Academic Year: 2022-23
Class / Branch: TE IT
Subject: Advanced Devops Lab (ADL)
Subject Lab Incharge: Prof. Manjusha Kashilkar

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Semester: V
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EXPERIMENT NO. 07

Aim: To understand Static Analysis SAST process and learn to integrate Jenkins SonarQube/GitLab.

Theory:

Static application security testing (SAST) is a way to perform automated testing and analysis of a program's source code without executing it to catch security vulnerabilities early on in the software development cycle. Also referred to as static code analysis, SAST is the process of parsing through the code looking at how it was written and checking for security vulnerabilities and safety concerns.

Because static application security testing tools don't need a running application to perform an analysis, they can be used early and often in the implementation phase of the software development life cycle (SDLC). As a developer is writing code, SAST can analyze it in real-time to inform the user of any rule violations, so you can immediately deal with issues and deliver higher quality applications out of the box while preventing issues at the end of the development process.

Additionally, as SAST helps you audit code and triage issues during implementation, test automation tools can also easily integrate into development ecosystems where continuous integration/continuous delivery (CI/CD) are part of the workflow that helps assure secure, safe, and reliable code during integration, and before it's delivered.

What's the Difference Between SAST and DAST?

While SAST analyses every line of code without running the application, dynamic application security testing (DAST) simulates malicious attacks and other external behaviors by searching for ways to exploit security vulnerabilities during runtime or black box testing.

DAST is particularly useful when catching unexpected vulnerabilities that development teams simply didn't think of. This additional level of insight that DAST brings offers a broad array of security testing to find flaws and prevent attacks like SQL injections, cross-site scripting (XSS), and

other exploits. Remember the 2014 Sony Pictures hack? That could have been prevented with DAST.

Comparing SAST against DAST, each is more effective than the other during different stages of the SDLC. SAST represents the developer's point of view to make sure that all coding procedures follow the appropriate safety standards to ensure the security of an application from the start. DAST, on the other hand, mimics the hacker approach to identify possible user behavior towards the end of development.

Steps:

1)Install and configure a Jenkins and SonarQube CICD environment using containers.

2)Configure Jenkins with the SonarQube Scanner plugin for automated analysis.

1)Install and configure a Jenkins and SonarQube CICD environme Docker containers.

Installation of Jenkins

The version of Jenkins included with the default Ubuntu packages is often behind the latest available version from the project itself. To take advantage of the latest fixes and features, you can use the project-maintained packages to install Jenkins.

```
manjusha@apsit-$ wget -q -O - https://pkg.jenkins.io/debian-stable/jenkins.io.key
| sudo apt-key add -
```

When the key is added, the system will return OK. Next, append the Debian package repository address to the server's sources.list:

```
manjusha@apsit-$ sudo sh -c 'echo deb http://pkg.jenkins.io/debian-stable binary/ >
/etc/apt/sources.list.d/jenkins.list'
```

When both of these are in place, run `update` so that `apt`will use the new repository:

```
manjusha@apsit:~$ sudo apt update
```

Finally, install Jenkins and its dependencies:

```
manjusha@apsit:~$sudo apt install jenkins
```

Let's start Jenkins using systemctl:

```
manjusha@apsit:~$sudo systemctl start jenkins
```

Since systemctl doesn't display output, you can use its status command to verify that Jenkins started successfully:

```
manjusha@apsit:~$sudo systemctl status jenkins
```

If everything went well, the beginning of the output should show that the service is active and configured to start at boot:

Now that Jenkins is running, let's adjust our firewall rules so that we can reach it from a web browser to complete the initial setup.

Opening the Firewall

By default, Jenkins runs on port 8080, so let's open that port using ufw:

```
manjusha@apsit:~$sudo ufw allow
```

8080 Setting Up Jenkins

To set up your installation, visit Jenkins on its default port, 8080, using your server domain name or IP address: **http://your_server_ip_or_domain:8080**

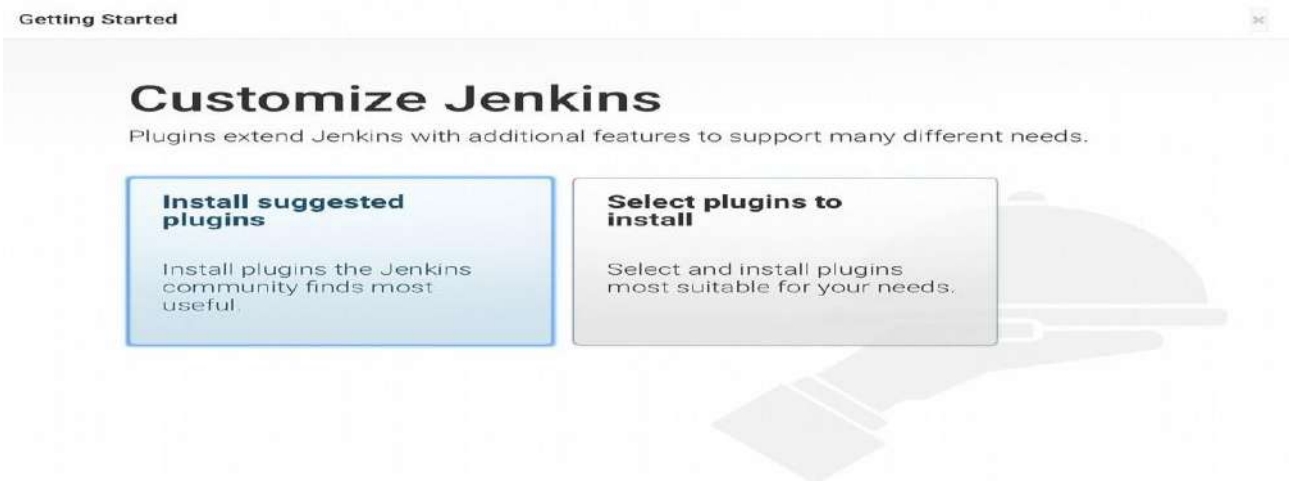
You should see the Unlock Jenkins screen, which displays the location of the initial password:

In the terminal window, use the cat command to display the password:

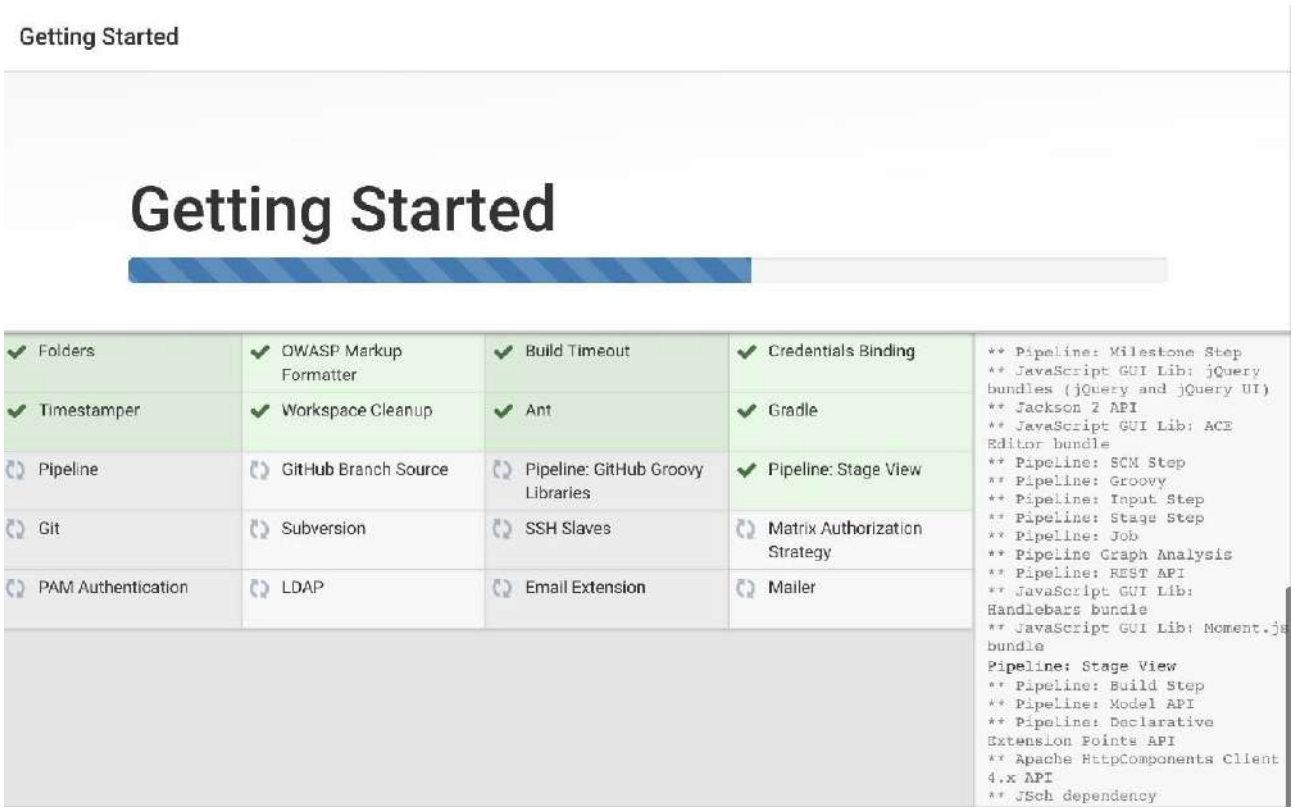
manjusha@apsit:~$ sudo cat /var/lib/jenkins/secrets/initialAdminPassword

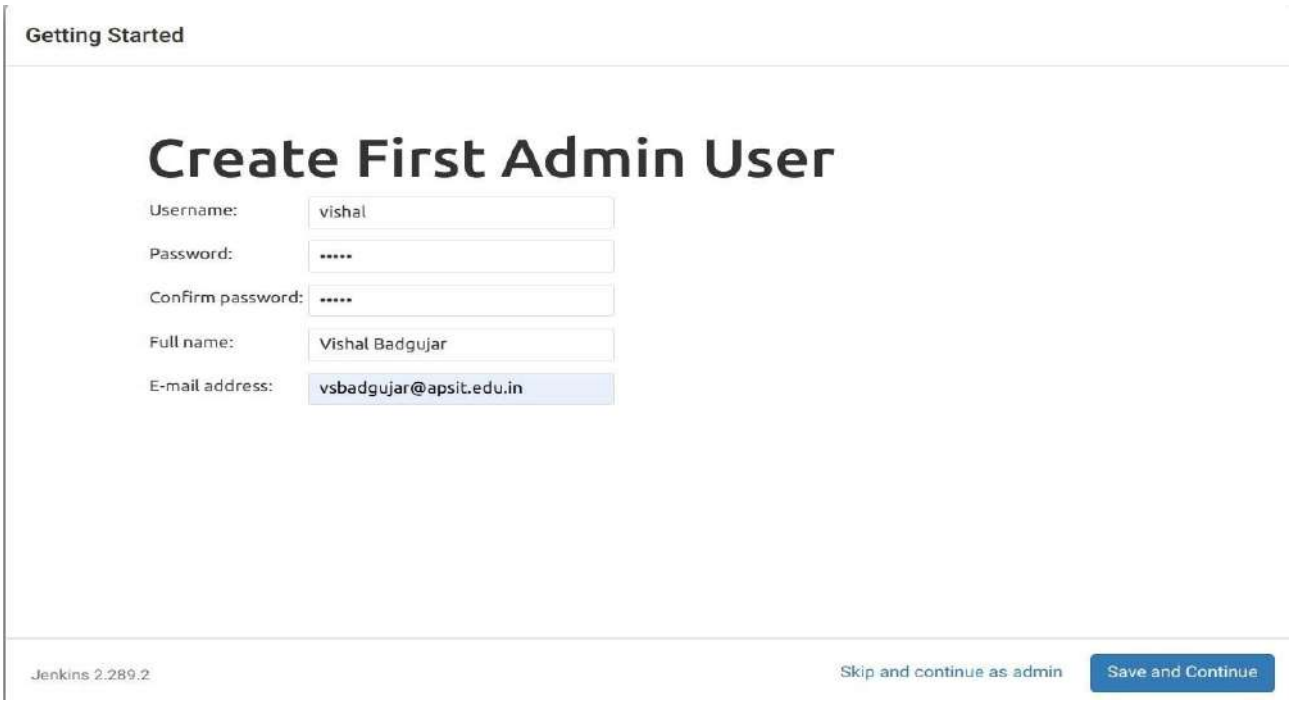
Copy the 32-character alphanumeric password from the terminal and paste it into the Administrator password field, then click Continue.

The next screen presents the option of installing suggested plugins or selecting specific plugins:



We'll click the Install suggested plugins option, which will immediately begin the installation process:

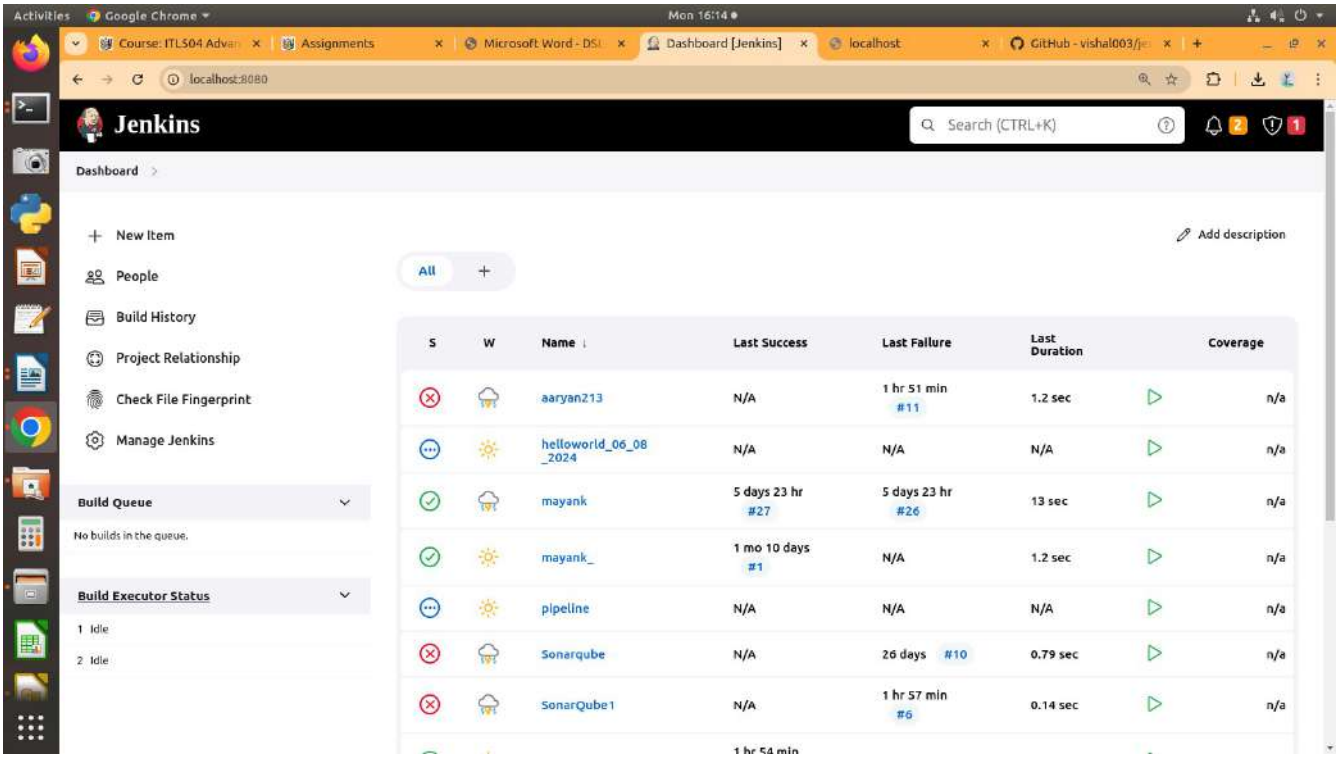




When the installation is complete, you will be prompted to set up the first administrative user. It's possible to skip this step and continue as admin using the initial password we used above, but we'll take a moment to create the user.

After confirming the appropriate information, click Save and Finish. You will see a confirmation page confirming that "Jenkins is Ready!":

Click Start using Jenkins to visit the main Jenkins dashboard:



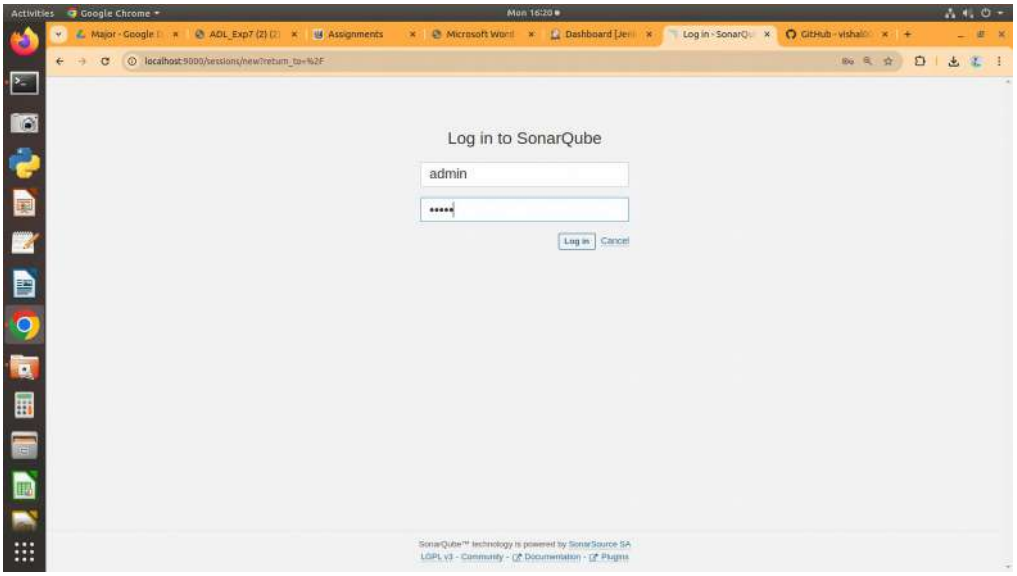
SonarQube Setup

Before proceeding with the integration, we will setup SonarQube Instance. we are using SonarQube Docker Container.

manjusha@apsit:~$docker run -d -p 9000:9000 sonarqube

```
apsit@apsit-HP-280-Pro-G6-Microtower-PC:~$ sudo docker run -d -p 9000:9000 sonarqube
9b8194b9a4766719e8e51f4294fb674845c2c2d90463e247218061553e76aa67
```

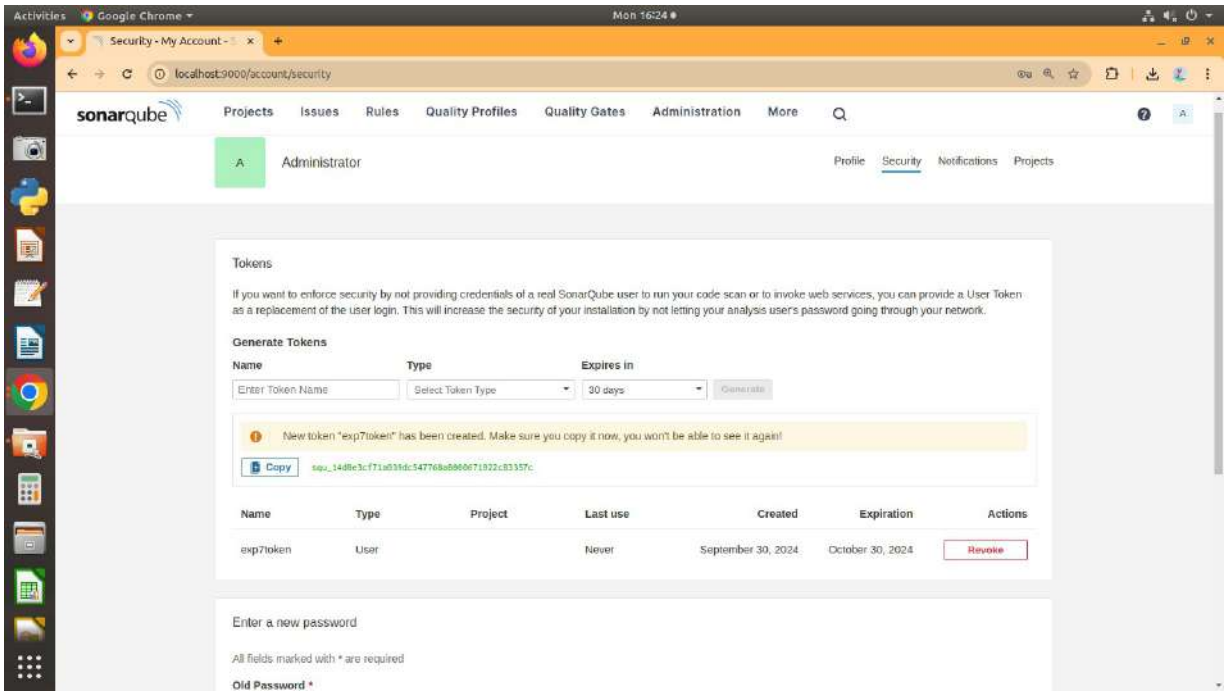
In the above command, we are forwarding port 9000 of the container to the port 9000 of the host machine as SonarQube is will run on port 9000. Then, from the browser, enter http://localhost:9000. After That, you will see the SonarQube is running. Then, login using default credentials (admin:admin).



Generate User Token

Now, we need to get the SonarQube user token to make connection between Jenkins and SonarQube. For the same, go to **Administration> User > My Account > Security** and then, from the bottom of the page you can create new tokens by clicking the Generate Button. Copy the Token and keep it safe.

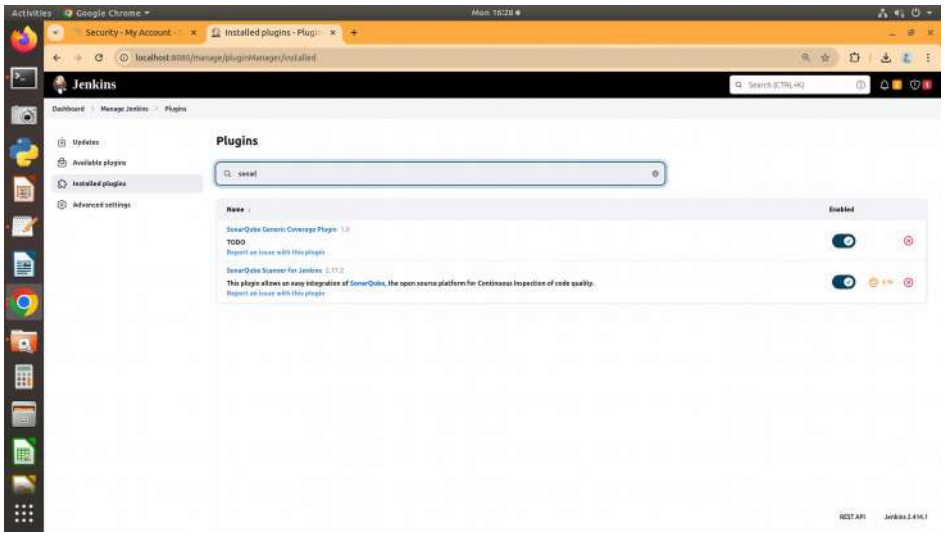
C96798e9bd081e117189b516c868ddb7d87ee785 SonarQube



2) Configure Jenkins with the SonarQube Scanner plugin for static code analysis.

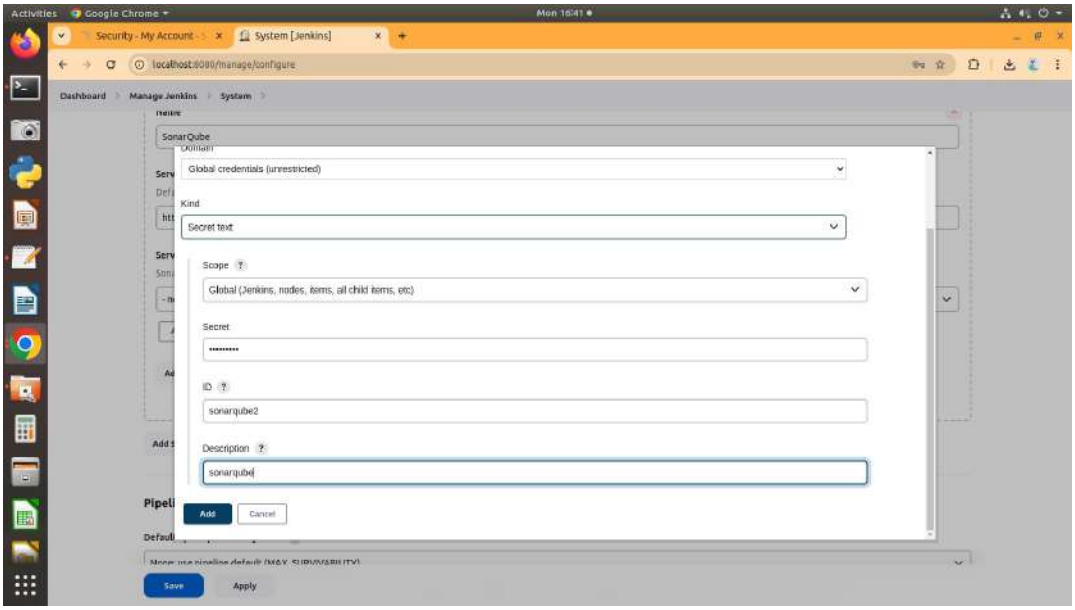
Jenkins Setup for SonarQube

Before all, we need to install the SonarQube Scanner plugin in Jenkins. For the same, go to **Manage Jenkins > Plugin Manager > Available.** Then, type SonarQube Scanner then select and install.

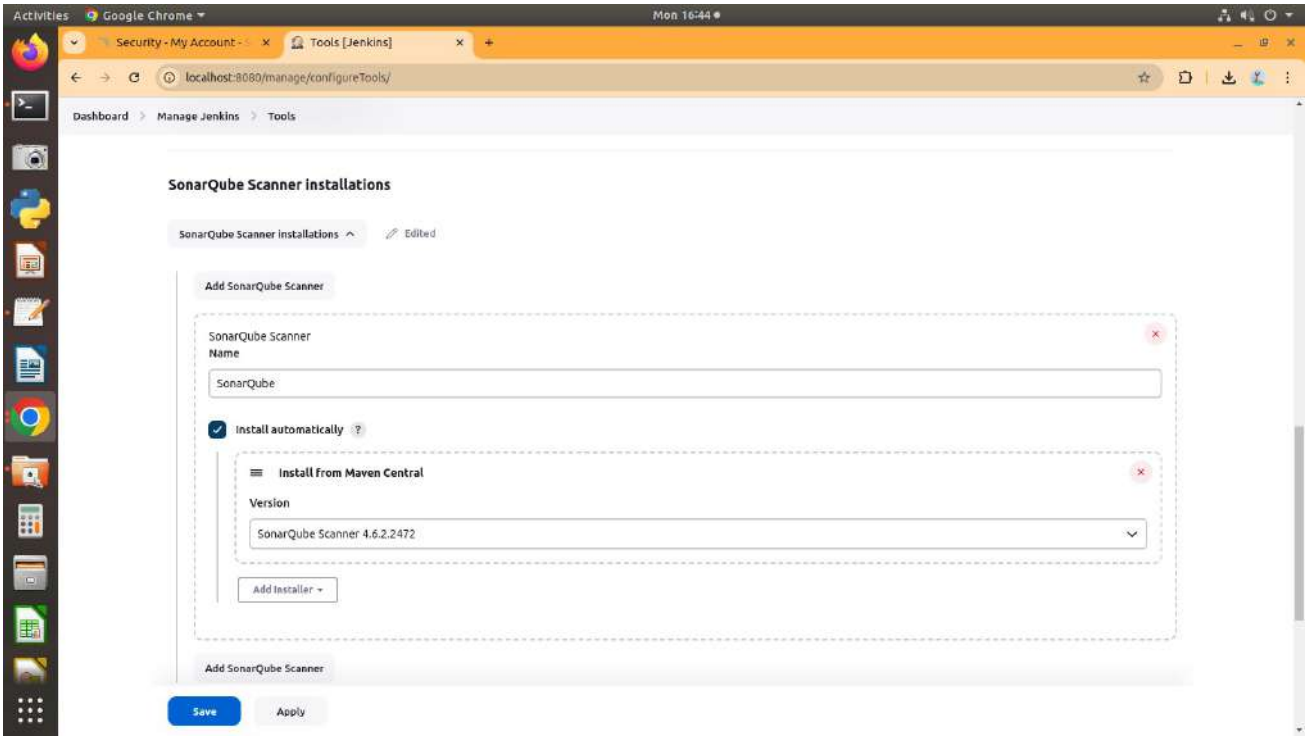


Tool Configuration SonarQube Scanner

Now, we need to configure the Jenkins plugin for SonarQube Scanner to make a connection with the SonarQube Instance. For that, got to **Manage Jenkins > Configure System > SonarQube Server.** Then, Add SonarQube. In this, give the Installation Name, Server URL then Add the Authentication token in the Jenkins Credential Manager and select the same in the configuration.

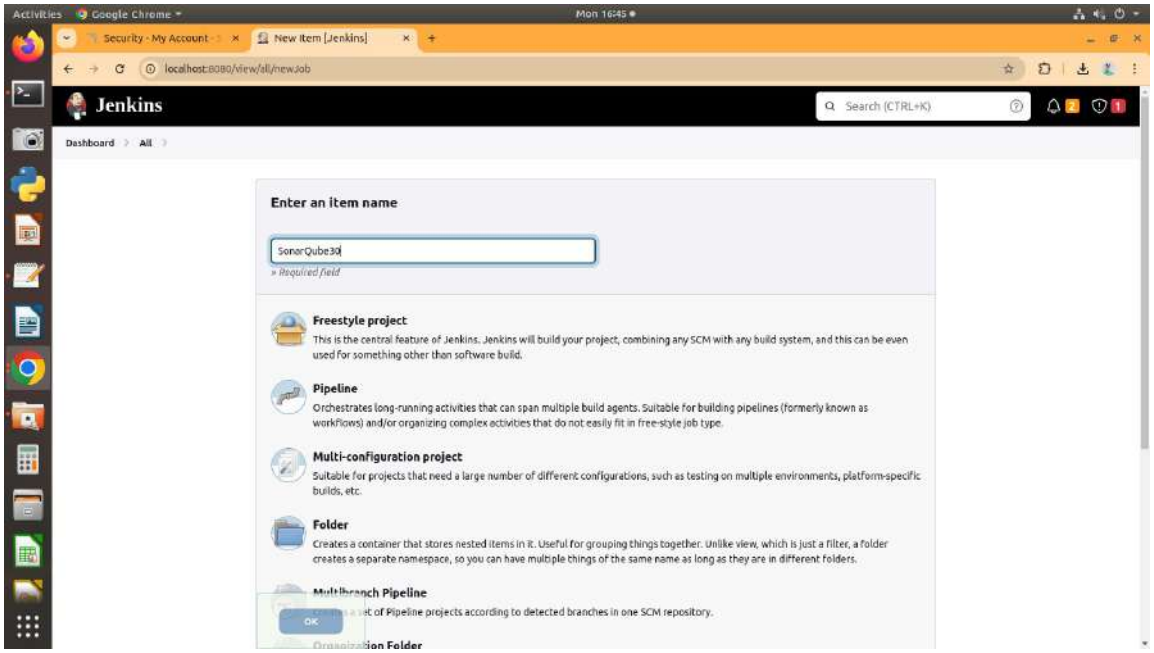


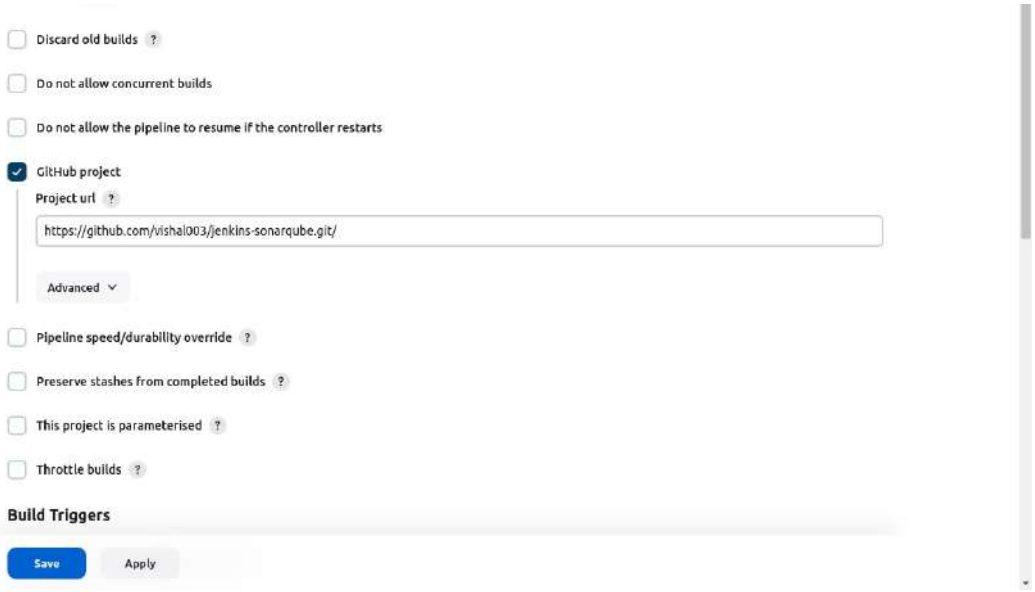
Then, we need to set-up the SonarQube Scanner to scan the source code in the various stage. For the same, go to **Manage Jenkins > Global Tool Configuration > SonarQube Scanner**. Click **Add SonarQube Scanner Button** here, give some name of the scanner type and **Add Installer** of your choice. In this case, I have selected SonarQube Scanner from Maven Central.


Activities
Google Chrome
Mon 16:44
Security - My Account -
Tools [Jenkins]
localhost:8080/manage/configureTools/
Dashboard
Manage Jenkins
Tools
SonarQube Scanner installations
SonarQube Scanner installations
Edited
Add SonarQube Scanner
SonarQube Scanner
Name
SonarQube
Install automatically
Install from Maven Central
Version
SonarQube Scanner 4.6.2.2472
Add Installer
Add SonarQube Scanner
Save
Apply

SonarQube Scanner in Jenkins Pipeline

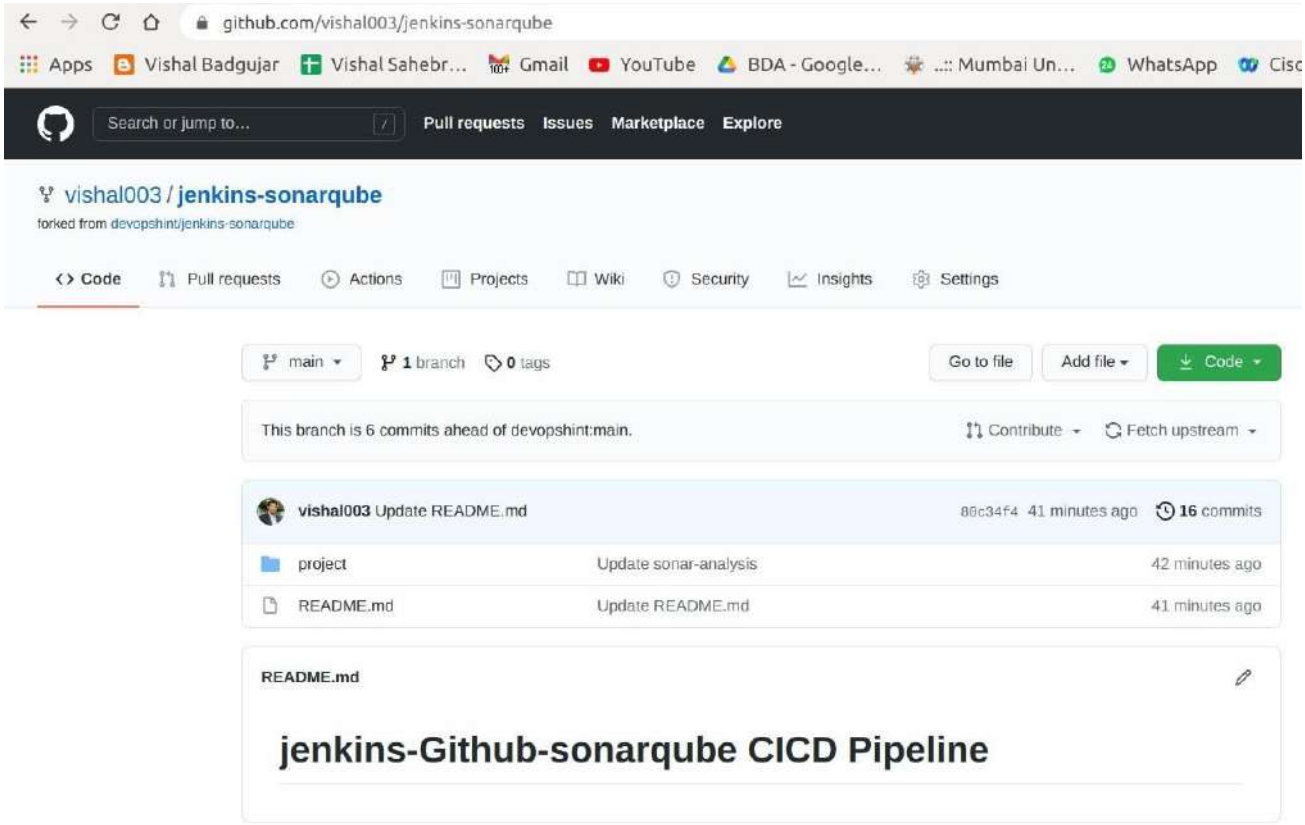
Now, It's time to integrate the SonarQube Scanner in the Jenkins Pipeline. For the same, we are going to add one more stage in the Jenkinsfile called SonarQube and inside that, I am adding the following settings and code.



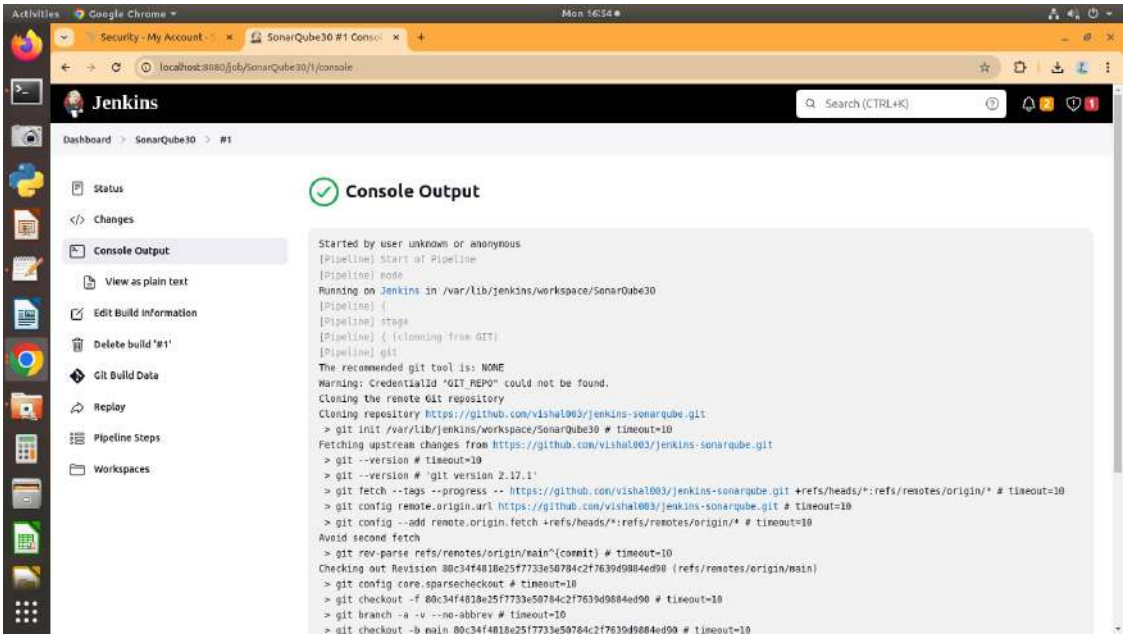


Github Configuration in Jenkins Pipeline

Git Clonning into Jenkins



Github Repository Contents



Successfully Build Github Repository in Jenkins

Pre-requiste required for Integration settings of Jenkins SAST with SonarQube w here successfully, now in order to Integrate of Jenkins CICD with SonarQube wit sample JAVA program we will implement in next experiment.

Conclusion: Thus we understood how to configure sonar and use it.