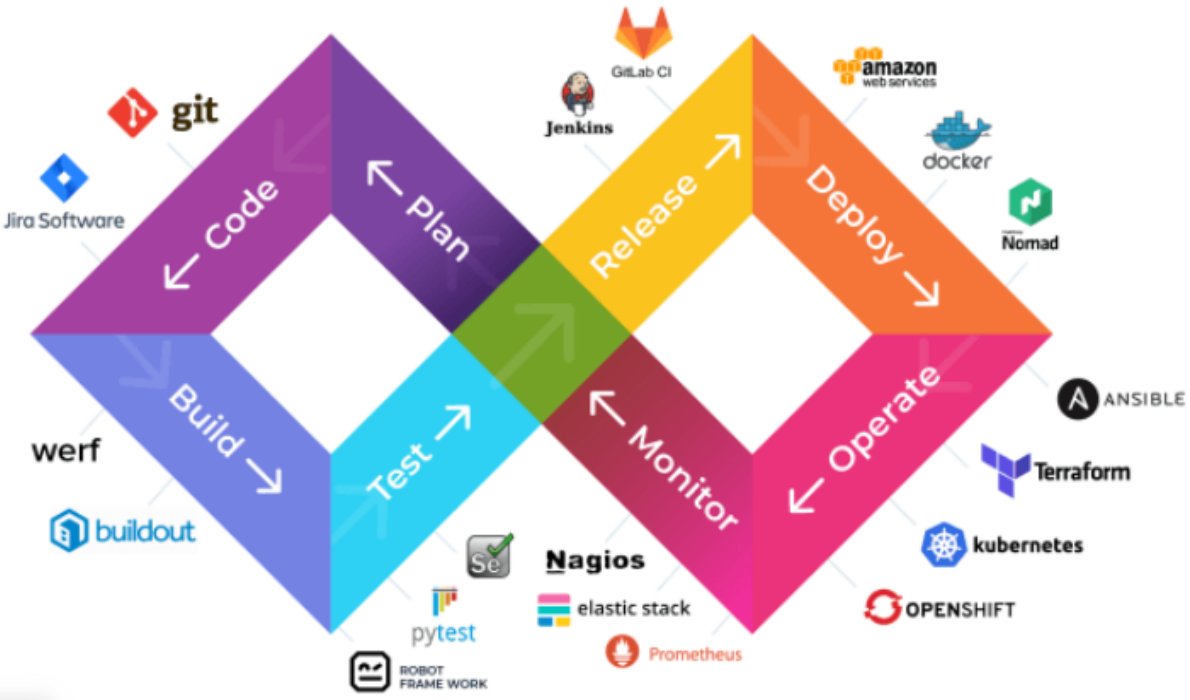
MT2022118 - SUBHAM BASU ROY CHOWDHURY
Calculator with Devops MiniProject

What is Devops?

DevOps is a set of practices that combines software development (Dev) and information technology operations (Ops) to shorten the systems development life cycle and provide continuous delivery with high software quality. It aims to improve the collaboration and communication between development and operations teams, leading to better and faster software delivery.



Why do we Need Devops?

There are several benefits of having a Devops Practices over the Agile Practices, some of them are:

- Faster time-to-market: DevOps helps organizations to deliver software faster, reducing the time-to-market and enabling them to respond quickly to changing business needs and customer requirements.

- Improved collaboration and communication: DevOps encourages collaboration and communication between development and operations teams, leading to better alignment, understanding, and trust, and improving the overall efficiency and effectiveness of the software delivery process.

- Better quality and reliability: DevOps includes continuous integration, continuous delivery, and automated testing, which helps to identify and fix issues early in the development process, improving software quality and reliability.
-
- Reduced costs: DevOps helps organizations to reduce costs by automating repetitive tasks, improving efficiency, and reducing waste and rework.
-
- Increased agility and scalability: DevOps enables organizations to quickly and easily scale their infrastructure and applications, allowing them to respond rapidly to changing business needs and market demands.

Problem Statement:

Create a scientific calculator program with user menu driven operations

- Square root function - √x
- Factorial function - x!
- Natural logarithm (base e) - ln(x)
- Power function - x^b

Devops Tool Chain Used:

1. Source code management: **GIT AND GITHUB**
2. Testing: **JUnit**
3. Build: **MAVEN**
4. Continous Integration: **JENKINS**
5. Containerization: **DOCKER**, **DOCKER HUB**
6. Configuration Management: **ANSIBLE**
7. Deployment: **Localhost**
8. Logging: **LOG4J**
9. Monitoring: **ELK** Stack.

Programming Language Used: **JAVA**
Type of Application: **COMMAND LINE INTERFACE**

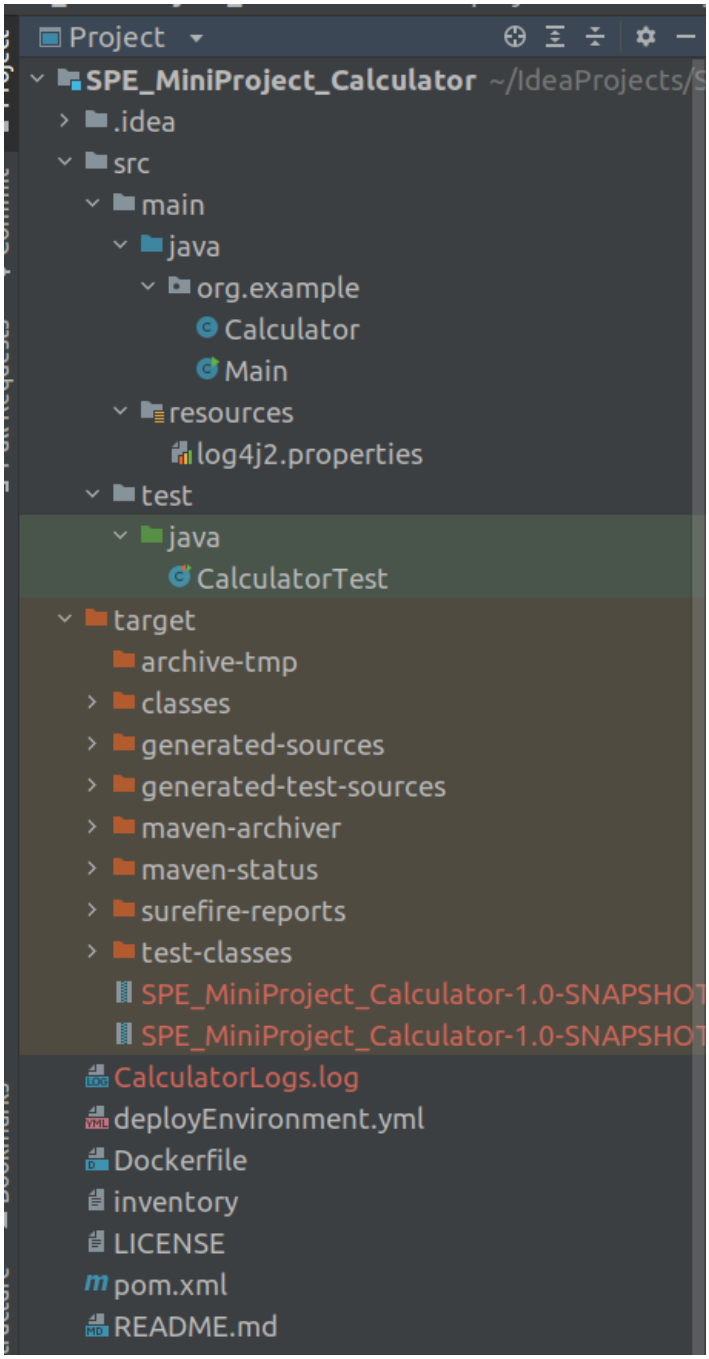
GITHUB REPO: https://github.com/sbrc1996/SPE_Calculator (master branch)

Steps followed in development:

1. Start the development in local
2. Write the test cases for the application using JUint
3. Push the code into the guthub repository via git
4. Build the entire project using Maven
5. Create the Pipeline for the application using groovy script in Jenkins
6. Create image in the Docker
7. Push the image in the Docker Hub after creating an account
8. Deploy the code in the Docker container with the help of Ansible
9. Run the code in the local machine through the help of Ansible user
10. Generate the Log file by the help of Log4j2.

Step 1: Development of the application.

The folder structure:

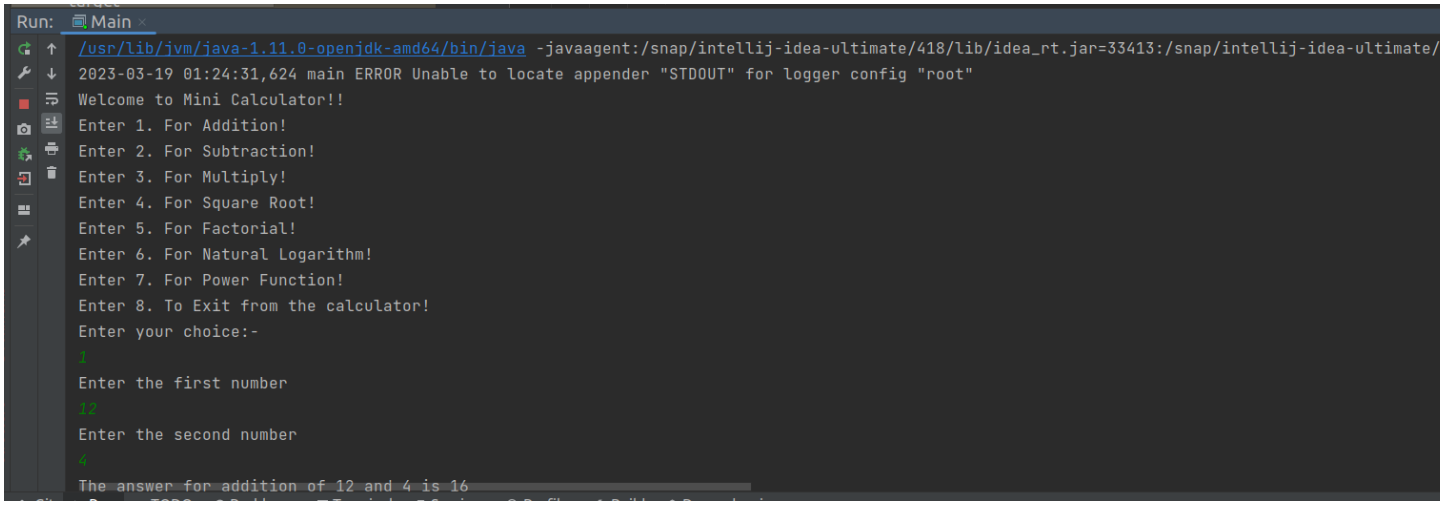


Dependency File: POM.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0"
         xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
         xsi:schemaLocation="http://maven.apache.org/POM/4.0.0
http://maven.apache.org/xsd/maven-4.0.0.xsd">
    <modelVersion>4.0.0</modelVersion>

    <groupId>org.example</groupId>
    <artifactId>SPE_MiniProject_Calculator</artifactId>
    <version>1.0-SNAPSHOT</version>

    <properties>
        <maven.compiler.source>11</maven.compiler.source>
        <maven.compiler.target>11</maven.compiler.target>

<project.build.sourceEncoding>UTF-8</project.build.sourceEncodin
g>
    </properties>


    <build>
        <plugins>
            <plugin>
                <groupId>org.apache.maven.plugins</groupId>
                <artifactId>maven-assembly-plugin</artifactId>
                <version>3.5.0</version>
                <executions>
                    <execution>
                        <phase>package</phase>
                        <goals>
                            <goal>single</goal>
                        </goals>
                        <configuration>
                            <archive>
                                <manifest>

<mainClass>org.example.Main</mainClass>
                                </manifest>
```

```
                            </archive>
                            <descriptorRefs>

<descriptorRef>jar-with-dependencies</descriptorRef>
                            </descriptorRefs>
                        </configuration>
                    </execution>
                </executions>
            </plugin>
        </plugins>
    </build>


    <!-- https://mvnrepository.com/artifact/junit/junit -->
    <dependencies>
        <dependency>
            <groupId>junit</groupId>
            <artifactId>junit</artifactId>
            <version>4.13.2</version>
            <scope>test</scope>
        </dependency>
<!--          https://mvnrepository.com/artifact/log4j/log4j-->
        <dependency>
            <groupId>org.apache.logging.log4j</groupId>
            <artifactId>log4j-api</artifactId>
            <version>2.19.0</version>
        </dependency>
        <dependency>
            <groupId>org.apache.logging.log4j</groupId>
            <artifactId>log4j-core</artifactId>
            <version>2.19.0</version>
        </dependency>

    </dependencies>


</project>
```

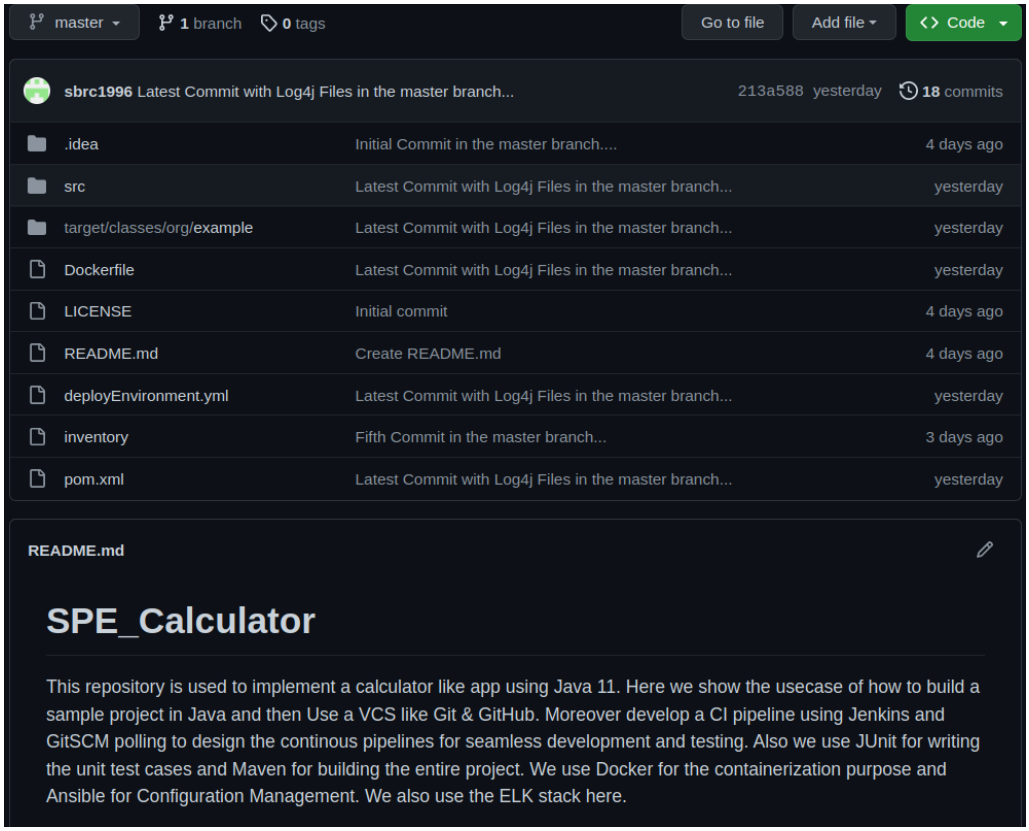
Output of the application:



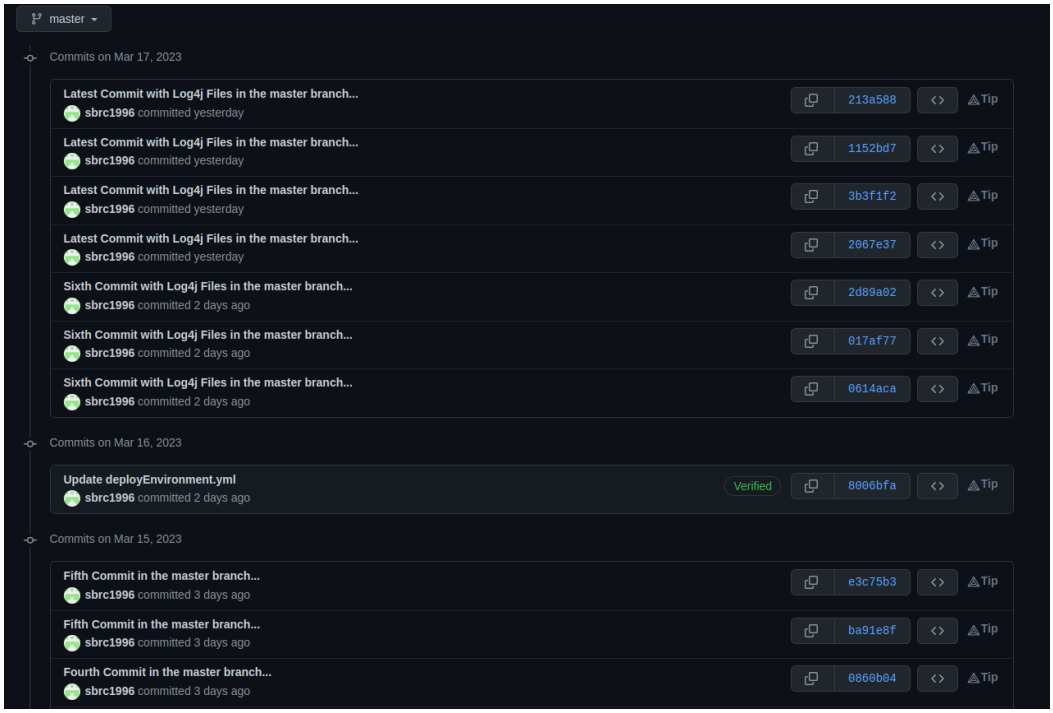
Step 2: Writing Test Cases with JUnit:

```java
n.java × CalculatorTest.java ×
import org.example.Calculator;
import org.junit.Test;

import static org.junit.Assert.assertEquals;
import static org.junit.Assert.assertNotEquals;


no usages  sbrc1996
public class CalculatorTest
{
    12 usages
    Calculator cc = new Calculator();
    no usages  sbrc1996
    @Test
    public void testAddFunction()
    {
        assertEquals( message: "Verifying the add function for True Positive: ", expected: 26,cc.add( a: 13, b: 13));
        assertNotEquals( message: "Verifying the add function for False Positive: ", unexpected: 22,cc.add( a: 13, b: 13));
    }
    no usages  sbrc1996
    @Test
    public void testSubFunction()
    {
        assertEquals( message: "Verifying the add function for True Positive: ", expected: 0,cc.sub( a: 13, b: 13));
        assertNotEquals( message: "Verifying the add function for False Positive: ", unexpected: 22,cc.sub( a: 13, b: 13));
    }
```

Step 3: SOURCE CODE MANAGEMENT



Commit History:

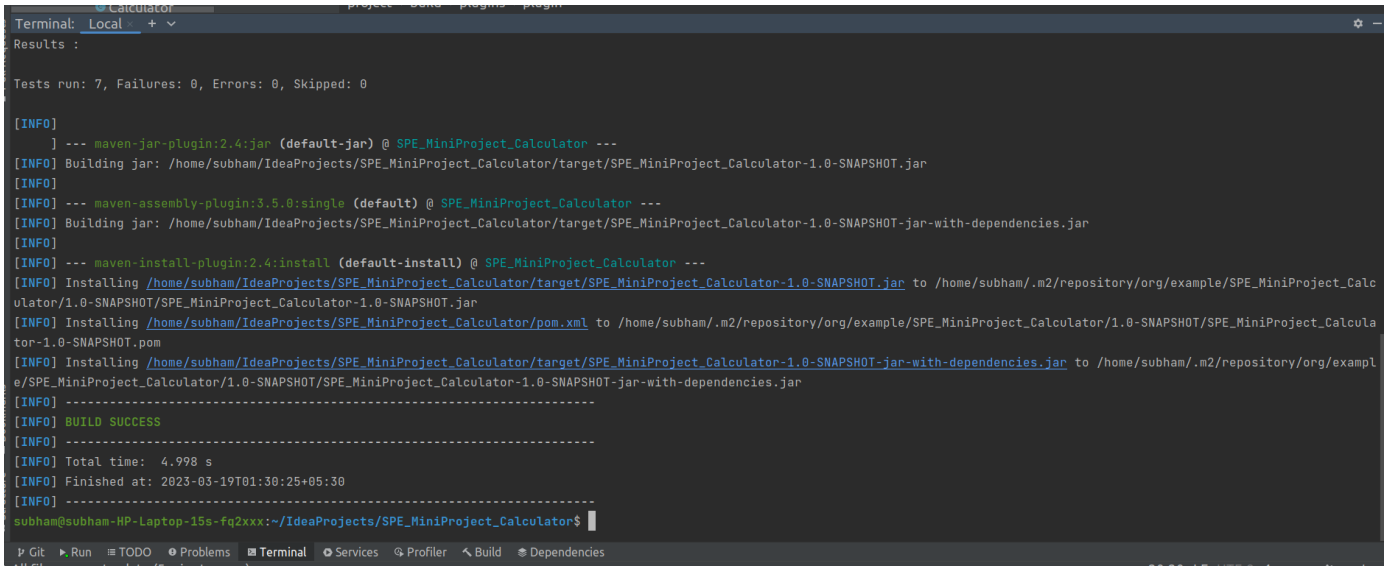


Commands used 👍

- **Git init**
- **Git add .**
- **Git remote add origin**
- **Git commit -m <Commit Message>**
- **Git push origin master**

Step 4: Build the entire project using Maven

Command used: **mvn clean install**



After running the above command we get a 2 JAR file created in the Target folder.
We need to execute that jar file using the following command:

java -jar SPE_MiniProject_Calculator-1.0-SNAPSHOT-jar-with-dependencies.jar

To execute our CLI application:

```
subham@subham-HP-Laptop-15s-fq2xxx:~/IdeaProjects/SPE_MiniProject_Calculator$ cd target/
subham@subham-HP-Laptop-15s-fq2xxx:~/IdeaProjects/SPE_MiniProject_Calculator/target$ java -jar SPE_MiniProject_Calculator-1.0-SNAPSHOT-jar-with-dependencies.jar
2023-03-19 01:32:38,884 main ERROR Unable to locate appender "STDOUT" for logger config "root"
Welcome to Mini Calculator!!
Enter 1. For Addition!
Enter 2. For Subtraction!
Enter 3. For Multiply!
Enter 4. For Square Root!
Enter 5. For Factorial!
Enter 6. For Natural Logarithm!
Enter 7. For Power Function!
Enter 8. To Exit from the calculator!
Enter your choice:-
5
Enter the number
67
The answer for square Root of 67 is 0
```

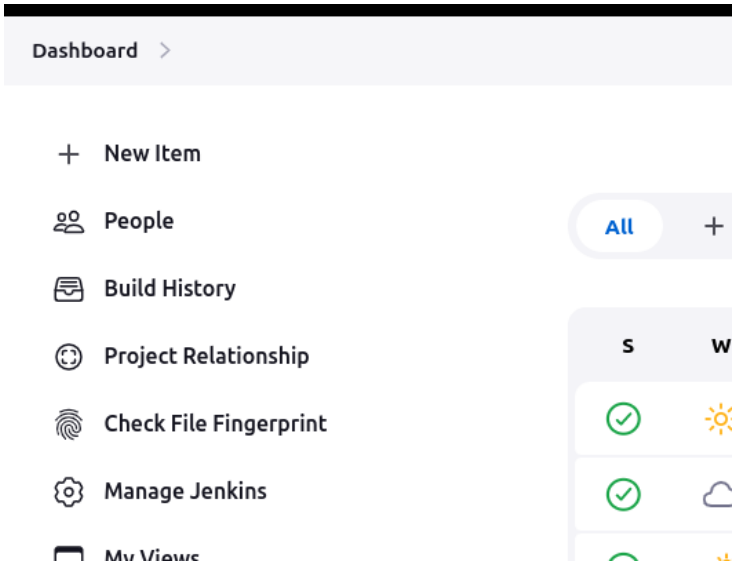
Step 5: Pipeline Creation in Jenkins

What is Jenkins?

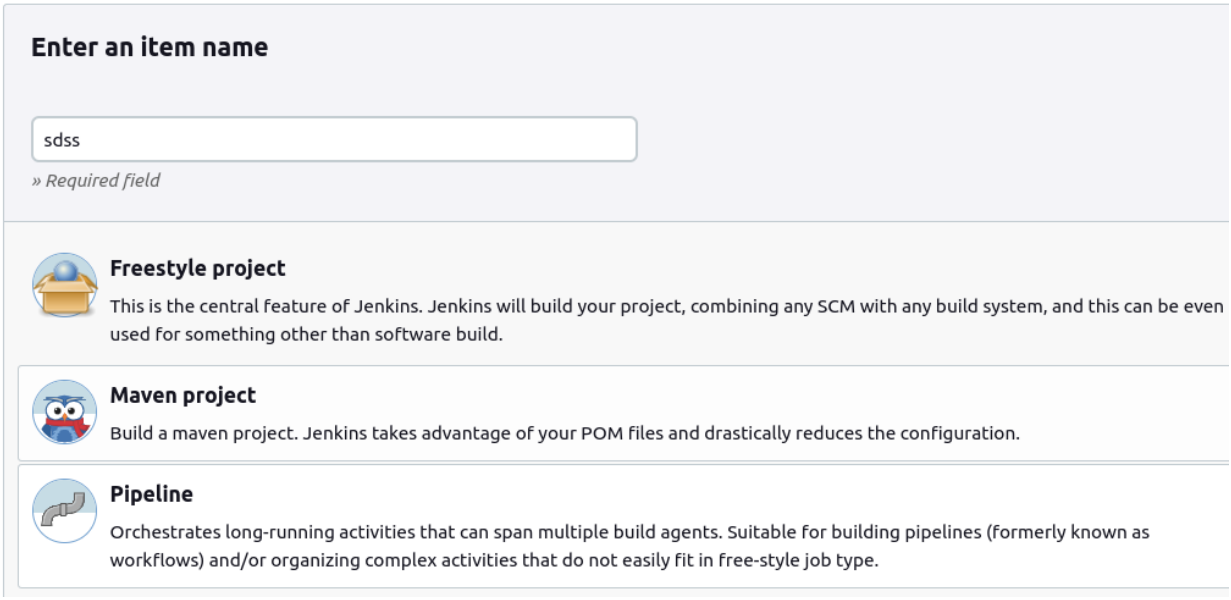
Jenkins is an open-source automation server. It helps automate the parts of software development related to building, testing, and deploying, facilitating continuous integration and continuous delivery. It is a server-based system that runs in servlet containers such as Apache Tomcat.

Steps to create a pipeline in Jenkins:

1. Install Jenkins in Ubuntu
2. Click on New Item:



3. Enter a project name and create a project of type Pipeline.



4. Our Pipeline name here is: SPE_Calculator_Pipeline.
5. Steps involved in our pipeline are:
    - Git Pull
    - Maven Build + Junit Scripts execution
    - Docker Image Build
    - Push Docker Image in the Docker Hub by creating a repository
    - Delete the already created Docker image
    - Ansible Deploy

We have used Groovy Scripts to write the pipeline:
Groovy script for:

- **Git Pull:**

```
8  stages {
9      stage('Git Pull') {
10         steps {
11             git 'https://github.com/sbrc1996/SPE_Calculator.git'
12         }
13     }
```

- **Maven Build + Junit Scripts execution:**

```
14     stage('Maven Build + JUint Test Cases') {
15         steps {
16             sh 'mvn clean install'
17         }
18     }
```

- **Docker Image Build:**

```
19      stage('Docker Build Image') {
20          steps {
21              script{
22                  dockerimg=docker.build("sbrc1996/speminiproject:latest")
23              }
24          }
25      }
```

- **Push Docker Image in the Docker Hub by creating a repository:**

```
26      stage('Push Docker Image') {
27          steps {
28              script{
29                  docker.withRegistry('','dockerhub'){
30                  dockerimg.push()
31                  }
32              }
33          }
34      }
```

- **Delete the already created Docker image:**

```
35      stage('Delete Docker Image') {
36          steps {
37              script{
38                  sh 'docker image rm -f sbrc1996/speminiproject'
39              }
40          }
41      }
```

- **Ansible Deploy:**

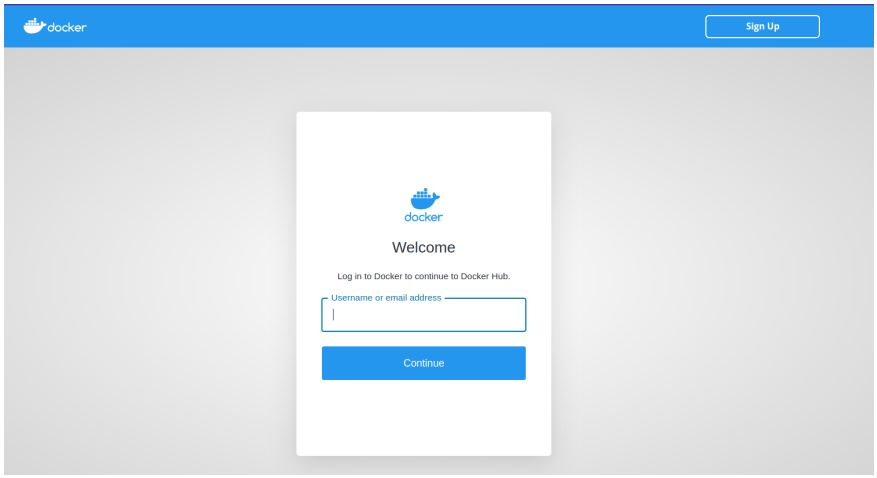
```
42  stage('Ansible deploy') {
43      steps {
44          //Ansible Deploy to remote server
45          ansiblePlaybook becomeUser: null, colorized: true, disableHostKeyChecking: true, inventory: 'inventory', playbook: 'deployEnvironment.yml',
46      }
47  }
48
```

Pipeline Full Run:

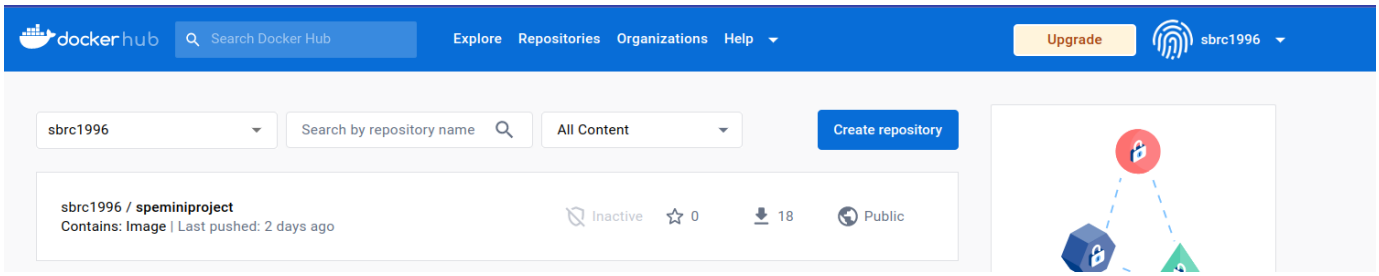
SPE_Calculator_Pipeline - Stage View

	Git Pull	Maven Build + JUint Test Cases	Docker Build Image	Push Docker Image	Delete Docker Image	Ansible deploy
Average stage times: (Average full run time: ~42s)	1s	7s	1s	16s	330ms	9s
#61 Mar 19 No Changes	1s	8s	2s	20s	444ms	13s
#60 Mar 17 No Changes	960ms	3s	698ms	23s	333ms	10s
#59 Mar 17 1 commit	1s	14s	1s	21s	349ms	8s

Before executing the entire pipeline we have to create an account on the docker Hub.



Your repository will be created here..



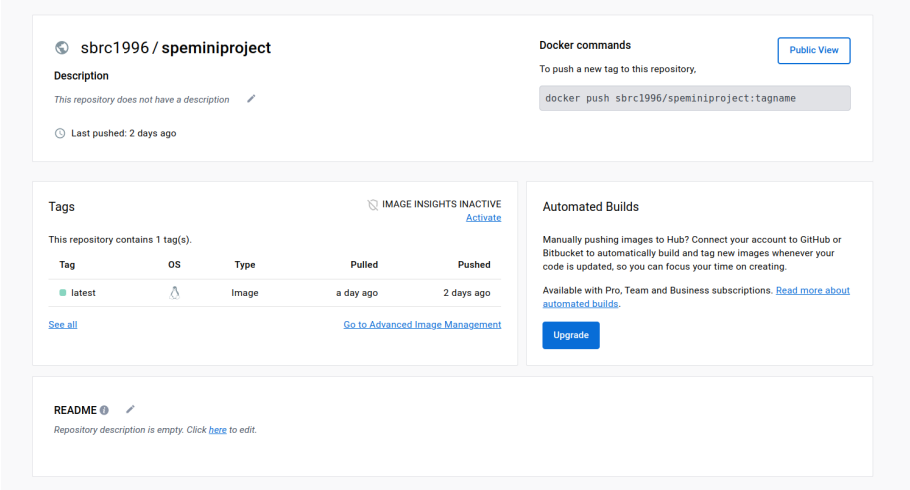
We have to provide sudo privileges to run our docker container:

sudo chmod 666 /var/run/docker.sock

Step 6: Execution

After execution of the pipeline, we will have our docker image created and a repository created in the docker hub.

A more detailed view of the Repository:



Docker Image creation:

```
subham@subham-HP-Laptop-15s-fq2xxx:~$ sudo chmod 666 /var/run/docker.sock
[sudo] password for subham:
subham@subham-HP-Laptop-15s-fq2xxx:~$ docker images
REPOSITORY                   TAG       IMAGE ID       CREATED          SIZE
sbrc1996/speminiproject      latest    3374256285ba   50 seconds ago   656MB
sbrc1996/speminiproject      <none>    d8571eb06fd0   44 hours ago     656MB
sbrc1996/speminiproject      <none>    19063e3b3458   4 days ago       656MB
sbrc1996/speminiproject      <none>    22627f61c235   4 days ago       656MB
sbrc1996/speminiproject      <none>    29da2144a5db   4 days ago       654MB
sbrc1996/speminiproject      <none>    9493cf8dc71c   4 days ago       654MB
sbrc1996/speminiproject      <none>    dfa459f1d91c   4 days ago       654MB
sbrc1996/speminiproject      <none>    8bf1b7319697   4 days ago       654MB
sbrc1996/speminiproject      <none>    83f57a90be1d   5 days ago       654MB
sbrc1996/speminiproject      <none>    57c6bbaceb1d   5 days ago       654MB
sbrc1996/speminiproject      <none>    f77f937a6f51   5 days ago       654MB
sbrc1996/speminiproject      <none>    2df7bd54152d   6 days ago       654MB
<none>                       <none>    47d489c8843d   6 days ago       654MB
<none>                       <none>    b2435593f6c1   6 days ago       654MB
sbrc1996/speminiproject      <none>    d619ffae5223   6 days ago       654MB
subham1996/speminiproject    latest    d668c576ffc1   6 days ago       654MB
<none>                       <none>    9d4319a285ff   6 days ago       654MB
<none>                       <none>    52b958325398   6 days ago       654MB
<none>                       <none>    53202ca58ce0   6 days ago       654MB
<none>                       <none>    8b9f242f2992   6 days ago       654MB
<none>                       <none>    939b52b36340   6 days ago       654MB
<none>                       <none>    21ef7e7e891a   6 days ago       654MB
<none>                       <none>    3a8c1aeaa20e   6 days ago       654MB
<none>                       <none>    74c89adaee61   6 days ago       654MB
<none>                       <none>    5049eedd8aa9   6 days ago       654MB
<none>                       <none>    6ce43d0a50e2   6 days ago       654MB
<none>                       <none>    381d08f77756   6 days ago       654MB
<none>                       <none>    c9165f1e6bd2   6 days ago       654MB
<none>                       <none>    a94a012e17c1   6 days ago       654MB
<none>                       <none>    5f652c2ec22e   6 days ago       654MB
<none>                       <none>    77209b1eda91   6 days ago       654MB
<none>                       <none>    4826d798ab36   6 days ago       654MB
<none>                       <none>    dba981f9a9d6   6 days ago       654MB
ubuntu                       latest    58db3edaf2be   7 weeks ago      77.8MB
openjdk                      11        47a932d998b7   7 months ago     654MB
subham@subham-HP-Laptop-15s-fq2xxx:~$
```

We can run this file by executing the following command

docker run -it sbrc1996/speminiproject

```
subham@subham-HP-Laptop-15s-fq2xxx:~$ docker run -it sbrc1996/speminiproject
2023-03-21 13:55:07,733 main ERROR Unable to locate appender "STDOUT" for logger config "root"
Welcome to Mini Calculator!!
Enter 1. For Addition!
Enter 2. For Subtraction!
Enter 3. For Multiply!
Enter 4. For Square Root!
Enter 5. For Factorial!
Enter 6. For Natural Logarithm!
Enter 7. For Power Function!
Enter 8. To Exit from the calculator!
Enter your choice:-
3
Enter the first number
23
Enter the second number
56
The answer for multiplication of 23 and 56 is 1288
Enter 1. For Addition!
Enter 2. For Subtraction!
Enter 3. For Multiply!
Enter 4. For Square Root!
Enter 5. For Factorial!
Enter 6. For Natural Logarithm!
Enter 7. For Power Function!
Enter 8. To Exit from the calculator!
Enter your choice:-
7
Enter the number
9
Enter the power
5
The answer for Power of 9^5 is 59049
Enter 1. For Addition!
Enter 2. For Subtraction!
Enter 3. For Multiply!
Enter 4. For Square Root!
Enter 5. For Factorial!
Enter 6. For Natural Logarithm!
Enter 7. For Power Function!
Enter 8. To Exit from the calculator!
Enter your choice:-
8
Thanks for visiting, see you soon!!!
subham@subham-HP-Laptop-15s-fq2xxx:~$
```

Step 7: Deployment.

We are not deploying our calculator code into any cloud environment, instead, we are deploying it in our localhost using Ansible.

What is Ansible?

Ansible is a suite of software tools that enables infrastructure as code. It is open-source and the suite includes software provisioning, configuration management, and application deployment functionality. Originally written by Michael DeHaan and acquired by Red Hat in 2015, Ansible is designed to configure both Unix-like systems and Microsoft Windows. Ansible is agentless, relying on temporary remote connections via SSH or Windows Remote Management which allows PowerShell execution. The Ansible control node runs on most Unix-like systems that are able to run Python, including Windows with Windows Subsystem for Linux installed. System configuration is defined in part by using its own declarative language.

Steps needed for a successful deployment:

- Install Ansible
- Create a dedicated Ansible user on your own computer.
- Generate SSH key which will be used in the authentication.
- Finally, write the YAML playbook file to install the required dependencies in the docker container.

Playbook:

13 lines (10 sloc) | 240 Bytes

```
---
- name: Pull docker image of Calculator
  hosts: all
  tasks:

    - name: Start docker service
      service:
        name: docker
        state: started

    - name: pull docker image
      shell: docker pull sbrc1996/speminiproject

```

Inventory File:

2 lines (2 sloc) | 51 Bytes

```
[ubuntu18]
172.16.133.72 ansible_user="ansible_usr"
```

Here Ubuntu18 is the group name, the ip-address is the one of my my own computer and the name of the ansible user through which I am going to deploy the code in the container.

Running in the docker container using ansible user: “ansible_usr”

- Login in as sudo ansible user
- Check the docker images
- Run the docker container

  Screenshots for the same:

```
subham@subham-HP-Laptop-15s-fq2xxx:~$ sudo su ansible_usr
[sudo] password for subham:
ansible_usr@subham-HP-Laptop-15s-fq2xxx:/home/subham$ docker images
REPOSITORY                    TAG       IMAGE ID       CREATED          SIZE
sbrc1996/speminiproject       latest    3374256285ba   29 minutes ago   656MB
sbrc1996/speminiproject       <none>    d8571eb06fd0   44 hours ago     656MB
sbrc1996/speminiproject       <none>    19063e3b3458   4 days ago       656MB
sbrc1996/speminiproject       <none>    22627f61c235   4 days ago       656MB
sbrc1996/speminiproject       <none>    29da2144a5db   4 days ago       654MB
sbrc1996/speminiproject       <none>    9493cf8dc71c   4 days ago       654MB
sbrc1996/speminiproject       <none>    dfa459f1d91c   4 days ago       654MB
sbrc1996/speminiproject       <none>    8bf1b7319697   4 days ago       654MB
sbrc1996/speminiproject       <none>    83f57a90be1d   5 days ago       654MB
sbrc1996/speminiproject       <none>    57c6bbaceb1d   5 days ago       654MB
sbrc1996/speminiproject       <none>    f77f937a6f51   5 days ago       654MB
sbrc1996/speminiproject       <none>    2df7bd54152d   6 days ago       654MB
<none>                        <none>    47d489c8843d   6 days ago       654MB
```

```
openjdk                       11        47a932d998b7   7 months ago     654MB
ansible_usr@subham-HP-Laptop-15s-fq2xxx:/home/subham$ docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS     NAMES
ansible_usr@subham-HP-Laptop-15s-fq2xxx:/home/subham$ docker ps -a
CONTAINER ID   IMAGE                      COMMAND                  CREATED         STATUS                       PORTS     NAMES
23355a41eac5   sbrc1996/speminiproject    "java -jar SPE_MiniP…"   27 minutes ago  Exited (0) 26 minutes ago              funny_kalam
77ab2bad1212   d8571eb06fd0               "java -jar SPE_MiniP…"   31 hours ago    Exited (129) 31 hours ago              minicalc
e8d07a1a7ff5   d8571eb06fd0               "java -jar SPE_MiniP…"   44 hours ago    Exited (143) 42 hours ago              xyz
cdbc4250ecda   190                        "java -jar SPE_MiniP…"   4 days ago      Exited (0) 4 days ago                  musing_wozniak
4c21ab285534   19063e3b3458               "java -jar SPE_MiniP…"   4 days ago      Exited (0) 4 days ago                  priceless_galois
cd84be51935c   226                        "java -jar SPE_MiniP…"   4 days ago      Exited (0) 4 days ago                  speminiproject
d307127edbfb   dfa459f1d91c               "java -jar SPE_MiniP…"   4 days ago      Exited (0) 4 days ago                  cranky_colden
d0b90362d040   dfa459f1d91c               "java -jar SPE_MiniP…"   4 days ago      Exited (130) 4 days ago                crazy_archimedes
a0dec8d71a6c   57c6bbaceb1d               "java -jar SPE_MiniP…"   5 days ago      Exited (130) 5 days ago                great_goodall
c183829392be   f77f937a6f51               "java -jar SPE_MiniP…"   5 days ago      Exited (143) 5 days ago                upbeat_germain
3c40dd828c7a   ubuntu                     "/bin/bash"              6 days ago      Created                                test1
48d959370b81   ubuntu                     "/bin/bash"              6 days ago      Created                                test
7774e2a2c057   ubuntu                     "/bin/bash"              3 weeks ago     Exited (137) 3 weeks ago               user10
2bdb38d03dad   ubuntu                     "/bin/bash"              3 weeks ago     Exited (137) 3 weeks ago               user9
53630d5a231e   ubuntu                     "/bin/bash"              3 weeks ago     Exited (137) 3 weeks ago               user8
bc1ef4d9b2f8   ubuntu                     "/bin/bash"              3 weeks ago     Exited (137) 3 weeks ago               user7
ad74ed162fe1   ubuntu                     "/bin/bash"              3 weeks ago     Exited (137) 3 weeks ago               user6
ef3529536654   ubuntu                     "/bin/bash"              3 weeks ago     Exited (137) 3 weeks ago               user5
a561d58973a0   ubuntu                     "/bin/bash"              3 weeks ago     Exited (137) 3 weeks ago               user4
fb4a7658c953   ubuntu                     "/bin/bash"              3 weeks ago     Exited (127) 3 weeks ago               user3
```

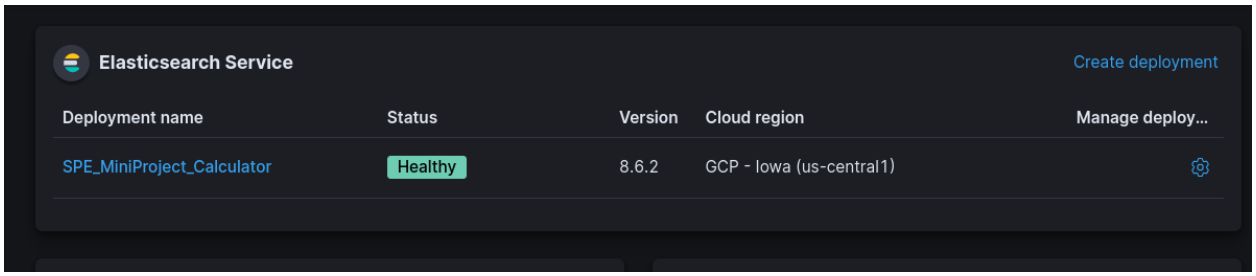
```
ansible_usr@subham-HP-Laptop-15s-fq2xxx:/home/subham$ docker run -it sbrc1996/speminiproject
2023-03-21 14:23:25,599 main ERROR Unable to locate appender "STDOUT" for logger config "root"
Welcome to Mini Calculator!!
Enter 1. For Addition!
Enter 2. For Subtraction!
Enter 3. For Multiply!
Enter 4. For Square Root!
Enter 5. For Factorial!
Enter 6. For Natural Logarithm!
Enter 7. For Power Function!
Enter 8. To Exit from the calculator!
Enter your choice:-
```

Code executing successfully in the docker container 23355a41eac5.

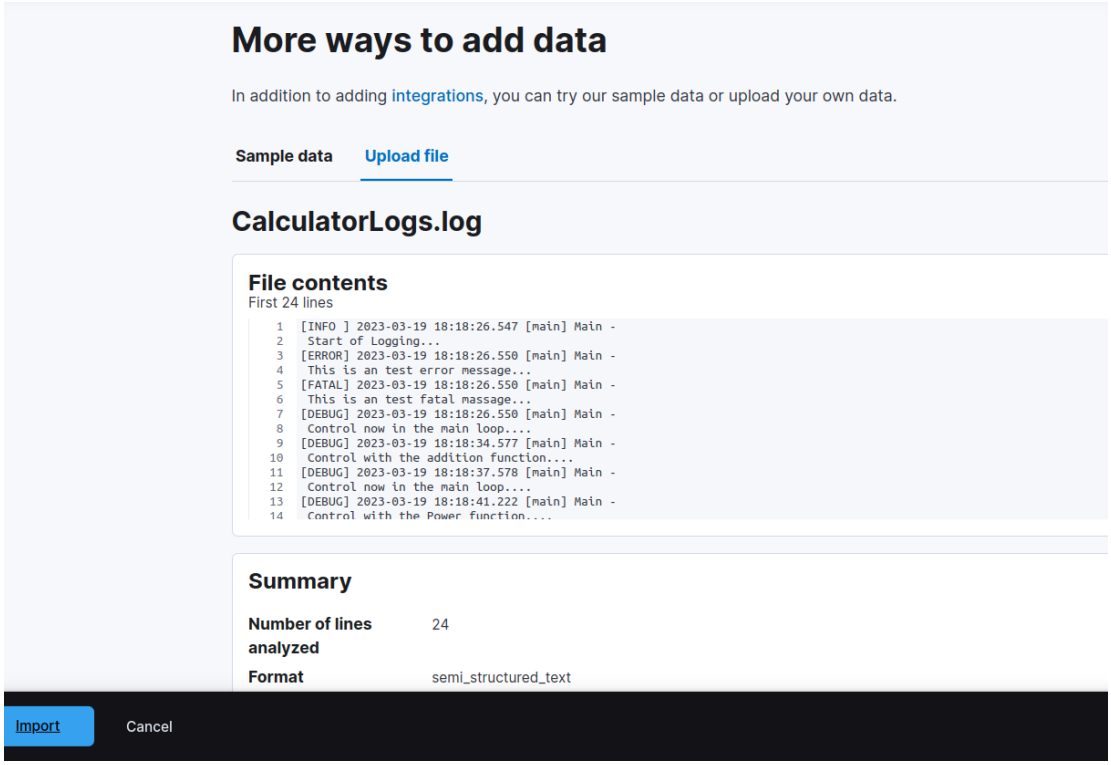
Step 8: Continuous Monitoring

We will perform continuous monitoring using the ELK stack. We have 2 options with the ELK stack either Install it locally or use the cloud version for a 14-day trail. I manually installed the log file from the Jenkins workspace in the docker container and uploaded it in the ELK dashboard to monitor the file.

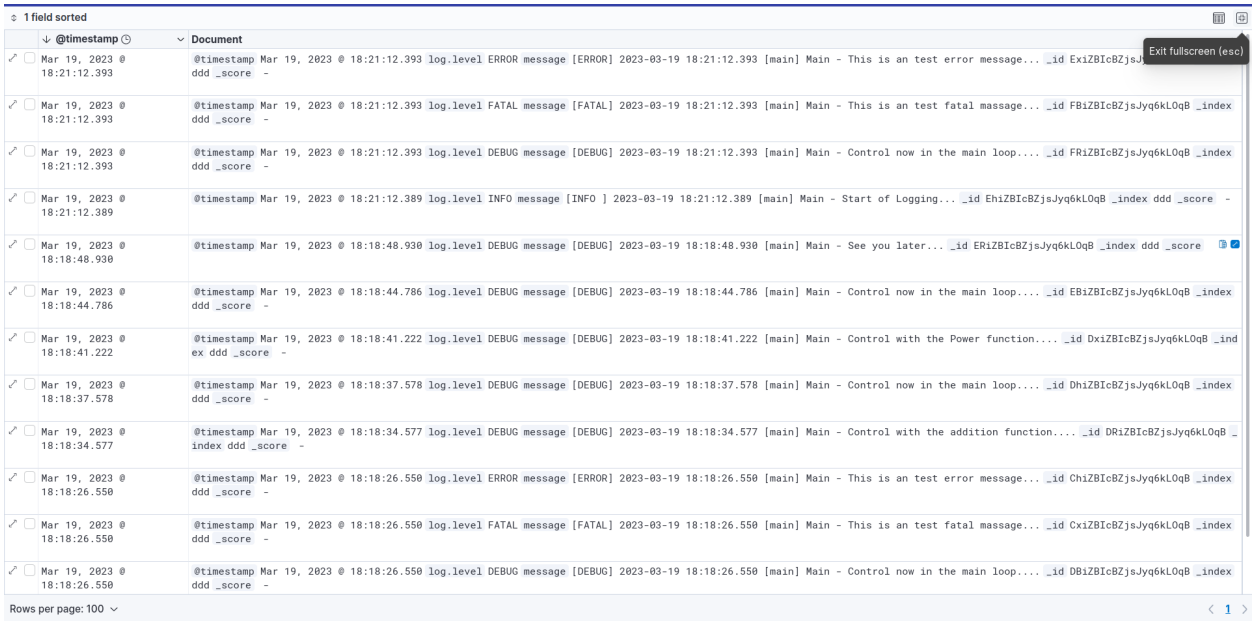
Screenshots:



Import the log file from the Local:



View the logs in the Discover dashboard:



Commands used in the ELK Stack:

- **sudo su ansible_usr**
- **docker images**
- **docker run -it --name xyz sbrc1996/speminiproject**
- **docker ps**
- **docker start xyz**
- **sudo docker cp xyz:CalculatorLogs.log /home/subham/Desktop/**

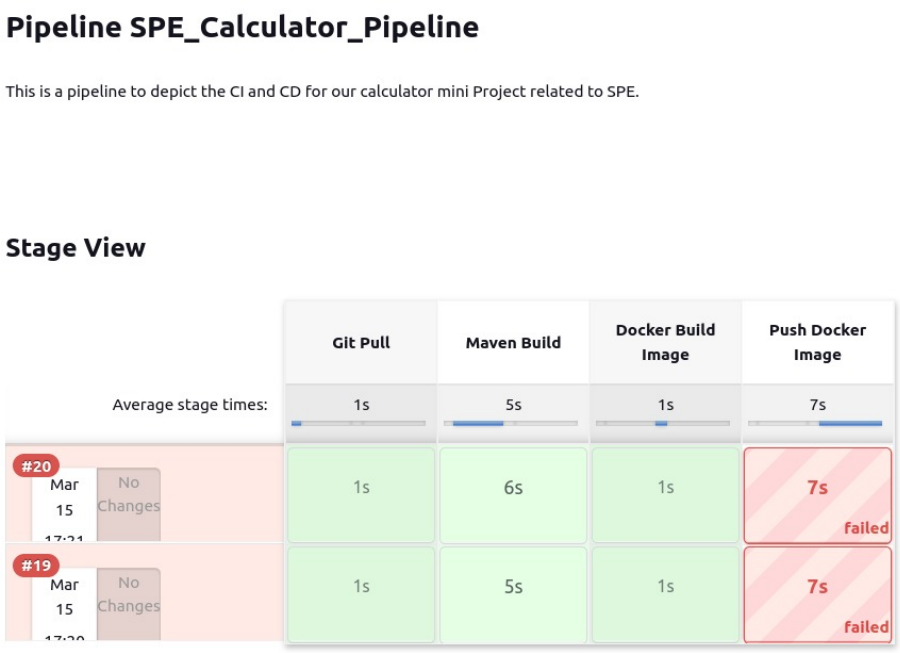
Challenges Faced:

- While installing the Ansible the config file was not available , hence I had to uninstall the entire Ansible and reinstall from scratch.
  Resources followed for the fix:
  https://www.cyberciti.biz/faq/how-to-install-and-configure-latest-version-of-ansible-on-ubuntu-linux/
  For locale issue run:
  export LC_ALL=en_IN.UTF-8
- Error in the 3rd stage of pipeline stating Docker Daemon socket: Got permission denied.
  Fix: sudo chmod 666 /var/run/docker.sock
  We need to run this command everytime we restart the server machine.
- On running the command mvn clean install I got the following error:

```
PLAY RECAP *********************************************************************
□[0;31m172.16.133.72□[0m             : □[0;32mok=3   □[0m □[0;33mchanged=1   □[0m unreachable=0    □[0;31mfailed=1   □[0m skipped=0    rescued=0
ignored=0

FATAL: command execution failed
hudson.AbortException: Ansible playbook execution failed
        at org.jenkinsci.plugins.ansible.AnsiblePlaybookBuilder.perform(AnsiblePlaybookBuilder.java:262)
        at org.jenkinsci.plugins.ansible.workflow.AnsiblePlaybookStep$AnsiblePlaybookExecution.run(AnsiblePlaybookStep.java:430)
        at org.jenkinsci.plugins.ansible.workflow.AnsiblePlaybookStep$AnsiblePlaybookExecution.run(AnsiblePlaybookStep.java:351)
        at org.jenkinsci.plugins.workflow.steps.AbstractSynchronousNonBlockingStepExecution$1$1.call(AbstractSynchronousNonBlockingStepExecution.java:47)
        at hudson.security.ACL.impersonate2(ACL.java:451)
        at hudson.security.ACL.impersonate(ACL.java:463)
        at org.jenkinsci.plugins.workflow.steps.AbstractSynchronousNonBlockingStepExecution$1.run(AbstractSynchronousNonBlockingStepExecution.java:44)
        at java.base/java.util.concurrent.Executors$RunnableAdapter.call(Executors.java:515)
        at java.base/java.util.concurrent.FutureTask.run(FutureTask.java:264)
        at java.base/java.util.concurrent.ThreadPoolExecutor.runWorker(ThreadPoolExecutor.java:1128)
        at java.base/java.util.concurrent.ThreadPoolExecutor$Worker.run(ThreadPoolExecutor.java:628)
        at java.base/java.lang.Thread.run(Thread.java:829)
[Pipeline] }
[Pipeline] // stage
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // node
[Pipeline] End of Pipeline
ERROR: Ansible playbook execution failed
Finished: FAILURE
```

  The fix to the problem was to change the dependencies added in the pom.xml file.

- Error in the Push Docker Image stage in the pipeline:




```
Login Succeeded
[Pipeline] {
[Pipeline] isUnix
[Pipeline] withEnv
[Pipeline] {
[Pipeline] sh
+ docker tag subham1996/speminiproject:latest subham1996/speminiproject:latest
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] isUnix
[Pipeline] withEnv
[Pipeline] {
[Pipeline] sh
+ docker push subham1996/speminiproject:latest
The push refers to repository [docker.io/subham1996/speminiproject]
d59b3e7affa2: Preparing
7b7f3078e1db: Preparing
826c3ddbb29c: Preparing
b626401ef603: Preparing
9b55156abf26: Preparing
293d5db30c9f: Preparing
03127cdb479b: Preparing
9c742cd6c7a5: Preparing
03127cdb479b: Waiting
293d5db30c9f: Waiting
9c742cd6c7a5: Waiting
denied: requested access to the resource is denied
[Pipeline] }
[Pipeline] // withEnv
```

Fix: in the pipeline groovy script I changed the name from subham1996/speminiproject:latest -> sbrc1996/speminiproject:latest
Here sbrc1996 is the login id of my DockerHub.com
