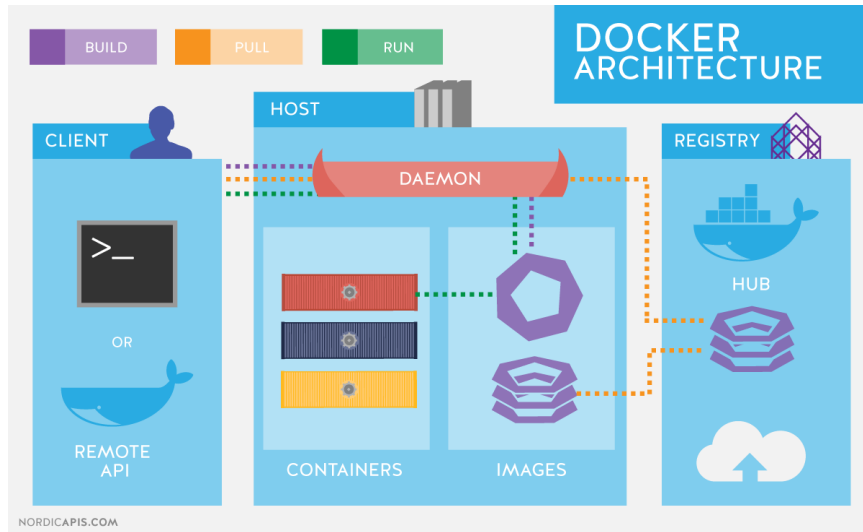
Maven:- Maven is a project management tool. Most popular use of Maven is for build management and dependencies. Maven automatically download the dependencies that are required in your project. Maven will make those jar files available during compile/run.



Jenkins :- Jenkins is a powerful application that allows continuous integration and continuous delivery of projects, regardless of the platform you are working on. It is a free source that can handle any kind of build or continuous integration. You can integrate Jenkins with a number of testing and deployment technologies.



Docker :- Docker is a tool designed to make it easier to create, deploy, and run applications by using containers. Containers allow a developer to package up an application with all of the parts it needs, such as libraries and other dependencies, and deploy it as one package.



ELK :- "ELK" is the acronym for three open source projects: Elasticsearch, Logstash, and Kibana. Elasticsearch is a search and analytics engine. Logstash is a server-side data processing pipeline that ingests data from multiple sources simultaneously, transforms it, and then sends it to a "stash" like Elasticsearch. Kibana lets users visualize data with charts and graphs in Elasticsearch.



Steps by Steps Explanation of Project

Step :- 1 Maven Installation

Let's look into the installation of Maven on our machine. To install Maven we want to first

install its dependency JAVA, here we will be installing java version 8, to do that

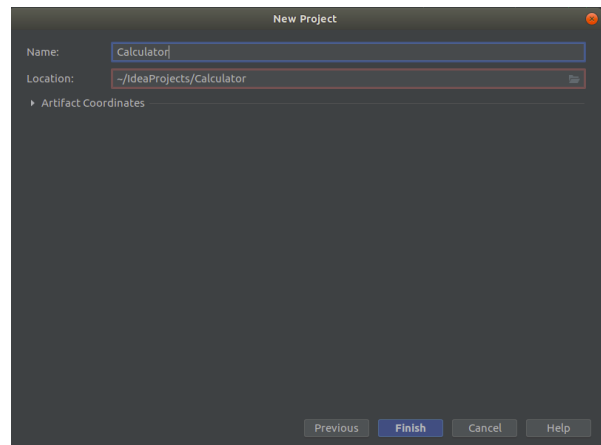
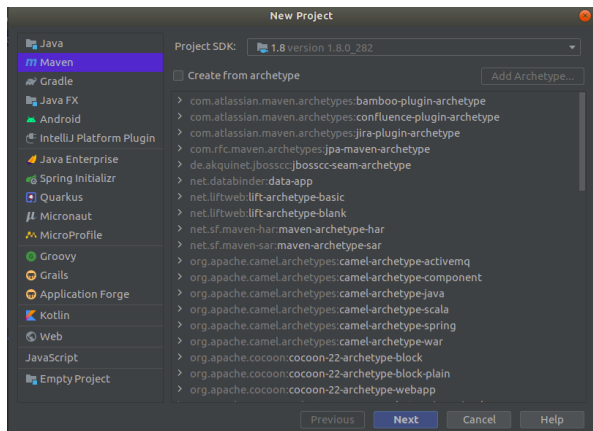
follow the
following commands.

```
$ sudo apt update  
$ sudo apt install maven
```

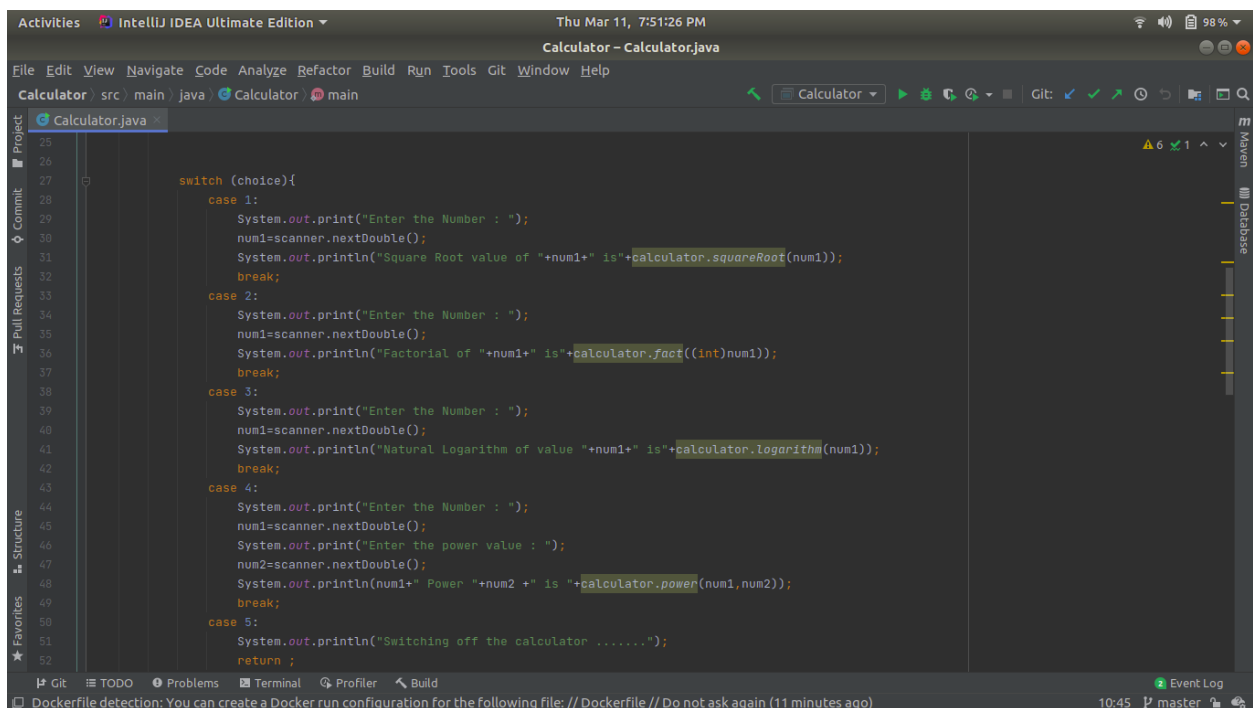
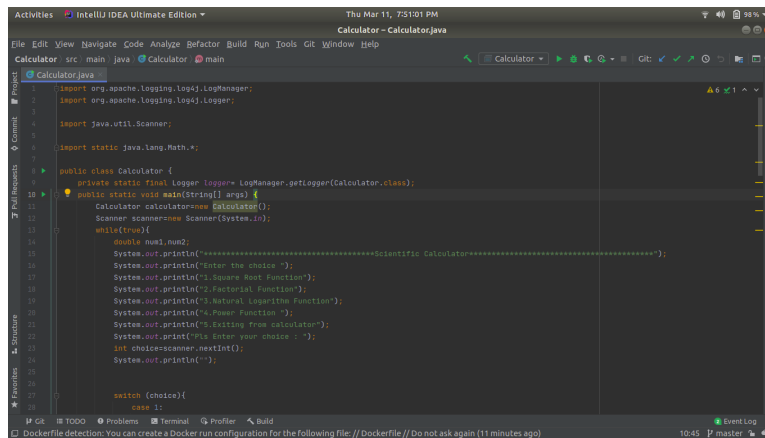
check Maven version

```
neeraj@njjetha:~$ mvn --version  
Apache Maven 3.6.0  
Maven home: /usr/share/maven  
Java version: 1.8.0_282, vendor: Private Build, runtime: /usr/lib/jvm/java-8-ope  
njdk-amd64/jre  
Default locale: en_IN, platform encoding: UTF-8  
OS name: "linux", version: "5.4.0-65-generic", arch: "amd64", family: "unix"
```

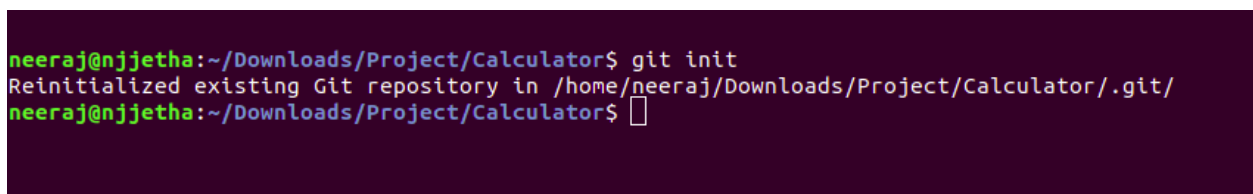
Start Maven Project and name of the project is Calculator



Typing the logic for the calculator



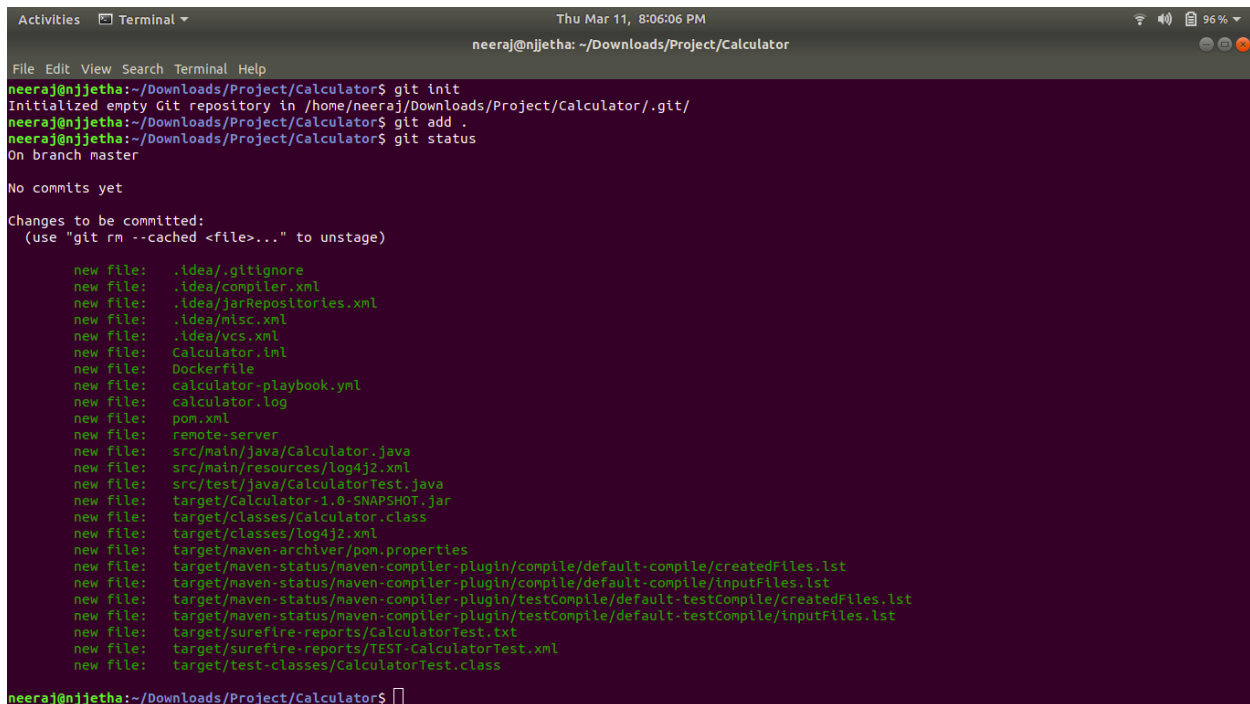
Step 2:- Inititalize the git repository



git add → The git add command adds a change in the working directory to the staging area. It tells Git that you want to include updates to a particular file in the

next commit

git status → The git status command displays the state of the working directory and the staging area. It lets you see which changes have been staged, which haven't, and which files aren't being tracked by Git. Status output does not show you any information regarding the committed project history.

A screenshot of a terminal window titled "neeraj@njjetha: ~/Downloads/Project/Calculator". The terminal shows the execution of the following commands: `git init`, `git add .`, and `git status`. The output of `git status` indicates that no commits have been made yet and lists 25 new files to be committed. The files include IDE configuration files (e.g., `.idea/.gitignore`), source code files (e.g., `src/main/java/Calculator.java`), test files (e.g., `src/test/java/CalculatorTest.java`), and build artifacts (e.g., `target/Calculator-1.0-SNAPSHOT.jar`).

```
neeraj@njjetha:~/Downloads/Project/Calculator$ git init
Initialized empty Git repository in /home/neeraj/Downloads/Project/Calculator/.git/
neeraj@njjetha:~/Downloads/Project/Calculator$ git add .
neeraj@njjetha:~/Downloads/Project/Calculator$ git status
On branch master

No commits yet

Changes to be committed:
  (use "git rm --cached <file>..." to unstage)

    new file:   .idea/.gitignore
    new file:   .idea/compiler.xml
    new file:   .idea/jarRepositories.xml
    new file:   .idea/misc.xml
    new file:   .idea/vcs.xml
    new file:   Calculator.iml
    new file:   Dockerfile
    new file:   calculator-playbook.yml
    new file:   calculator.log
    new file:   pom.xml
    new file:   remote-server
    new file:   src/main/java/Calculator.java
    new file:   src/main/resources/log4j2.xml
    new file:   src/test/java/CalculatorTest.java
    new file:   target/Calculator-1.0-SNAPSHOT.jar
    new file:   target/classes/Calculator.class
    new file:   target/classes/log4j2.xml
    new file:   target/maven-archiver/pom.properties
    new file:   target/maven-status/maven-compiler-plugin/compile/default-compile/createdFiles.lst
    new file:   target/maven-status/maven-compiler-plugin/compile/default-compile/inputFiles.lst
    new file:   target/maven-status/maven-compiler-plugin/testCompile/default-testCompile/createdFiles.lst
    new file:   target/maven-status/maven-compiler-plugin/testCompile/default-testCompile/inputFiles.lst
    new file:   target/surefire-reports/CalculatorTest.txt
    new file:   target/surefire-reports/TEST-CalculatorTest.xml
    new file:   target/test-classes/CalculatorTest.class

neeraj@njjetha:~/Downloads/Project/Calculator$
```

git commit → The git commit command captures a snapshot of the project's currently staged changes. ... Prior to the execution of git commit, The git add command is used to promote or 'stage' changes to the project that will be stored in a commit. These two commands git commit and git add are two of the most frequently used.

```
Activities Terminal ▾ Thu Mar 11, 8:09:43 PM neeraj@njjetha: ~/Downloads/Project/Calculator

File Edit View Search Terminal Help
new file: target/maven-archiver/pom.properties
new file: target/maven-status/maven-compiler-plugin/compile/default-compile/createdFiles.lst
new file: target/maven-status/maven-compiler-plugin/compile/default-compile/inputFiles.lst
new file: target/maven-status/maven-compiler-plugin/testCompile/default-testCompile/createdFiles.lst
new file: target/maven-status/maven-compiler-plugin/testCompile/default-testCompile/inputFiles.lst
new file: target/surefire-reports/CalculatorTest.txt
new file: target/surefire-reports/TEST-CalculatorTest.xml
new file: target/test-classes/CalculatorTest.class

neeraj@njjetha:~/Downloads/Project/Calculator$ git commit -m "First Commit including test cases"
[master (root-commit) f0159aa] First Commit including test cases
25 files changed, 450 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 .idea/vcs.xml
create mode 100644 Calculator.iml
create mode 100644 Dockerfile
create mode 100644 calculator-playbook.yml
create mode 100644 calculator.log
create mode 100644 pom.xml
create mode 100644 remote-server
create mode 100644 src/main/java/Calculator.java
create mode 100644 src/main/resources/log4j2.xml
create mode 100644 src/test/java/CalculatorTest.java
create mode 100644 target/Calculator-1.0-SNAPSHOT.jar
create mode 100644 target/classes/Calculator.class
create mode 100644 target/classes/log4j2.xml
create mode 100644 target/maven-archiver/pom.properties
create mode 100644 target/maven-status/maven-compiler-plugin/compile/default-compile/createdFiles.lst
create mode 100644 target/maven-status/maven-compiler-plugin/compile/default-compile/inputFiles.lst
create mode 100644 target/maven-status/maven-compiler-plugin/testCompile/default-testCompile/createdFiles.lst
create mode 100644 target/maven-status/maven-compiler-plugin/testCompile/default-testCompile/inputFiles.lst
create mode 100644 target/surefire-reports/CalculatorTest.txt
create mode 100644 target/surefire-reports/TEST-CalculatorTest.xml
create mode 100644 target/test-classes/CalculatorTest.class
neeraj@njjetha:~/Downloads/Project/Calculator$
```

Create a new Repository name **Calculator**

Create a new repository

A repository contains all project files, including the revision history. Already have a project repository elsewhere? [Import a repository.](#)

Owner *



Repository name *



Great repository names are short and memorable. Need inspiration? How about [refactored-rotary-phone?](#)

Description (optional)



Public

Anyone on the internet can see this repository. You choose who can commit.



Private

You choose who can see and commit to this repository.

Initialize this repository with:

Skip this step if you're importing an existing repository.



Add a README file

This is where you can write a long description for your project. [Learn more.](#)



Add .gitignore

Choose which files not to track from a list of templates. [Learn more.](#)

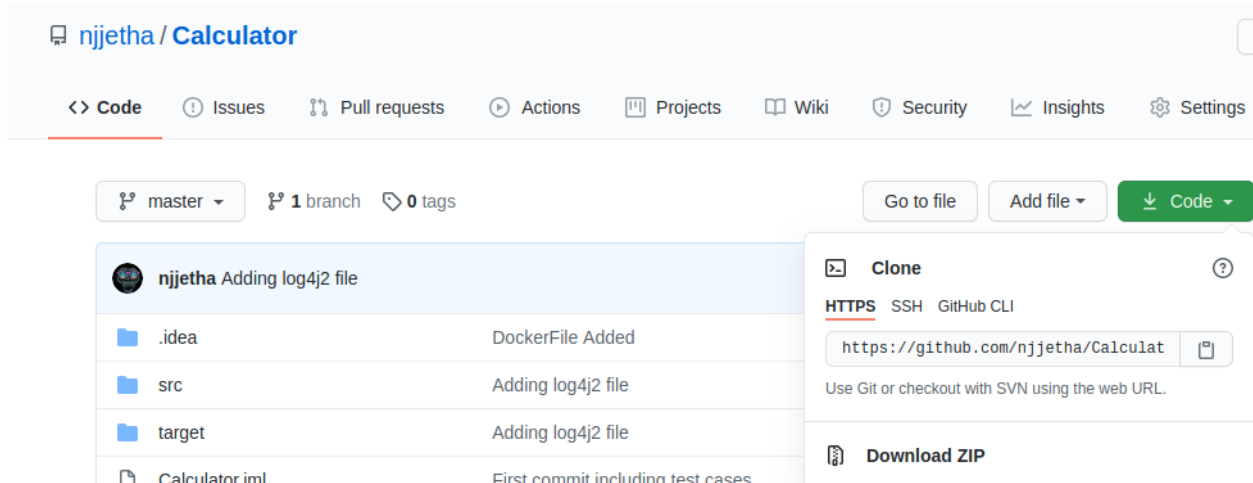


Choose a license

A license tells others what they can and can't do with your code. [Learn more.](#)

Create repository

Copy the URL of the repository Calculator where we need to push our code from local repository to remote repository i.e Github



Setting the remote directory path as origin

```
neeraj@njjetha:~/Downloads/Project/Calculator$ git remote add origin https://github.com/njjetha/Calculator_.git
```

Pushing the code onto the remote repository

```
neeraj@njjetha: ~/Downloads/Project/Calculator
File Edit View Search Terminal Help
neeraj@njjetha:~/Downloads/Project/Calculator$ git push origin master
Username for 'https://github.com': njjetha
Password for 'https://njjetha@github.com':
Counting objects: 44, done.
Delta compression using up to 4 threads.
Compressing objects: 100% (32/32), done.
Writing objects: 100% (44/44), 13.59 KiB | 1.24 MiB/s, done.
Total 44 (delta 0), reused 0 (delta 0)
To https://github.com/njjetha/Calculator_.git
 * [new branch]      master -> master
neeraj@njjetha:~/Downloads/Project/Calculator$
```

master 1 branch 0 tags Go to file Add file Code

nijetha Adding log4j2 file 410db6f 8 hours ago 4 commits

.idea	DockerFile Added	19 days ago
src	Adding log4j2 file	8 hours ago
target	Adding log4j2 file	8 hours ago
Calculator.iml	First commit including test cases	21 days ago
Dockerfile	DockerFile Added	19 days ago
calculator-playbook.yml	ansible playbook added	18 days ago
calculator.log	Adding log4j2 file	8 hours ago
pom.xml	Adding log4j2 file	8 hours ago
remote-server	ansible playbook added	18 days ago

Help people interested in this repository understand your project by adding a README. [Add a README](#)

Step :- 3 JUnit Test case writing

```

public class CalculatorTest extends TestCase {
    Calculator calculator=new Calculator();
    public void testMain() {
    }

    @Test
    public void testFactTruePositive() {
        assertEquals( message: "Factorial of the number for True Positive ", expected: 1,calculator.fact( num1: 0));
        assertEquals( message: "Factorial of the number for True Positive", expected: 1,calculator.fact( num1: 1));
        assertEquals( message: "Factorial of the number for True Positive", expected: 120,calculator.fact( num1: 5));
    }

    public void testFactFalsePositive() {
        assertEquals( message: "Factorial of the number for False Positive ", unexpected: 0,calculator.fact( num1: 0));
        assertEquals( message: "Factorial of the number for False Positive", unexpected: 0,calculator.fact( num1: 1));
        assertEquals( message: "Factorial of the number for False Positive", unexpected: 0,calculator.fact( num1: 5));
    }

    public void testSquareRootTruePositive() {
        assertEquals( message: "Square Root of the number for True Positive ", expected: 0.0,calculator.squareRoot( num1: 0));
        assertEquals( message: "Square Root of the number for True Positive", expected: 1.0,calculator.squareRoot( num1: 1));
        assertEquals( message: "Square Root of the number for True Positive", expected: 2.0,calculator.squareRoot( num1: 4));
    }

    public void testSquareRootFalsePositive() {
    }
}

```

Step 4:- start Jenkins

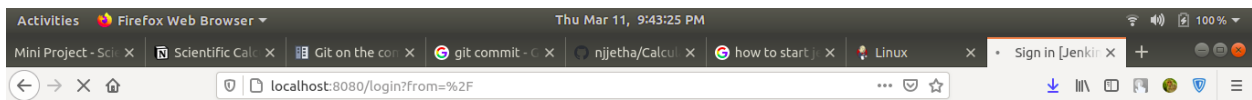
command to start jenkins

```

neeraj@njjetha:~$ sudo systemctl start jenkins
neeraj@njjetha:~$ sudo systemctl status jenkins
● jenkins.service - LSB: Start Jenkins at boot time
   Loaded: loaded (/etc/init.d/jenkins; generated)
   Active: active (exited) since Thu 2021-03-11 02:46:34 IST; 18h ago
     Docs: man:systemd-sysv-generator(8)
   Process: 2038 ExecStart=/etc/init.d/jenkins start (code=exited, status=0/SUCCESS)

Mar 11 02:46:33 njjetha systemd[1]: Starting LSB: Start Jenkins at boot time...
Mar 11 02:46:33 njjetha jenkins[2038]: Correct java version found
Mar 11 02:46:33 njjetha jenkins[2038]: * Starting Jenkins Automation Server jenkins
Mar 11 02:46:33 njjetha su[2149]: Successful su for jenkins by root
Mar 11 02:46:33 njjetha su[2149]: + ??? root:jenkins
Mar 11 02:46:33 njjetha su[2149]: pam_unix(su:session): session opened for user jenkins
Mar 11 02:46:33 njjetha su[2149]: pam_unix(su:session): session closed for user jenkins
Mar 11 02:46:34 njjetha jenkins[2038]: ...done.
Mar 11 02:46:34 njjetha systemd[1]: Started LSB: Start Jenkins at boot time.

```



Welcome to Jenkins!

☐ Keep me signed in

localhost

git cloning and building Maven automatically using jenkins

```

pipeline {
  agent any
  environment {
    imageName=""
  }
  stages {
    stage('git cloning') {
      steps {

```

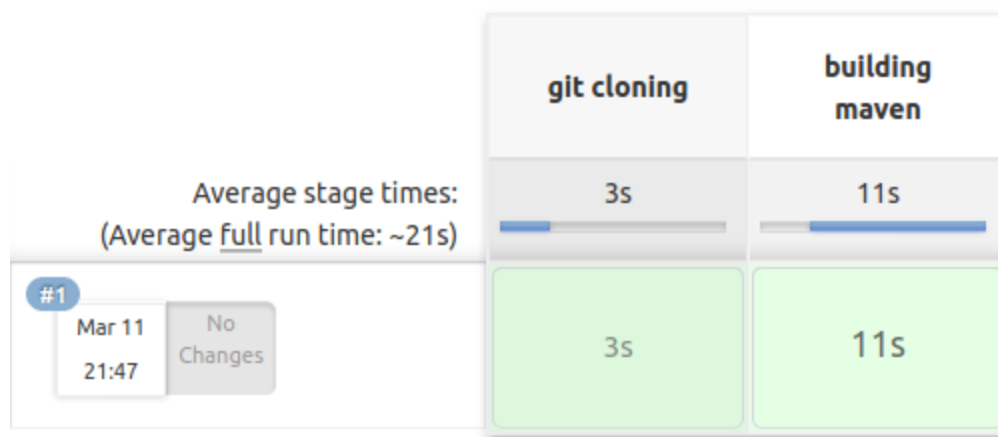
```

        script{
            git 'https://github.com/njjetha/Calculator.git'
        }
    }

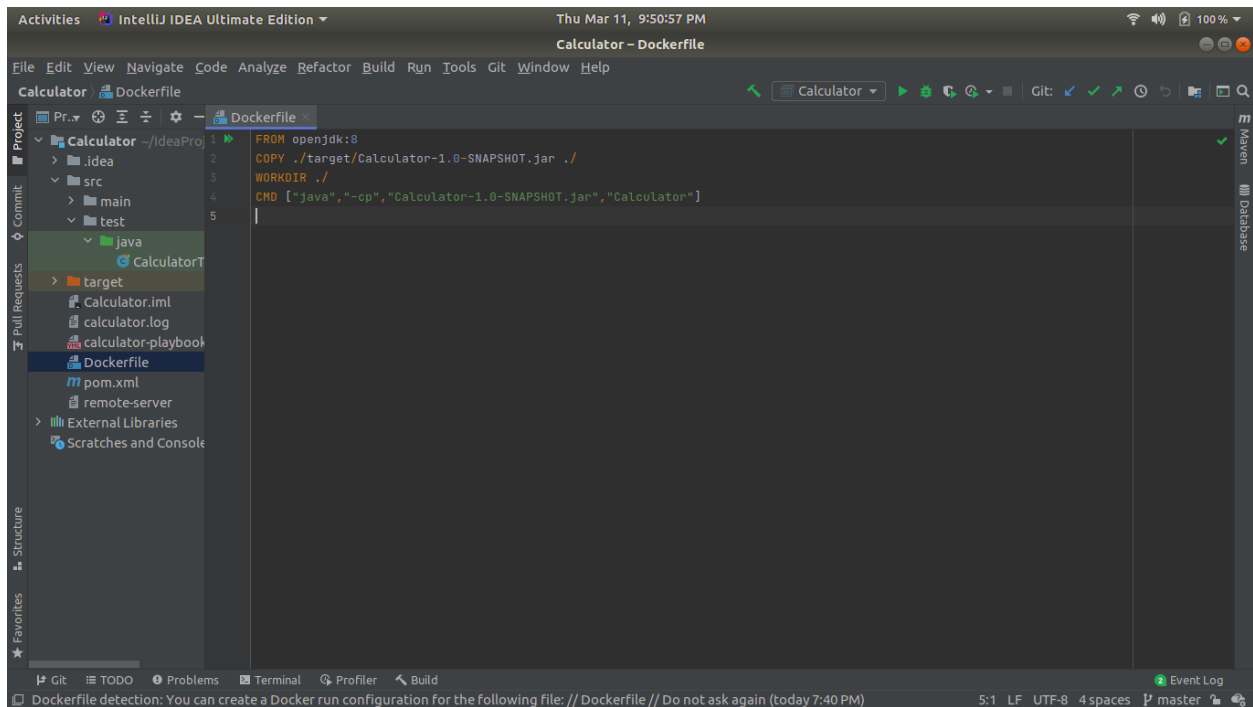
    stage('building maven') {
        steps {
            script{
                sh 'mvn clean install'
            }
        }
    }
}

```

Stage View



Step 5 :- Adding Docker file to the project directory





Step 6:- Adding Credentials of Docker Hub repository to the Jenkins

Jenkins will create the docker image and push the docker image into the docker repository



Global credentials (unrestricted)

Credentials that should be available irrespective of domain specification to requirements matching.

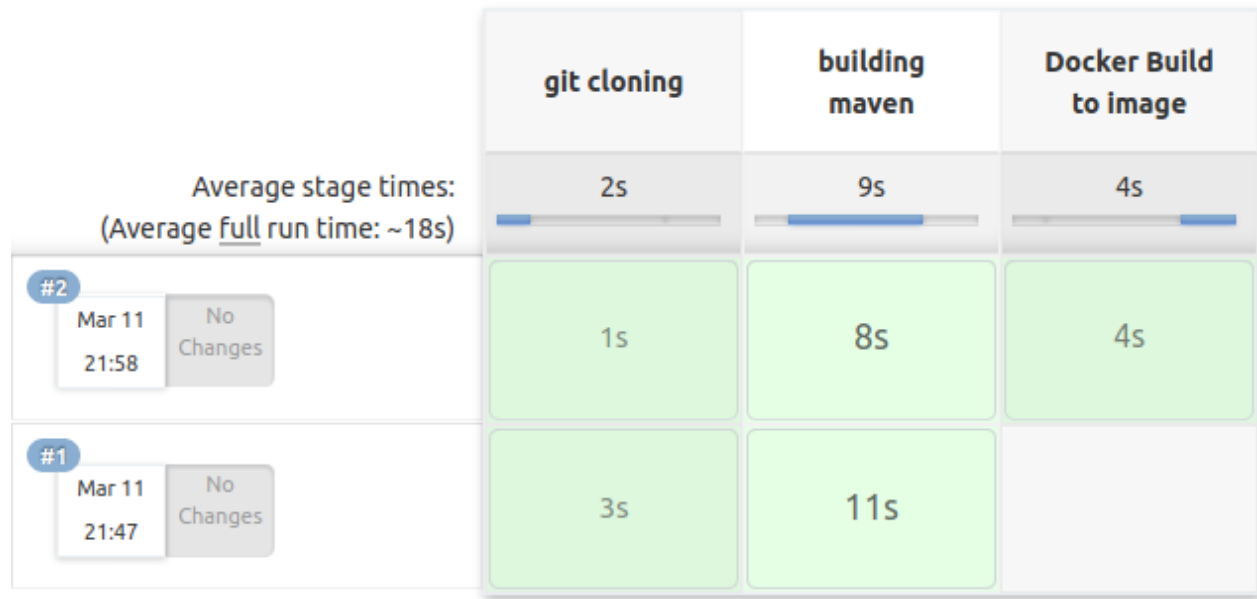
ID	Name	Kind	Description
 docker-jenkins	njjetha/***** (Docker hub credentials)	Username with password	Docker hub credentials 

Icon: [S](#) [M](#) [L](#)

Credentials of docker hub repository added and id is docker-jenkins

Now we will write the script for creating the docker image

Stage View



```
-----  
Sending build context to Docker daemon 227.8kB
```

```
Step 1/4 : FROM openjdk:8
```

```
---> 9324460525ca
```

```
Step 2/4 : COPY ./target/Calculator-1.0-SNAPSHOT.jar ./
```

```
---> 09d1f1fd0fc2
```

```
Step 3/4 : WORKDIR ./
```

```
---> Running in e9ba4f48b4d7
```

```
Removing intermediate container e9ba4f48b4d7
```

```
---> 2461f1e07090
```

```
Step 4/4 : CMD ["java","-cp","Calculator-1.0-SNAPSHOT.jar","Calculator"]
```

```
---> Running in 27916cc0c7c7
```

```
Removing intermediate container 27916cc0c7c7
```

```
---> 4e4269345624
```

```
Successfully built 4e4269345624
```

```
Successfully tagged njjetha/calculator-devops:latest
```

```
[Pipeline] }
```

```
[Pipeline] // script
```

```
[Pipeline] }
```

```
[Pipeline] // stage
```

```
[Pipeline] }
```

```
[Pipeline] // withEnv
```

```
[Pipeline] }
```

```
[Pipeline] // node
```

```
[Pipeline] End of Pipeline
```

```
Finished: SUCCESS
```

Now pushing the docker image to docker hub repository

Stage View

		git cloning	building maven	Docker Build to image	Push Docker image
Average stage times: (Average <u>full</u> run time: ~25s)		2s	9s	2s	26s
#3	Mar 11 22:01 No Changes	1s	8s	1s	26s
#2	Mar 11 21:58 No Changes	1s	8s	4s	
#1	Mar 11 21:47 No Changes	3s	11s		

```

[Pipeline] withDockerRegistry
$ docker login -u njjetha -p ***** https://index.docker.io/v1/
WARNING! Using --password via the CLI is insecure. Use --password-stdin.
WARNING! Your password will be stored unencrypted in /var/lib/jenkins/workspace/Calculator_DevOps@tmp/0e698342-db58-4aa1-b0fc
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credentials-store

Login Succeeded
[Pipeline] {
[Pipeline] isUnix
[Pipeline] sh
+ docker tag njjetha/calculator-devops:latest njjetha/calculator-devops:latest
[Pipeline] isUnix
[Pipeline] sh
+ docker push njjetha/calculator-devops:latest
The push refers to repository [docker.io/njjetha/calculator-devops]
7eebbe56b93f: Preparing
02412b9dda81: Preparing
d7b2c55f7e50: Preparing
02f0a7f763a3: Preparing
da654bc8bc80: Preparing
4ef81dc52d99: Preparing
909e93c71745: Preparing
7f03bfe4d6dc: Preparing
4ef81dc52d99: Waiting
909e93c71745: Waiting
7f03bfe4d6dc: Waiting
da654bc8bc80: Layer already exists
d7b2c55f7e50: Layer already exists
02412b9dda81: Layer already exists
02f0a7f763a3: Layer already exists
909e93c71745: Layer already exists
4ef81dc52d99: Layer already exists
7f03bfe4d6dc: Layer already exists
7eebbe56b93f: Pushed
latest: digest: sha256:06922691afd203ac2a98ac43eae8b374ca9b94895191f698f9a54c7147ec976a size: 2002
[Pipeline] }
[Pipeline] // withDockerRegistry
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // script
[Pipeline] }
[Pipeline] // stage
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // node
[Pipeline] End of Pipeline
Finished: SUCCESS

```

Docker hub private repository contain the image of the calculator project

njjetha / **calculator-devops**

Updated 4 minutes ago

Not Scanned

☆ 0

↓ 8

Public

Step 7:- Creating Playbook and Adding to the Project Directory

```

---
- name: Copy jar file to remoter server

```

```

hosts: remoteserver
tasks:
  - copy:
      src: ./target/Calculator-1.0-SNAPSHOT.jar
      dest: ~/

```

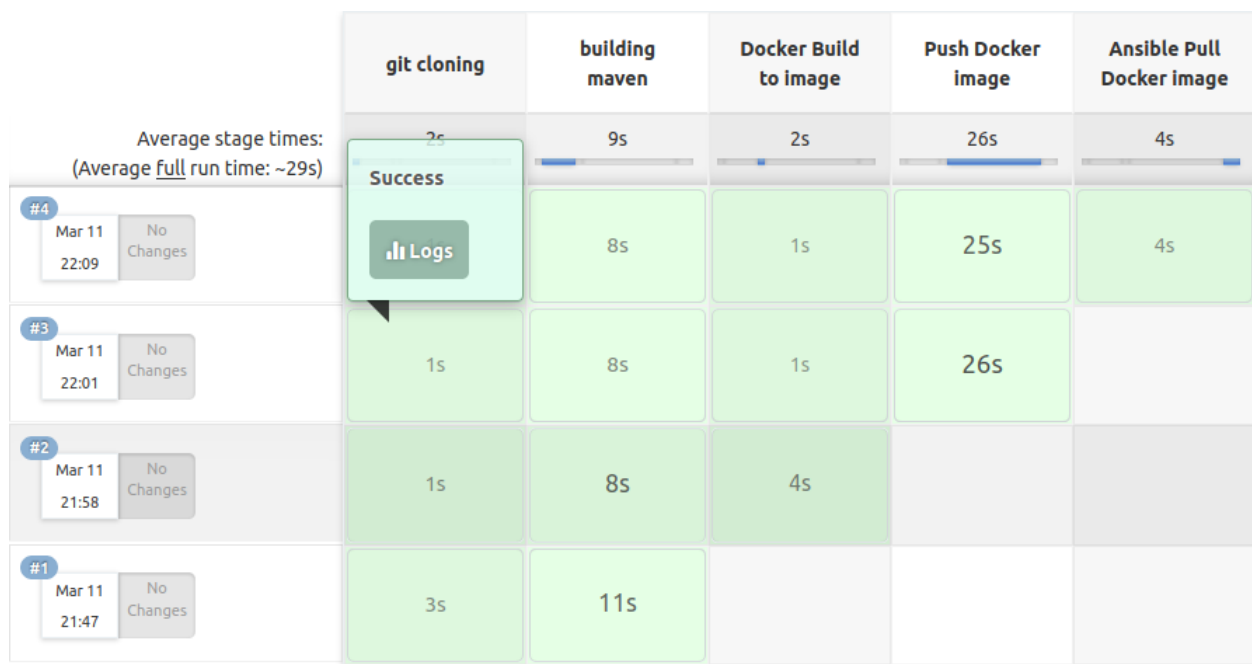
Inventory

```

[remoteserver]
127.0.1.1 ansible_user=neeraj

```

Playbook will pull the docker image into the specified machine defined in the inventory



```
[Calculator_DevOps] $ ansible-playbook calculator-playbook.yml -i remote-server

PLAY [Copy jar file to remoter server] *****

TASK [Gathering Facts] *****
[0;32mok: [127.0.1.1][0m

TASK [copy] *****
[0;33mchanged: [127.0.1.1][0m

PLAY RECAP *****
[0;33m127.0.1.1[0m          : [0;32mok=2    [0m [0;33mchanged=1    [0m unreachable=0    failed=0

[Pipeline] }
[Pipeline] // stage
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // node
[Pipeline] End of Pipeline
Finished: SUCCESS
```

Command to see docker images is

```
$ docker images
```

```
neeraj@njjetha:~$ docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
njjetha/calculator-devops   latest             f0bde47d220c       59 seconds ago     514MB
<none>                <none>             4e4269345624       12 minutes ago     514MB
ubuntu-sleeper           latest             1ce51f10b74b       3 weeks ago        72.9MB
njjetha/ubuntu-sleeper    latest             1ce51f10b74b       3 weeks ago        72.9MB
tomcat                   latest             bf4709e77b18       4 weeks ago        667MB
openjdk                  8                  9324460525ca       4 weeks ago        514MB
maven                    latest             3956fab279d0       5 weeks ago        753MB
ubuntu                   latest             f63181f19b2f       7 weeks ago        72.9MB
hello-world              latest             bf756fb1ae65       14 months ago      13.3kB
jenkins                   2.60.3            cd14cecfd3a        2 years ago        696MB
```

Command to run docker images is

```
docker run -it imageName
```

```
Activities Terminal Sat Mar 13, 5:21:57 PM neeraj@njjetha: ~
File Edit View Search Terminal Help
neeraj@njjetha:~$ docker run -lt njjetha/calculator-devops
*****Scientific Calculator*****
Enter the choice
1.Square Root Function
2.Factorial Function
3.Natural Logarithm Function
4.Power Function
5.Exiting from calculator
Pls Enter your choice : 1

Enter the Number : 16
13/Mar/2021:11:51:40 904 [Calculator.java] [INFO] Calculator Find the Square Root of number 16.0
13/Mar/2021:11:51:40 909 [Calculator.java] [INFO] Calculator Result of the square root of 16.0 is 4.0
Square Root value of 16.0 is 4.0
*****Scientific Calculator*****
Enter the choice
1.Square Root Function
2.Factorial Function
3.Natural Logarithm Function
4.Power Function
5.Exiting from calculator
Pls Enter your choice : 2

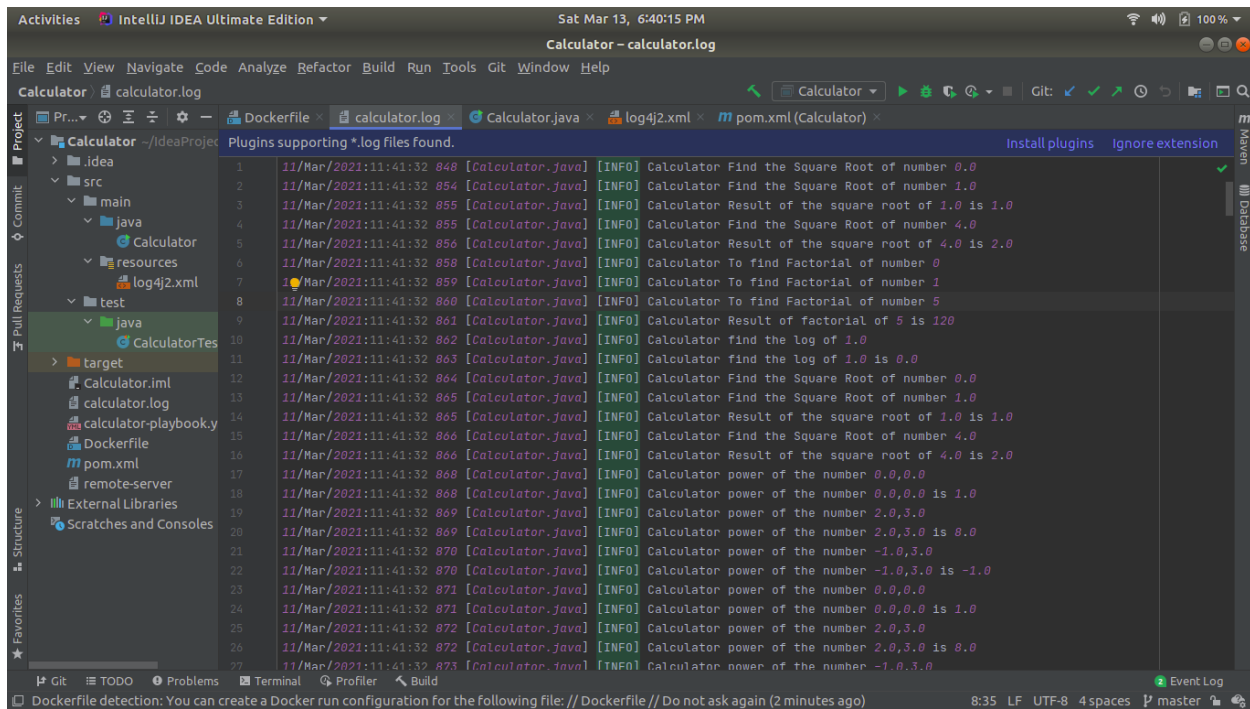
Enter the Number : 0
13/Mar/2021:11:51:53 481 [Calculator.java] [INFO] Calculator To find Factorial of number 0
Factorial of 0.0 is 1
*****Scientific Calculator*****
Enter the choice
1.Square Root Function
2.Factorial Function
3.Natural Logarithm Function
4.Power Function
5.Exiting from calculator
Pls Enter your choice : 
```

```
Activities Terminal Sat Mar 13, 5:22:14 PM neeraj@njjetha: ~
File Edit View Search Terminal Help
Enter the Number : 16
13/Mar/2021:11:51:40 904 [Calculator.java] [INFO] Calculator Find the Square Root of number 16.0
13/Mar/2021:11:51:40 909 [Calculator.java] [INFO] Calculator Result of the square root of 16.0 is 4.0
Square Root value of 16.0 is 4.0
*****Scientific Calculator*****
Enter the choice
1.Square Root Function
2.Factorial Function
3.Natural Logarithm Function
4.Power Function
5.Exiting from calculator
Pls Enter your choice : 2

Enter the Number : 0
13/Mar/2021:11:51:53 481 [Calculator.java] [INFO] Calculator To find Factorial of number 0
Factorial of 0.0 is 1
*****Scientific Calculator*****
Enter the choice
1.Square Root Function
2.Factorial Function
3.Natural Logarithm Function
4.Power Function
5.Exiting from calculator
Pls Enter your choice : 4

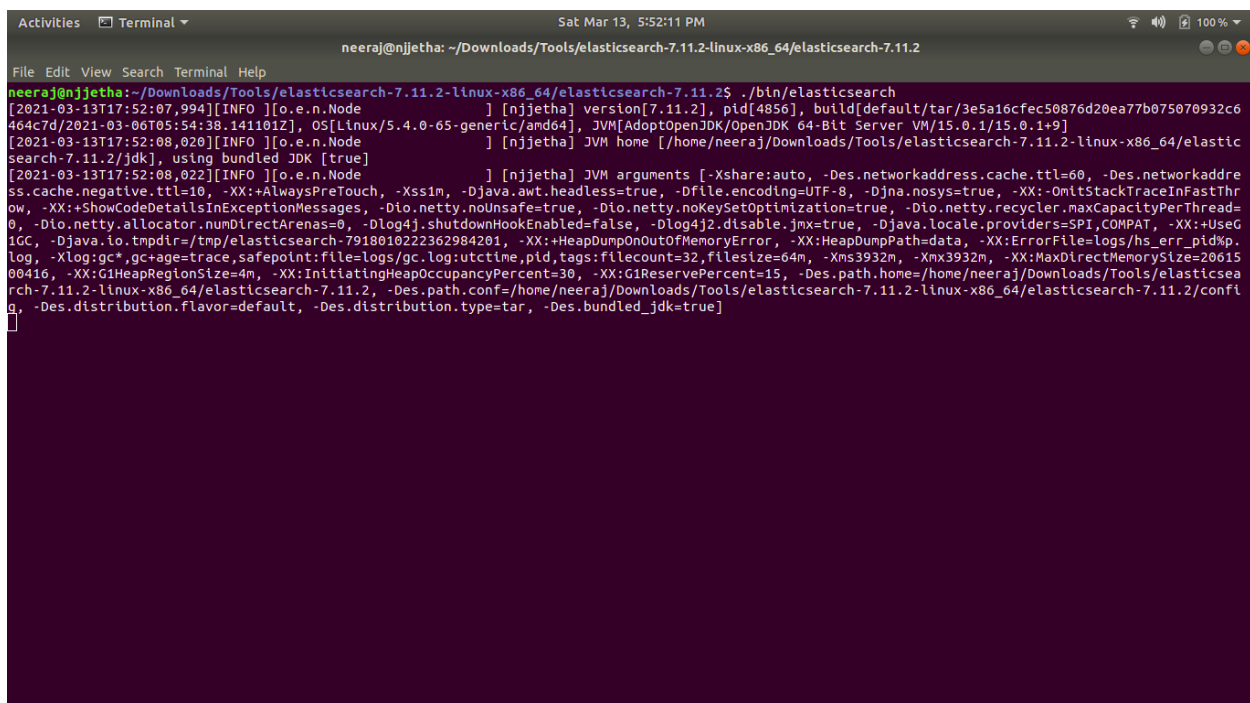
Enter the Number : 4
Enter the power value : 2
13/Mar/2021:11:52:12 514 [Calculator.java] [INFO] Calculator power of the number 4.0,2.0
13/Mar/2021:11:52:12 515 [Calculator.java] [INFO] Calculator power of the number 4.0,2.0 is 16.0
4.0 Power 2.0 is 16.0
*****Scientific Calculator*****
Enter the choice
1.Square Root Function
2.Factorial Function
3.Natural Logarithm Function
4.Power Function
5.Exiting from calculator
Pls Enter your choice : 
```

Step 8 :- The path of log file is added to the configuration file .



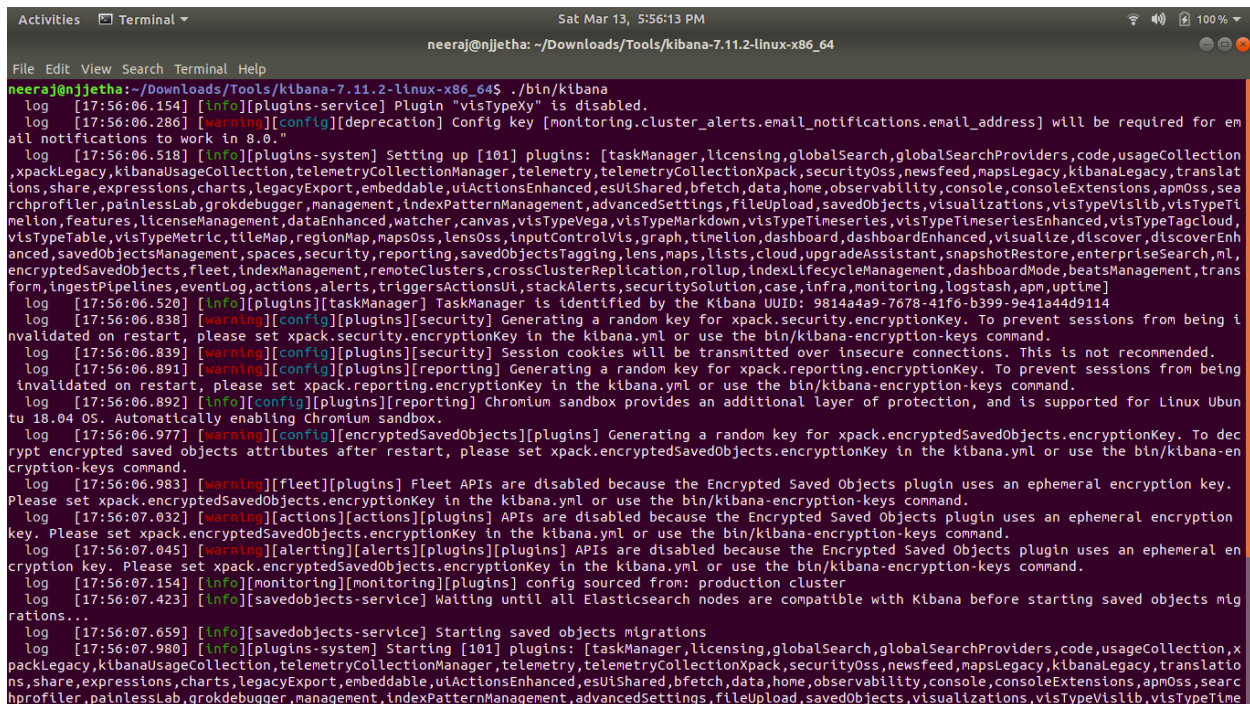
Run Elastic search

```
./bin/elasticsearch
It runs on port number 9200
```



Run Kibana

```
./bin/kibana  
It runs on port number 5601
```



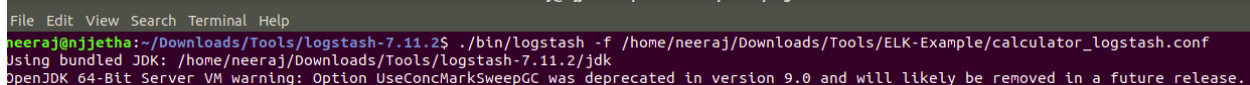
```
Activities Terminal Sat Mar 13, 5:56:13 PM  
neeraj@njetha: ~/Downloads/Tools/kibana-7.11.2-linux-x86_64  
File Edit View Search Terminal Help  
neeraj@njetha:~/Downloads/Tools/kibana-7.11.2-linux-x86_64$ ./bin/kibana  
log [17:56:06.154] [info][plugins-service] Plugin "visTypeXy" is disabled.  
log [17:56:06.286] [warning][config][deprecation] Config key [monitoring.cluster_alerts.email_notifications.email_address] will be required for em  
all notifications to work in 8.0.  
log [17:56:06.518] [info][plugins-system] Setting up [101] plugins: [taskManager,licensing,globalSearch,globalSearchProviders,code,usageCollection  
,xpackLegacy,kibanaUsageCollection,telemetryCollectionManager,telemetry,telemetryCollectionXpack,securityOss,newsfeed,mapsLegacy,kibanaLegacy,translat  
ions,share,expressions,charts,legacyExport,embeddable,uiActionsEnhanced,esUIShared,bfetch,data,home,observability,console,consoleExtensions,apmOss,sea  
rchProfiler,painlessLab,grokDebugger,management,indexPatternManagement,advancedSettings,fileUpload,savedObjects,visualizations,visTypeVislib,visTypeT  
imeline,features,licenseManagement,dataEnhanced,watcher,canvas,visTypeVega,visTypeMarkdown,visTypeTimeSeries,visTypeTimeSeriesEnhanced,visTypeTagCloud,  
visTypeTable,visTypeMetric,tileMap,regionMap,mapsOss,lensOss,inputControlVis,graph,timeline,dashboard,dashboardEnhanced,visualize,discover,discoverEnh  
anced,savedObjectsManagement,spaces,security,reporting,savedObjectsTagging,lens,maps,lists,cloud,upgradeAssistant,snapshotRestore,enterpriseSearch,m  
l,encryptedSavedObjects,fleet,indexManagement,remoteClusters,crossClusterReplication,rollup,indexLifecycleManagement,dashboardMode,beatsManagement,trans  
form,ingestPipelines,eventLog,actions,alerts,triggersActionsUI,stackAlerts,securitySolution,case,infra,monitoring,logstash,apm,uptime]  
log [17:56:06.520] [info][plugins][taskManager] TaskManager is identified by the Kibana UUID: 9814a4a9-7678-41f6-b399-9e41a44d9114  
log [17:56:06.838] [warning][config][plugins][security] Generating a random key for xpack.security.encryptionKey. To prevent sessions from being i  
nvalidated on restart, please set xpack.security.encryptionKey in the kibana.yml or use the bin/kibana-encryption-keys command.  
log [17:56:06.839] [warning][config][plugins][security] Session cookies will be transmitted over insecure connections. This is not recommended.  
log [17:56:06.891] [warning][config][plugins][reporting] Generating a random key for xpack.reporting.encryptionKey. To prevent sessions from being  
invalidated on restart, please set xpack.reporting.encryptionKey in the kibana.yml or use the bin/kibana-encryption-keys command.  
log [17:56:06.892] [info][config][plugins][reporting] Chromium sandbox provides an additional layer of protection, and is supported for Linux Ubu  
ntu 18.04 OS. Automatically enabling Chromium sandbox.  
log [17:56:06.977] [warning][config][encryptedSavedObjects][plugins] Generating a random key for xpack.encryptedSavedObjects.encryptionKey. To dec  
rypt encrypted saved objects attributes after restart, please set xpack.encryptedSavedObjects.encryptionKey in the kibana.yml or use the bin/kibana-en  
ryption-keys command.  
log [17:56:06.983] [warning][fleet][plugins] Fleet APIs are disabled because the Encrypted Saved Objects plugin uses an ephemeral encryption key.  
Please set xpack.encryptedSavedObjects.encryptionKey in the kibana.yml or use the bin/kibana-encryption-keys command.  
log [17:56:07.032] [warning][actions][actions][plugins] APIs are disabled because the Encrypted Saved Objects plugin uses an ephemeral encryption  
key. Please set xpack.encryptedSavedObjects.encryptionKey in the kibana.yml or use the bin/kibana-encryption-keys command.  
log [17:56:07.045] [warning][alerting][alerts][plugins][plugins] APIs are disabled because the Encrypted Saved Objects plugin uses an ephemeral en  
ryption key. Please set xpack.encryptedSavedObjects.encryptionKey in the kibana.yml or use the bin/kibana-encryption-keys command.  
log [17:56:07.154] [info][monitoring][monitoring][plugins] config sourced from: production cluster  
log [17:56:07.423] [info][savedobjects-service] Waiting until all Elasticsearch nodes are compatible with Kibana before starting saved objects mig  
rations...  
log [17:56:07.659] [info][savedobjects-service] Starting saved objects migrations  
log [17:56:07.980] [info][plugins-system] Starting [101] plugins: [taskManager,licensing,globalSearch,globalSearchProviders,code,usageCollection,x  
packLegacy,kibanaUsageCollection,telemetryCollectionManager,telemetry,telemetryCollectionXpack,securityOss,newsfeed,mapsLegacy,kibanaLegacy,translatio  
ns,share,expressions,charts,legacyExport,embeddable,uiActionsEnhanced,esUIShared,bfetch,data,home,observability,console,consoleExtensions,apmOss,searc  
hProfiler,painlessLab,grokDebugger,management,indexPatternManagement,advancedSettings,fileUpload,savedObjects,visualizations,visTypeVislib,visTypeTime
```

Run Logstash

To run the logstash we have to input a configuration file on how to parse the data of a given log file, run this command after you change directory to logstash.

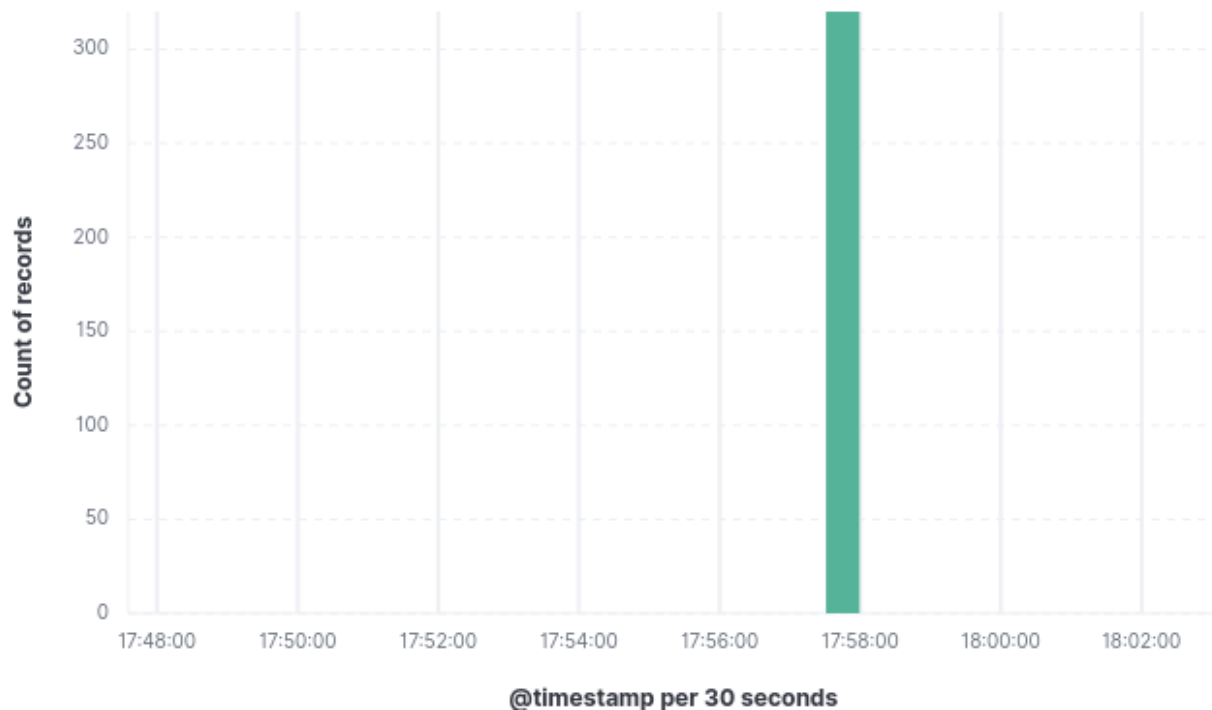
Logstash runs on port number **9600** and it forwards the filters of the log file to the elasticsearch server.

```
./bin/logstash -f /path/to/configuration/file
```



```
File Edit View Search Terminal Help  
neeraj@njetha:~/Downloads/Tools/logstash-7.11.2$ ./bin/logstash -f /home/neeraj/Downloads/Tools/ELK-Example/calculator_logstash.conf  
Using bundled JDK: /home/neeraj/Downloads/Tools/logstash-7.11.2/jdk  
OpenJDK 64-Bit Server VM warning: Option UseConcMarkSweepGC was deprecated in version 9.0 and will likely be removed in a future release.
```

```
Activities Terminal Sat Mar 13, 5:57:43 PM neeraj@njetha: ~/Downloads/Tools/logstash-7.11.2
File Edit View Search Terminal Help
{
  "path" => "/home/neeraj/IdeaProjects/Calculator/calculator.log",
  "@timestamp" => 2021-03-13T12:27:32.338Z,
  "message" => "12/Mar/2021:01:47:08 138 [Calculator.java] [INFO] Calculator power of the number -1.0,3.0",
  "@version" => "1",
  "tags" => [
    [0] "_grokparsefailure"
  ],
  "host" => "njetha"
}
{
  "path" => "/home/neeraj/IdeaProjects/Calculator/calculator.log",
  "@timestamp" => 2021-03-13T12:27:32.339Z,
  "message" => "12/Mar/2021:01:47:08 140 [Calculator.java] [INFO] Calculator power of the number 2.0,3.0",
  "@version" => "1",
  "tags" => [
    [0] "_grokparsefailure"
  ],
  "host" => "njetha"
}
{
  "path" => "/home/neeraj/IdeaProjects/Calculator/calculator.log",
  "@timestamp" => 2021-03-13T12:27:32.340Z,
  "message" => "12/Mar/2021:01:47:08 143 [Calculator.java] [INFO] Calculator To find Factorial of number 0",
  "@version" => "1",
  "tags" => [
    [0] "_grokparsefailure"
  ],
  "host" => "njetha"
}
{
  "path" => "/home/neeraj/IdeaProjects/Calculator/calculator.log",
  "@timestamp" => 2021-03-13T12:27:32.341Z,
  "message" => "12/Mar/2021:01:50:40 764 [Calculator.java] [INFO] Calculator Find the Square Root of number 0.0",
  "@version" => "1",
  "tags" => [
    [0] "_grokparsefailure"
  ],
  "host" => "njetha"
}
```

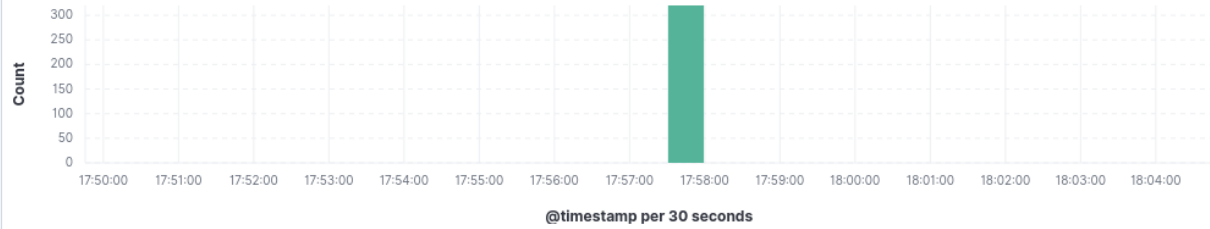


320 hits

Mar 13, 2021 @ 17:49:47.260 - Mar 13, 2021 @ 18:04:47.260

Auto

[Hide chart](#)



Time

_source

```
> Mar 13, 2021 @ 17:57:32.362 path: /home/neeraj/IdeaProjects/Calculator/calculator.log @timestamp: Mar 13, 2021 @ 17:57:32.362
message: 12/Mar/2021:02:03:58 763 [Calculator.java] [INFO] Calculator To find Factorial of number 5
@version: 1 tags: _grokparsefailure host: njjetha _id: 2yqOK3gBkIc3buR8WnDF _type: _doc
_index: calculator_elastic_devops _score: -

> Mar 13, 2021 @ 17:57:32.362 path: /home/neeraj/IdeaProjects/Calculator/calculator.log @timestamp: Mar 13, 2021 @ 17:57:32.362
message: 12/Mar/2021:02:03:58 763 [Calculator.java] [INFO] Calculator Result of factorial of 5 is 120
```

