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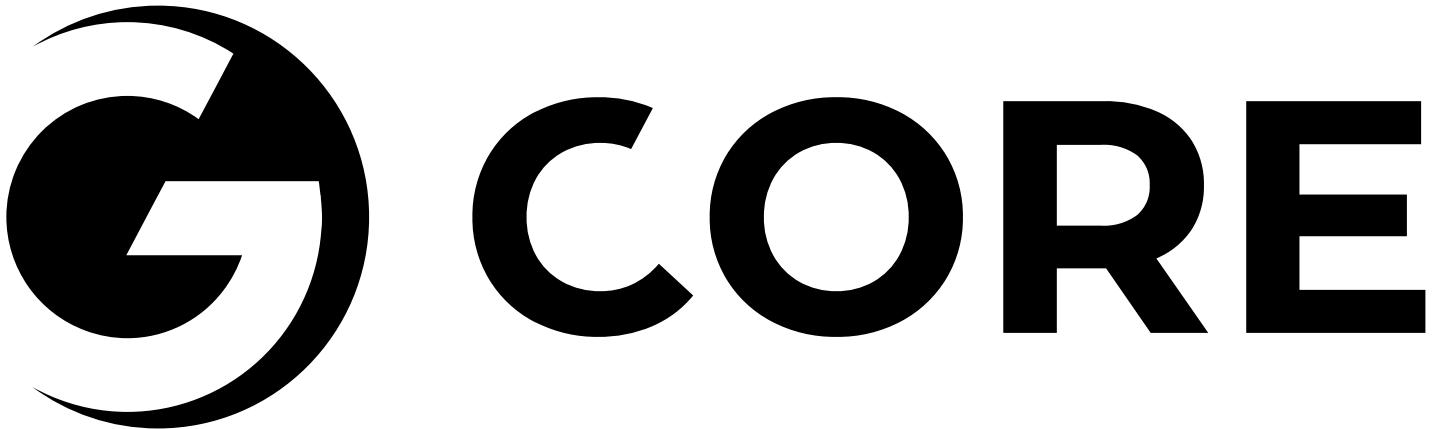
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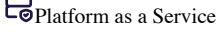
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3. Jenkins Pipeline with Sonarqube and Gitlab

Jenkins Pipeline with Sonarqube and Gitlab

Published April 2, 2023 in [Tutorials, CI/CD, Docker, Jenkins](#)

In this article

- [Setup Jenkins, SonarQube & GitLabs](#)
- [Configuring Jenkins Pipeline with SonarQube and GitLab integration](#)
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GitLab

In this guide, we are going to deploy a continuous integration process between [Jenkins](#), GitLab, and SonarQube.

The end goal will be to review the code quality through SonarQube for GitLab repository using Jenkins. Following is the process flow we need to manage:

- Push code to GitLab from the local machine.
- Next, checkout code and run tests in Jenkins, here it is acting as a Continuous Integrator.
- Generate quality report via SonarQube as a code analyser.

Setup Jenkins, SonarQube & GitLabs

In case, if you haven't set up the required software yet, go through the below-mentioned steps:

Step 1:

Make sure that your host machine has enough power to run these components, as GitLab alone requires 4 GB of RAM to perform its operations smoothly. To run all three together, you need at least 8 GB of RAM and 20 GB of hard disk space.

Step 2:

For SonarQube, you need to set the recommended values as a root user on the host machine:

```
$ sysctl -w vm.max_map_count=262144
$ sysctl -w fs.file-max=65536
$ ulimit -n 65536
$ ulimit -u 4096
```

Step 3:

For this guide, we are going to use a simple docker-compose.yml file. However, you are free to edit the file as per your requirement.

Before launching the containers, please make sure that you change the value of `GITLAB_SECRETS_DB_KEY_BASE`, `GITLAB_HOST`, `SONARQUBE_JDBC_PASSWORD`, and `POSTGRES_PASSWORD`. Although, along with this, you can also modify the define ports in the file.

```
version: "3.2"

services:
  jenkins:
    image: jenkinsci/jenkins:lts
    container_name: jenkins-container
    restart: always
    ports:
      - "8080:8080"
      - '50000:50000'
    volumes:
      - '/var/run/docker.sock:/var/run/docker.sock'
      - '/data/jenkins/jenkins_home:/var/jenkins_home'
    environment:
      - "JENKINS_OPTS=-prefix=/jenkins"

  gitlab:
    image: gitlab/gitlab-ce:latest
    container_name: gitlab-container
    restart: always
    environment:
      - GITLAB_SECRETS_DB_KEY_BASE=long-and-random-alphanumeric-string
      - GITLAB_HOST=your-host-ip-here
      - GITLAB_PORT=10080
      - GITLAB_SSH_PORT=10022
    ports:
      - "10080:80"
      - "10022:22"
    volumes:
      - '/data/gitlab/config:/etc/gitlab'
      - '/data/gitlab/logs:/var/log/gitlab'
      - '/data/gitlab/data:/var/opt/gitlab'

  sonarqube:
    image: sonarqube:7.9.2-community
    container_name: sonar-container
    restart: always
    networks:
      - sonarnet
    environment:
      - SONARQUBE_JDBC_USERNAME=sonar
      - SONARQUBE_JDBC_PASSWORD=your-strong-password-here
      - SONARQUBE_JDBC_URL=jdbc:postgresql://postgresdb:5432/sonarqube
    ports:
      - "9000:9000"
      - "9092:9092"
    volumes:
      - '/data/sonar/sonarqube_conf:/opt/sonarqube/conf'
      - '/data/sonar/sonarqube_data:/opt/sonarqube/data'
      - '/data/sonar/sonarqube_extensions:/opt/sonarqube/extensions'
      - '/data/sonar/sonarqube_bundled-plugins:/opt/sonarqube/lib/bundled-plugins'
```

```

postgressdb:
  image: postgres:12.1
  container_name: postgres-container
  restart: always
  networks:
    - sonarnet
  environment:
    - POSTGRES_USER=sonar
    - POSTGRES_PASSWORD=your-strong-password-here
    - POSTGRES_DB=sonarqube
  volumes:
    - '/data/postgresql/sonarqube_db:/var/lib/postgresql'
    - '/data/postgresql/postgresql_data:/var/lib/postgresql/data'

networks:
  sonarnet:
    driver: bridge

```

Now, run the following command to launch the stack:

```
$ docker-compose up -d
```

Note that the installation process is going to take some time, so sit back and have some coffee. You deserve it!

Step 4:

Now, to verify if all systems are up and running, run this command:

```

$ docker ps

CONTAINER ID        IMAGE               COMMAND                  CREATED             STATUS              PORTS
NAMES
f54e223417fa      gitlab/gitlab-ce:latest   "/assets/wrapper"   1 minute ago       1 minute ago (healthy)   443/tcp, 0.0.0.0:10022->22/tcp, 0.0.0.0:10080->80/tcp
gitlab-container
9102f03f69b8      sonarqube           "./bin/run.sh"     1 minute ago       1 minute ago
sonar-container
05f554da39fc      jenkinsci/jenkins:lts   "/bin/tini --..."   1 minute ago       1 minute ago
jenkins-container
0.0.0.0:50000->50000/tcp
jenkins-container

```

If all went well, then you can access all three of them by following mentioned URLs:

- Jenkins – <http://your-ip-address:8080>
- SonarQube – <http://your-ip-address:9000>
- GitLab – <http://your-ip-address:10080>

As you are visiting your Jenkins environment for the first time, it is going to prompt you to enter the administrator password, which was generated during the installation process. To access the password from the container, you can run the following command:

```

$ docker exec -it <your-jenkins-container-id> cat /var/jenkins_home/secrets/initialAdminPassword
$ gSzHTGfbtxSpCBXMyJ6gzmNfNH7BjhK23

```

Once you enter the password, you can select the option *Install suggested plugin*. Wait until the download finishes.

For SonarQube, the default username and password are admin and admin, respectively. Whereas, for GitLab, you will be prompted to enter the new password for the default username root.

Configuring Jenkins Pipeline with SonarQube and GitLab integration

SonarQube Configuration:

We will begin with SonarQube. To connect it with Jenkins, you need to generate the token to access the SonarQube instance.

Login into the SonarQube dashboard and go to the Administrator tab. In the Security drop-down menu, select User tab as shown in the below image:

The screenshot shows the Sonarqube Administration interface. A red box labeled '1' highlights the 'Administration' tab in the top navigation bar. A red box labeled '2' highlights the 'Security' dropdown menu. A red box labeled '3' highlights the 'Users' option under the 'General' section of the dropdown menu.

Database Cleaner

Keep only one analysis a day after

After this number of hours, if there are several analyses during the same day, the DbCleaner keeps the most recent one and fully deletes the other ones.

(default)

Key: sonar.dbcleaner.hoursBeforeKeepingOnlyOneS...

Keep only one analysis a week after

After this number of weeks, if there are several analyses during the same week, the DbCleaner keeps the most recent one and fully deletes the other ones.

(default)

Key: sonar.dbcleaner.weeksBeforeKeepingOnlyOneS...

Keep only one analysis a month after

After this number of weeks, if there are several analyses during the same month, the DbCleaner keeps the most recent one and fully deletes the other ones.

(default)

Key: sonar.dbcleaner.monthsBeforeKeepingOnlyOneS...

Analysis Scope

- C#
- CSS
- External Analyzers
- Flex
- General
- GitHub
- Go
- HTML
- JaCoCo
- Java

Here you will find Administrator user, for which you are going to generate the access token:

The screenshot shows the Sonarqube Users page. A red box highlights the 'Security' dropdown menu. A red box highlights the 'Users' option under the 'General' section of the dropdown menu.

Administrator

Create and administer individual users.

	SCM Accounts	Last connection	Groups
A Administrator admin		< 1 hour ago	sonar-administrators sonar-users

1 of 1 shown

In the pop-up that displays on your screen, enter the desired name and click on the *Generate* button. Copy the newly generated token and save it somewhere safe, as you won't be able to view/copy the generated token again.

Tokens of Administrator

The screenshot shows the 'Generate Tokens' section of the Jenkins 'Tokens of Administrator' page. A red box highlights the 'Generate' button and the resulting token '3f2d85d78312da6578c18f0bab4de19e551404ce'. Below this, a table lists tokens with columns 'Name', 'Last use', and 'Created'. The single token listed is 'your-project-name-here', with 'Never' in 'Last use' and 'January 17, 2020' in 'Created'. A 'Revoke' button is next to it. At the bottom right is a 'Done' button.

GitLab Configuration:

To establish a connection between GitLab and Jenkins, again, we need to generate an access token, which can be done as mentioned below:

To generate an access token, go to your GitLab dashboard and follow Dashboard > Setting > Access Tokens. Once you have the token with you, copy it for further use.

The screenshot shows the 'User Settings > Access Tokens' page on GitLab. A red box highlights the 'Access Tokens' link in the sidebar (1). The main area displays the 'Personal Access Tokens' section, explaining how to generate tokens for applications. It includes fields for 'Name' (3), 'Expires at' (4), and 'Scopes' (5). The 'Scopes' section lists 'api', 'read_user', 'read_repository', and 'write_repository'. The 'api' scope is checked, while 'read_repository' is also checked and highlighted with a red box.

Integrating SonarQube and GitLabs in Jenkins:

This guide assumes that you have already done the basic setup for Jenkins. Now, let's move to configure GitLab and SonarQube in the Jenkins server.

First, we are going to integrate SonarQube. Go Dashboard > Manage Jenkins > Manage Plugins and search for SonarQube.

SonarQube Scanner

This plugin allows an easy integration of [SonarQube](#), the open source platform for Continuous Inspection and Quality Analysis.

Mashup Portlets

Additional Dashboard Portlets: Generic JS Portlet (lets you pull in arbitrary content via JS), Recent changes for a given job), SonarQube Portlets (show SonarQube statistics directly in Jenkins) and Test results for a given job).

Sonar Gerrit

This plugin allows to submit issues from [SonarQube](#) to [Gerrit](#) as comments directly.

Warning: This plugin version may not be safe to use. Please review the following security notices:

- [Credentials stored in plain text](#)

SonarQube Generic Coverage

TODO

Install without restart **Download now and install after restart**

Update information obtained

Page generated: Jan 17, 2024

Make sure you restart Jenkins once the plugin is successfully installed.

Installing Plugins/Upgrades

Preparation

- Checking internet connectivity
- Checking update center connectivity
- Success

SonarQube Scanner

● Success

Loading plugin extensions

● Success

[Go back to the top page](#)

(you can start using the installed plugins right away)

↳ Restart Jenkins when installation is complete and no jobs are running

Click on the checkbox

Once the restart is completed, you have to set up Sonar Scanner, which is a standalone tool used for scanning the source code and send the result to SonarQube Server. Here you are going to install it in the Jenkins container itself, although you are free to launch a separate container for the same purpose.

```
$ docker exec -it <your-jenkins-container-id> bash
$ cd /var/jenkins_home
$ wget https://binaries.sonarsource.com/Distribution/sonar-scanner-cli/sonar-scanner-cli-4.2.0.1873-linux.zip
$ unzip sonar-scanner-cli-4.2.0.1873-linux.zip
```

Go back to the Manage Jenkins page and select Global Tool Configuration.

In this page, find SonarQube Scanner and add complete the installation:

The screenshot shows the Jenkins 'SonarQube Scanner' configuration page. It includes fields for 'Name' (sonarqube-scanner) and 'SONAR_RUNNER_HOME' (/var/jenkins_home/sonar-scanner-3.3.0.1492-linux). A checkbox for 'Install automatically' is unchecked. A red 'Delete SonarQube Scanner' button is visible. Below the form, a message says 'List of SonarQube Scanner installations on this system'.

Don't forget to uncheck *Install automatically* as you have to define the installation path of Sonar Scanner explicitly.

As Jenkins and SonarQube are running in separate docker containers, we need to create a Webhook at SonarQube Server so that both can communicate with each other. To do so, follow Dashboard > Administrator > Configuration > Webhook:

The screenshot shows the SonarQube 'Administration' > 'Configuration' > 'Webhooks' page. A modal window titled 'Create Webhook' is open, prompting for 'Name*' (your-project-name-here), 'URL*', and 'Secret'. The URL is set to http://127.0.0.1:8080/sonarqube-webhook. The modal has 'Create' and 'Cancel' buttons. The footer of the page includes links like 'Community Edition - Version 7.9.2 (build 30863) - LGPL v3 - Community - Documentation - Get Support - Plugins - Web API - About'.

Lastly, you have to add the access token you generated on your SonarQube server in Jenkins. Follow the URL <http://your-ip-addr-here:8080/credentials/store/system/> or go to Dashboard > Credentials > System, as shown below:

System

Domain	Description
Global credentials (unrestricted)	3 Credentials that should be available irrespective of domain scope

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

Build Queue
No builds in the queue.

Build Executor Status
1 Idle
2 Idle

Page generated: Jan 17, 2024

Click on *Add Credentials* link and select “Secret Text” field under *Kind*:

Back to credential domains

Add Credentials

Kind: Secret text

Scope: Global (Jenkins, nodes, items, all child items, etc)

Secret:

ID: sonarqube_access_token

Description: SonarQube Access Token

OK

Page generated: Jan 17, 2024

In the Secret field, paste the generated token from SonarQube that you previously created.

Now, add the SonarQube server to your Jenkins environment. Go to Dashboard > Manage Jenkins > Configure System. Find *SonarQube server* on the page and add the required details as mentioned below:

SonarQube servers

Environment variables	<input checked="" type="checkbox"/> Enable injection of SonarQube server configuration as build environment variables If checked, job administrators will be able to inject a SonarQube server configuration as environment variables in the build.														
SonarQube installations	<table border="0"> <tr> <td>Name</td> <td>sonarqube-container</td> </tr> <tr> <td>Server URL</td> <td>http://192.168.1.10:9000</td> </tr> <tr> <td colspan="2">Default is http://localhost:9000</td> </tr> <tr> <td>Server authentication token</td> <td> <input type="text" value="SonarQube Access Token"/> Add </td> </tr> <tr> <td colspan="2">SonarQube authentication token. Mandatory when anonymous access is disabled.</td> </tr> <tr> <td colspan="2" style="text-align: right;">Advanced...</td> </tr> <tr> <td colspan="2" style="text-align: right; background-color: #e6f2ff;">Delete SonarQube</td> </tr> </table>	Name	sonarqube-container	Server URL	http://192.168.1.10:9000	Default is http://localhost:9000		Server authentication token	<input type="text" value="SonarQube Access Token"/> Add	SonarQube authentication token. Mandatory when anonymous access is disabled.		Advanced...		Delete SonarQube	
Name	sonarqube-container														
Server URL	http://192.168.1.10:9000														
Default is http://localhost:9000															
Server authentication token	<input type="text" value="SonarQube Access Token"/> Add														
SonarQube authentication token. Mandatory when anonymous access is disabled.															
Advanced...															
Delete SonarQube															
Add SonarQube															

List of SonarQube installations

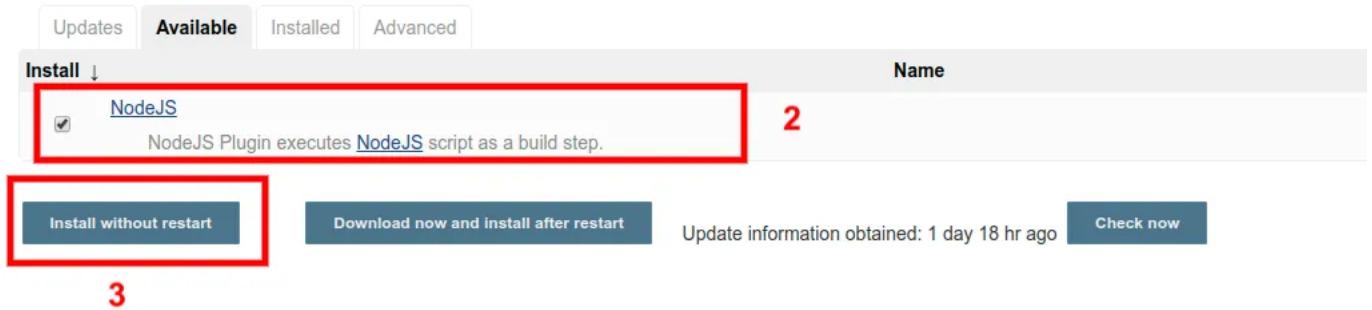
Now, you have to add Gitlab in Jenkins, visit `Dashboard > Credentials > System`. Here, you are going to add the access token you previously created to your Jenkins server. Although, you can also use *Kind* with username and password.

The screenshot shows the Jenkins 'Add Credentials' dialog. The 'Kind' dropdown is set to 'Secret text'. The 'Scope' dropdown is set to 'Global (Jenkins, nodes, items, all child items, etc)'. The 'Secret' field contains a masked password. The 'ID' field is set to 'gitlab_access_token'. The 'Description' field is set to 'GitLab Access Token'. At the bottom left is a blue 'OK' button. In the top left, there's a 'Back to credential domains' link and a 'Add Credentials' button. The top navigation bar shows 'Jenkins > Credentials > System > Global credentials (unrestricted)'.

As you are through with the SonarQube and GitLab integration in Jenkins, it's time to manage other dependencies. In this guide, we are going to use a simple NodeJS application; hence it's time to install NodeJS on your Jenkins Server.

NodeJS Environment in Jenkins:

To install NodeJS plugin, go to `Dashboard > Manage Jenkins > Manage Plugins > Available` and search and select NodeJS. Click on the *Install without restart* button, as shown in the figure below.



Upon successful installation of NodeJS plugin in Jenkins, make sure that you restart Jenkins.

To configure NodeJS plugin, go to `Dashboard > Manage Jenkins > Global Tool Configuration` and find “NodeJS”. Click on NodeJS installation button and add the necessary details, as shown in the figure:

The screenshot shows the Jenkins 'Global Tool Configuration' page under 'SonarQube Scanner installations...'. It lists 'Ant', 'Maven', and 'NodeJS' sections. The 'NodeJS' section is highlighted with a large red box. It contains fields for 'Name' (set to 'your-project-node'), 'Install automatically' (checkbox checked), 'Install from nodejs.org' (checkbox checked), 'Version' (set to 'NodeJS 13.6.0'), 'Force 32bit architecture' (checkbox), 'Global npm packages to install' (text input), 'Specify list of packages to install' (text input), 'Global npm packages refresh hours' (set to '72'), and 'Duration, in hours, before 2 np' (text input). At the bottom are 'Save' and 'Apply' buttons, and an 'Add Installer' dropdown.

Give a name and select the NodeJS version as per your requirement; you can also install Global NPM packages and set the refresh rate depending upon the project requirements.

Once done, you need to save the configuration. As we are through with the gruesome part of installing and configuring the environment, it's time to create the project pipeline.

Creating Jenkins Pipeline

Here you are going to create a pipeline using Declarative Scripted Pipeline. Follow the below steps to get started:

Step 1: Create a New Job

Go to Jenkins' Dashboard and click on the “New Item” link. Now, enter the item name and select *Pipeline* option as shown in the figure:

1

Enter an item name

Simple NodeJs Application

» Required field

2

Freestyle project
This is the central feature of Jenkins. Jenkins will build your project, combining any SCM with any build system, and...

Pipeline
Orchestrates long-running activities that can span multiple build agents. Suitable for building pipelines (formerly known as)

Multi-configuration project
Suitable for projects that need a large number of different configurations, such as testing on multiple environments,...

Folder
Creates a container that stores nested items in it. Useful for grouping things together. Unlike view, which is just a flat list of items, a folder...

GitHub Organization
Scans a GitHub organization (or user account) for all repositories matching some defined markers.

Multibranch Pipeline
Creates a set of Pipeline projects according to detected branches in one SCM repository.

3

Step 2: Pipeline

The below-mentioned simple pipeline script helps you to pull the code from GitLab, quality check via SonarQube, and use NodeJS.

```
pipeline {
    agent any
    tools {nodejs "nodenv"}
    stages {
        stage("Code Checkout from GitLab") {
            steps {
                git branch: 'master',
                credentialsId: 'gitlab_access_token',
                url: 'http://your-ip-here:10080/root/test-project.git'
            }
        }
        stage('Code Quality Check via SonarQube') {
            steps {
                script {
                    def scannerHome = tool 'sonarqube';
                    withSonarQubeEnv("sonarqube-container") {
                        sh "${tool('sonarqube')}/bin/sonar-scanner \
                            -Dsonar.projectKey=test-node-js \
                            -Dsonar.sources=. \
                            -Dsonar.css.node=. \
                            -Dsonar.host.url=http://your-ip-here:9000 \
                            -Dsonar.login=your-generated-token-from-sonarqube-container"
                    }
                }
            }
        }
        stage("Install Project Dependencies") {
            steps {
                nodejs(nodeJSInstallationName: 'nodenv') {
                    sh "npm install"
                }
            }
        }
    }
}
```

```
    }  
}  
}  
}
```

Make sure that you change the values of GitLab repo URL, SonarQube host URL, and its access token.

Add the above-mentioned pipeline script and save it, as shown in the below figure:

Jenkins > Simple NodeJs Application >

General Build Triggers Advanced Project Options Pipeline

GitHub hook trigger for GITScm polling
 Poll SCM
 Disable this project
 Quiet period

Advanced Project Options

Pipeline

Definition Pipeline script

```
Script      1 pipeline {  
2     agent any  
3     tools {nodejs "nodenv"}  
4     stages {  
5       stage("Code Checkout from GitLab") {  
6         steps {  
7           git branch: 'master',  
8           credentialsId: 'gitlab_access_token',  
9           url: 'http://[REDACTED]:10080/root/test-project.git'  
10       }  
11     }  
12     stage('Code Quality Check via SonarQube') {  
13       steps {  
14         script {  
15           def scannerHome = tool 'sonarqube';  
16           withSonarQubeEnv("sonarqube-container") {  
17             sh "${tool('sonarqube')}/bin/sonar-scanner \  
18             --sonar-projectKey=project-name --sonar-projectName=Project Name --sonar-projectVersion=1.0.0 --sonar-skipUpdate>true
```

Use Groovy Sandbox

[Pipeline Syntax](#)

[Save](#) [Apply](#)

Step 3: Run Pipeline

Now, as you have saved the pipeline script, it's time to build your application in Jenkins. Go to `dashboard > YOUR PROJECT > Build Now`.

The screenshot shows the Jenkins interface for a pipeline named "Simple NodeJs Application". On the left, a sidebar lists various actions: Back to Dashboard, Status, Changes, Build Now (which is highlighted with a red box and the number '1'), Delete Pipeline, Configure, Full Stage View, Rename, and Pipeline Syntax. Below this is the "Build History" section, which includes a search bar labeled "find" and links for "Atom feed for all" and "Atom feed for failures". The main content area is titled "Pipeline Simple NodeJs Application" and contains a "Stage View" section with the message "No data available. This Pipeline has not yet run." There is also a "Recent Changes" link with a notebook icon.

As soon as you click the *Build Now* link, Jenkins will start building project as per pipeline script. In Build History, you will see the progress bar for the current build along with the Stage View:

The screenshot shows the Jenkins Pipeline Simple NodeJs Application dashboard. On the left, there's a sidebar with various Jenkins navigation links: Back to Dashboard, Status, Changes, Build Now, Delete Pipeline, Configure, Full Stage View, Rename, and Pipeline Syntax. Below this is the 'Build History' section, which includes a search bar ('find') and a list of builds. The first build, '#1' from Jan 20, 2020, at 11:36 AM, is highlighted with a red box. To the right of the build history is the 'Stage View' section, which displays two stages: 'Declarative: Tool Install' (164ms) and 'Code Checkout from GitLab' (704ms). The 'Code Checkout from GitLab' stage has a blue diagonal striped background. At the bottom of the dashboard, there's a 'Permalinks' section.

If your build runs successfully, you will be able to see the time taken by each stage, in *Stage View*:

 Jenkins

Jenkins > Simple NodeJs Application >

[Back to Dashboard](#)

[Status](#)

[Changes](#)

[Build Now](#)

[Delete Pipeline](#)

[Configure](#)

[Full Stage View](#)

[SonarQube](#)

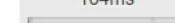
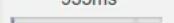
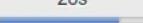
[Rename](#)

[Pipeline Syntax](#)

Pipeline Simple NodeJs Application

 [Recent Changes](#)

Stage View

Declarative: Tool Install	Code Checkout from GitLab	Code Quality Check via SonarQube
164ms	935ms	28s
		
164ms	935ms	28s

Build History [trend](#)

find

#1 Jan 20, 2020 11:36 AM 

 Atom feed for all  Atom feed for failures

Average stage times:
(Average full run time: ~37s)

#1 Jan 20 17:06 No Changes

SonarQube Quality Gate

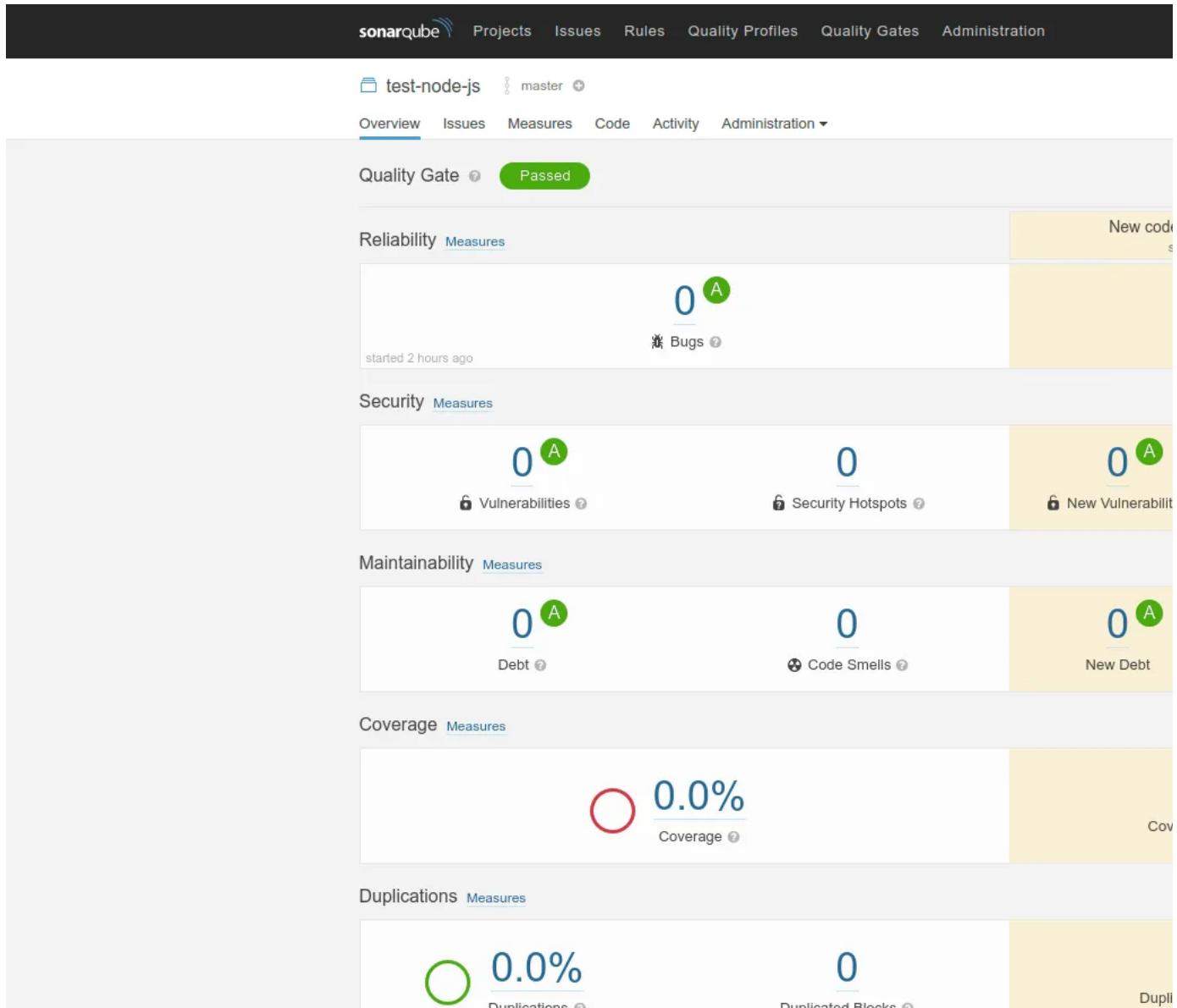
test-node-js OK

server-side processing: Success

Permalinks

- [Last build \(#1\), 28 min ago](#)
- [Last stable build \(#1\), 28 min ago](#)
- [Last successful build \(#1\), 28 min ago](#)
- [Last completed build \(#1\), 28 min ago](#)

Also, you can visit the SonarQube dashboard to see the project code report, by visiting the link named as “SonarQube” on project pipeline page.



That's it! You have successfully created a Jenkins Pipeline while using SonarQube and GitLab. Now, every time you push the code to the repo, you can build the project, which will show the code quality.

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