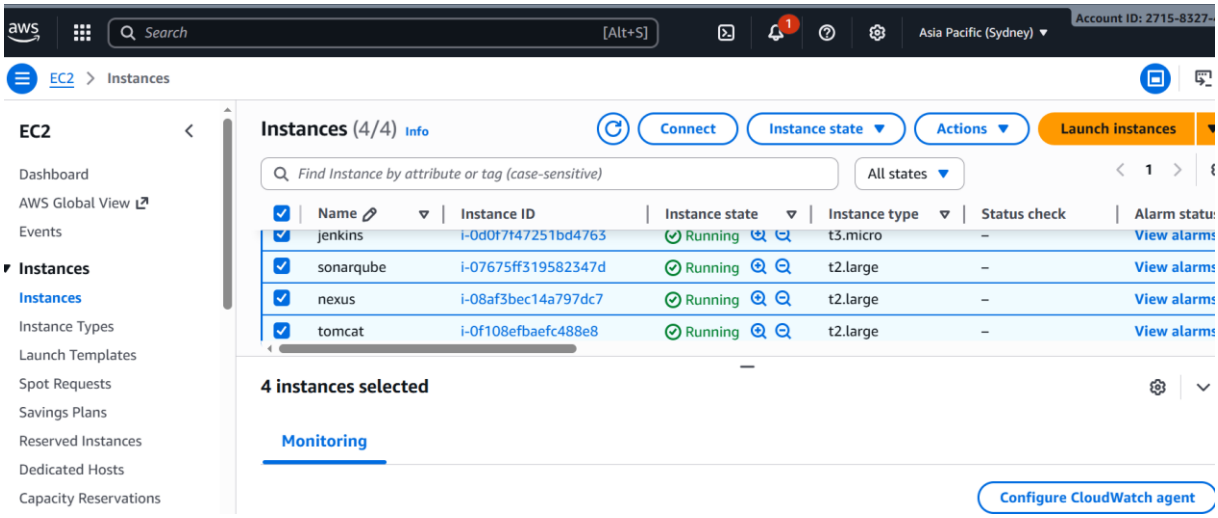
CI/CD Infrastructure with Jenkins Master and Dedicated Nodes (Nexus, SonarQube, Tomcat)

set up a CI/CD infrastructure with Jenkins as the master orchestrator and three nodes serving specific roles:

Nexus: Artifact repository (stores build outputs, dependencies)

SonarQube: Code quality and security analysis

Tomcat: Application deployment/runtime server



Getting Started

Customize Jenkins

Plugins extend Jenkins with additional features to support many different needs.

Install suggested plugins

Install plugins the Jenkins community finds most useful.

Select plugins to install

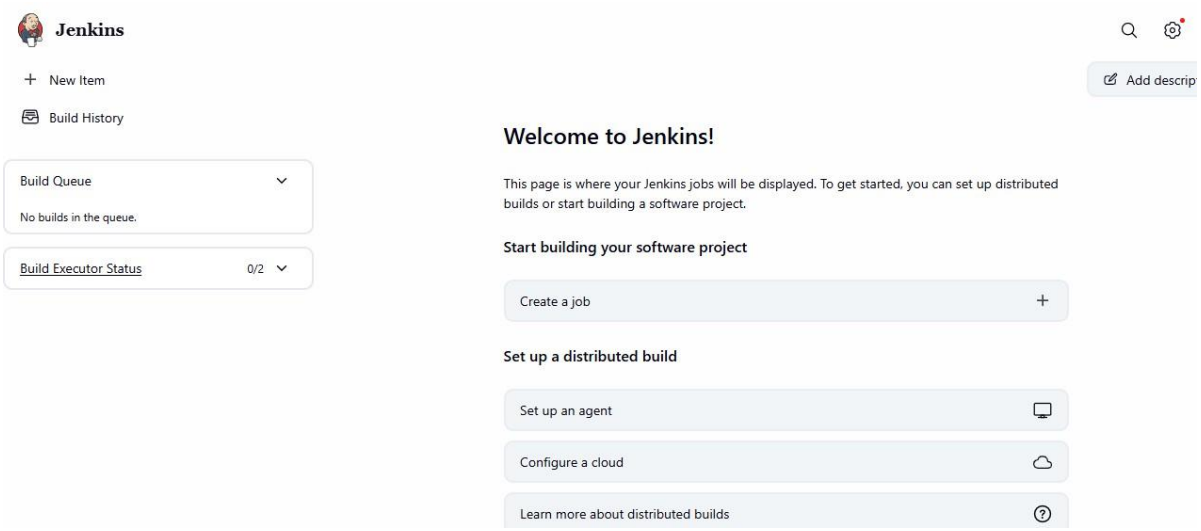
Select and install plugins most suitable for your needs.

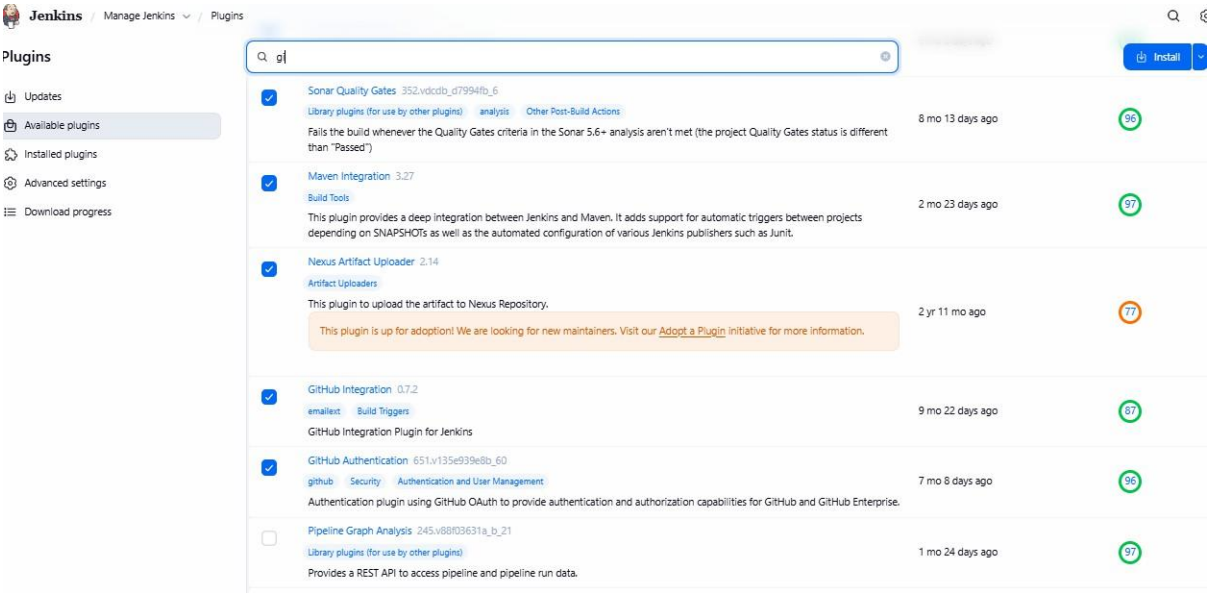
Getting Started

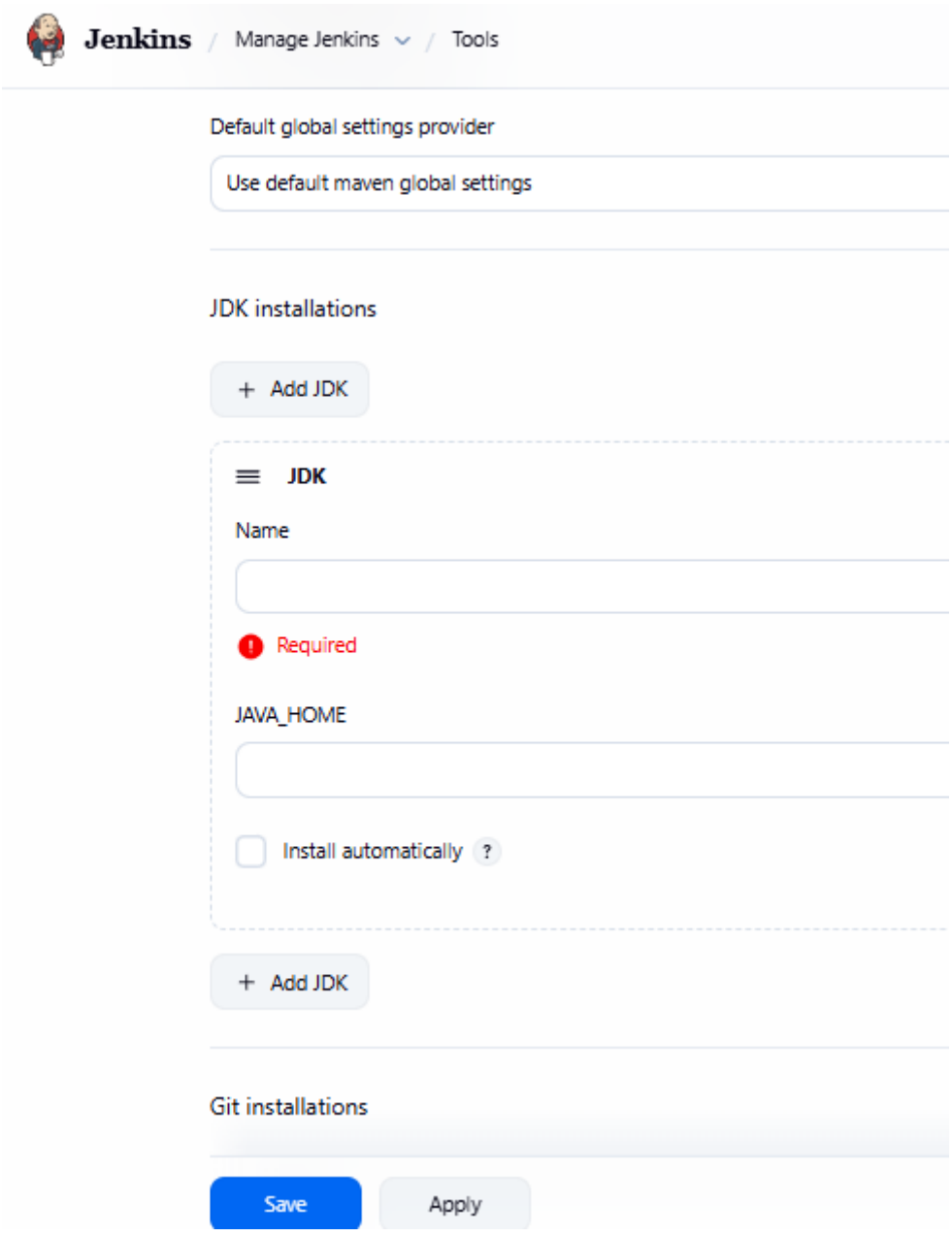
Jenkins is ready!

Your Jenkins setup is complete.

Start using Jenkins


Jenkins
New Item
Build History
Build Queue
No builds in the queue.
Build Executor Status
0/2
Add descrip
Welcome to Jenkins!
This page is where your Jenkins jobs will be displayed. To get started, you can set up distributed builds or start building a software project.
Start building your software project
Create a job
Set up a distributed build
Set up an agent
Configure a cloud
Learn more about distributed builds


Jenkins / Manage Jenkins / Plugins
Plugins
Updates
Available plugins
Installed plugins
Advanced settings
Download progress
gi
Install
Sonar Quality Gates 352.vdcdb_d7994fb_6
Library plugins (for use by other plugins) analysis Other Post-Build Actions
Fails the build whenever the Quality Gates criteria in the Sonar 5.6+ analysis aren't met (the project Quality Gates status is different than "Passed")
8 mo 13 days ago
96
Maven Integration 3.27
Build Tools
This plugin provides a deep integration between Jenkins and Maven. It adds support for automatic triggers between projects depending on SNAPSHOTs as well as the automated configuration of various Jenkins publishers such as Junit.
2 mo 23 days ago
97
Nexus Artifact Uploader 2.14
Artifact Uploaders
This plugin to upload the artifact to Nexus Repository.
This plugin is up for adoption! We are looking for new maintainers. Visit our Adopt a Plugin initiative for more information.
2 yr 11 mo ago
77
GitHub Integration 0.7.2
emailext Build Triggers
GitHub Integration Plugin for Jenkins
9 mo 22 days ago
87
GitHub Authentication 651.v135e939e8b_60
github Security Authentication and User Management
Authentication plugin using GitHub OAuth to provide authentication and authorization capabilities for GitHub and GitHub Enterprise.
7 mo 8 days ago
96
Pipeline Graph Analysis 245.v88f03631a_b_21
Library plugins (for use by other plugins)
Provides a REST API to access pipeline and pipeline run data.
1 mo 24 days ago
97


Jenkins / Manage Jenkins / Tools
Default global settings provider
Use default maven global settings
JDK installations
+ Add JDK
JDK
Name
Required
JAVA_HOME
Install automatically ?
+ Add JDK
Git installations
Save
Apply

Install Java

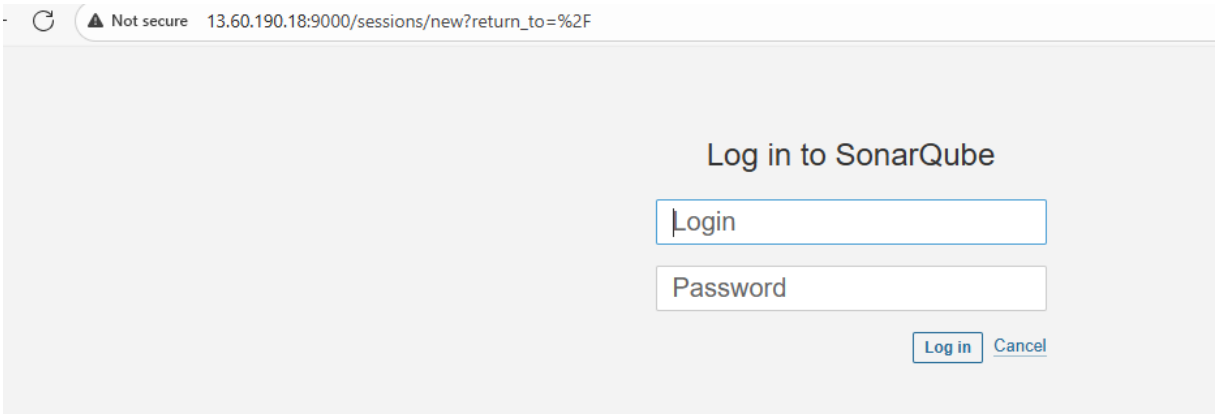
```
sudo apt update

sudo apt install openjdk-17-jdk -y

java -version
```

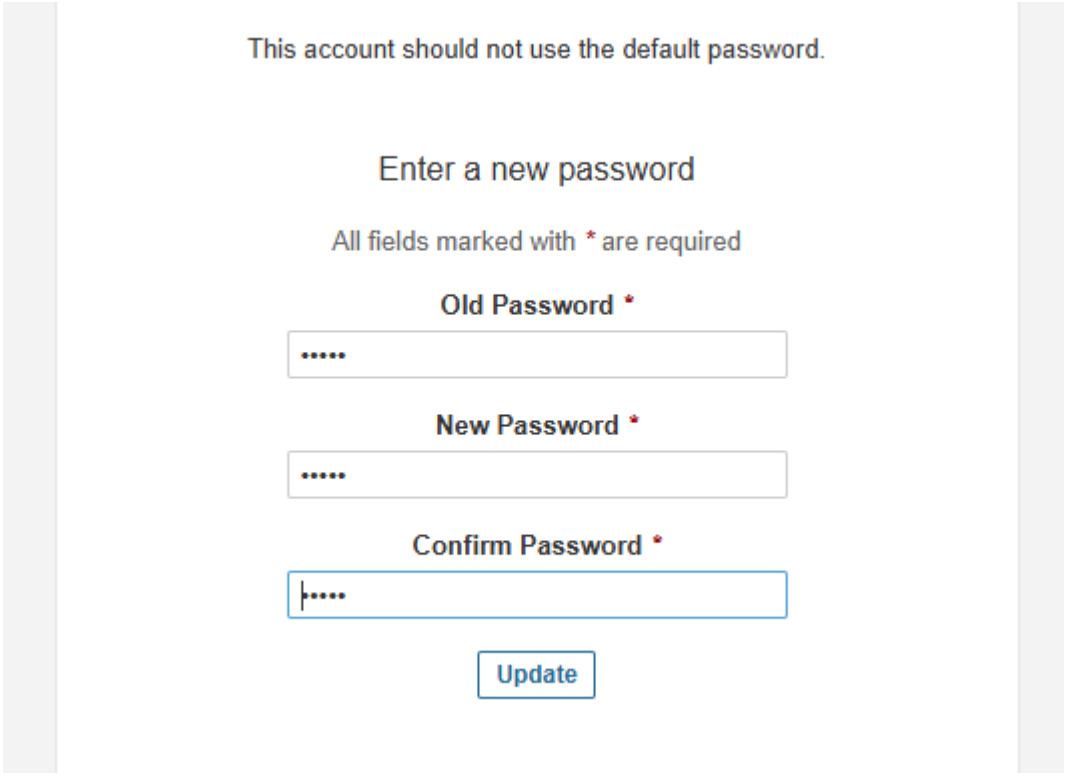
cd /opt
sudo wget https://binaries.sonarsource.com/Distribution/sonarqube/sonarqube-9.9.4.87374.zip

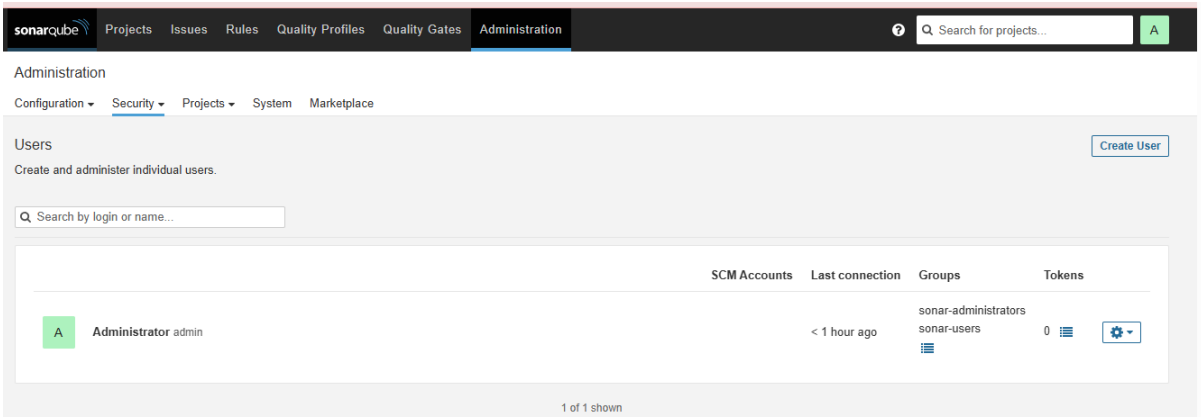
sudo apt install unzip -y
sudo unzip sonarqube-9.9.4.87374.zip

sudo mv sonarqube-9.9.4.87374 sonarqube
sudo chown -R $USER:$USER /opt/sonarqube

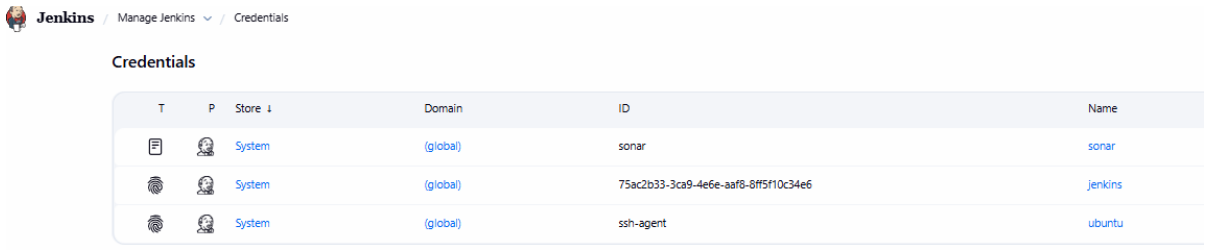
cd /opt/sonarqube/bin/linux-x86-64
./sonar.sh start

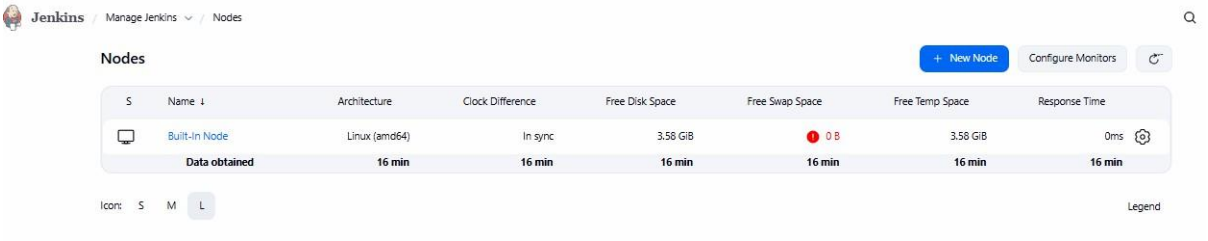

Not secure
13.60.190.18:9000/sessions/new?return_to=%2F
Log in to SonarQube
Login
Password
Log in
Cancel

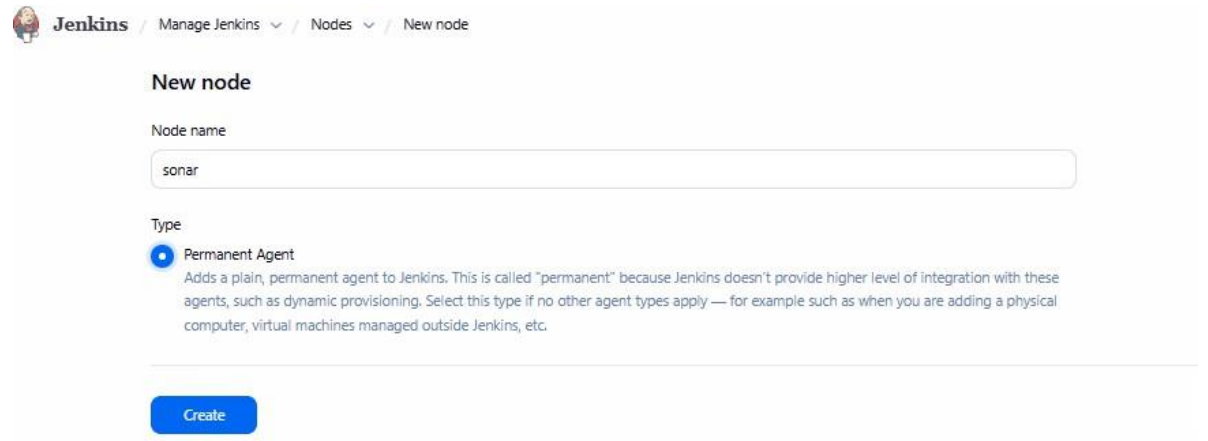

This account should not use the default password.
Enter a new password
All fields marked with * are required
Old Password *
New Password *
Confirm Password *
Update

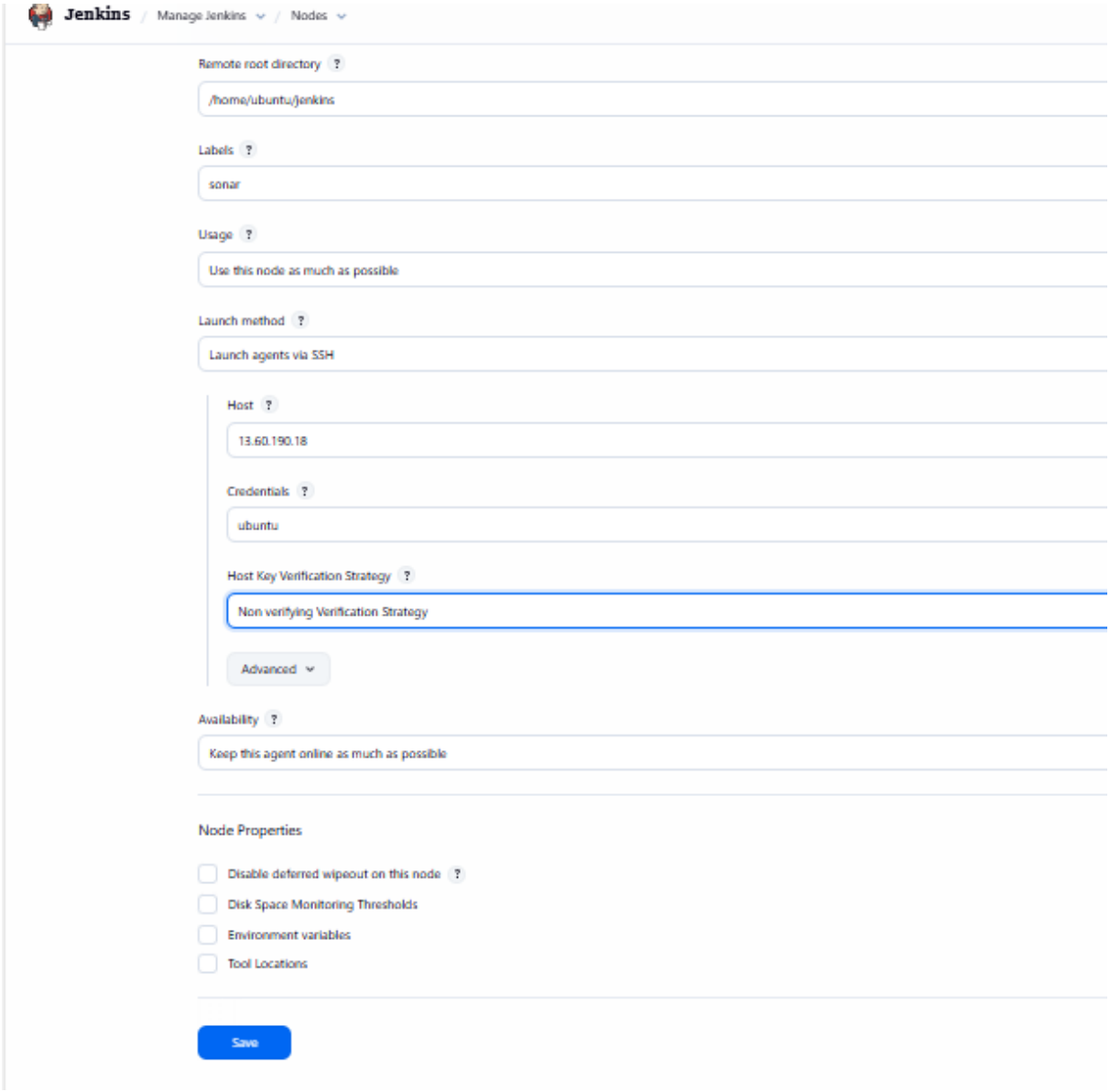


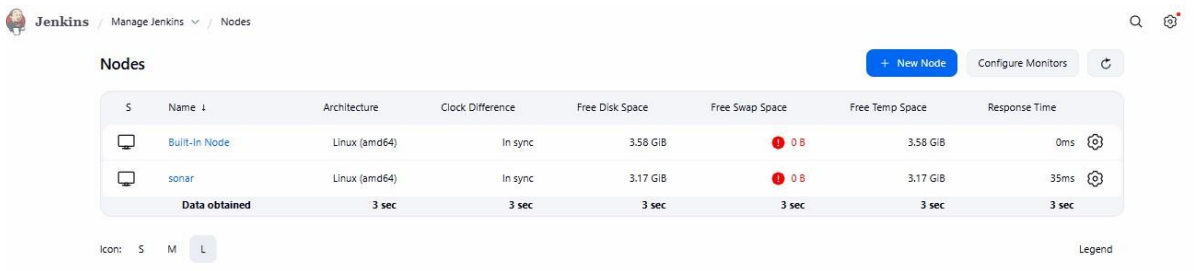

```
ubuntu@jenkins:~/.ssh$ ^C
ubuntu@jenkins:~/.ssh$ ssh ubuntu@13.60.190.18
The authenticity of host '13.60.190.18 (13.60.190.18)' can't be established.
ED25519 key fingerprint is SHA256:LkLU32KMZ22kWejqUWRIumTk+2Qm/kXd5gKbiBx5fms.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '13.60.190.18' (ED25519) to the list of known hosts.
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.14.0-1015-aws x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/pro

 System information as of Mon Nov  3 06:18:59 UTC 2025

  System load:  0.04              Temperature:              -273.1 C
  Usage of /:   52.2% of 6.71GB   Processes:                154
  Memory usage: 6%                Users logged in:          1
  Swap usage:   0%                IPv4 address for enp39s0: 172.31.40.5


Expanded Security Maintenance for Applications is not enabled.

15 updates can be applied immediately.
5 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status


Last login: Mon Nov  3 06:12:49 2025 from 14.195.14.22
ubuntu@sonar:~$ exit
logout
Connection to 13.60.190.18 closed
```


Jenkins / Manage Jenkins / Credentials
Credentials
T P Store ↓ Domain ID Name
System (global) sonar sonar
System (global) 75ac2b33-3ca9-4e6e-aaf8-8ff5f10c34e6 jenkins
System (global) ssh-agent ubuntu


Jenkins / Manage Jenkins / Nodes
Nodes
+ New Node
Configure Monitors
S Name ↓ Architecture Clock Difference Free Disk Space Free Swap Space Free Temp Space Response Time
Built-In Node Linux (amd64) In sync 3.58 GiB 0 B 3.58 GiB 0ms
Data obtained 16 min 16 min 16 min 16 min 16 min 16 min
Icon: S M L
Legend


Jenkins / Manage Jenkins / Nodes / New node
New node
Node name
sonar
Type
Permanent Agent
Adds a plain, permanent agent to Jenkins. This is called "permanent" because Jenkins doesn't provide higher level of integration with these agents, such as dynamic provisioning. Select this type if no other agent types apply — for example such as when you are adding a physical computer, virtual machines managed outside Jenkins, etc.
Create

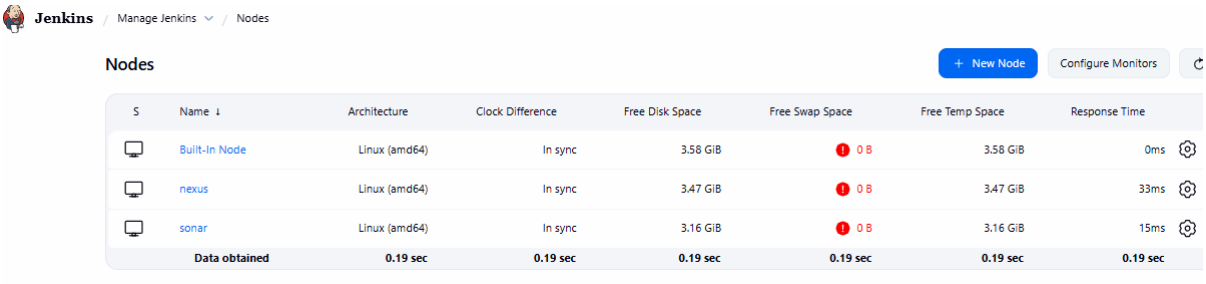

Jenkins / Manage Jenkins / Nodes
Remote root directory ?
/home/ubuntu/jenkins
Labels ?
sonar
Usage ?
Use this node as much as possible
Launch method ?
Launch agents via SSH
Host ?
13.60.190.18
Credentials ?
ubuntu
Host Key Verification Strategy ?
Non verifying Verification Strategy
Advanced
Availability ?
Keep this agent online as much as possible
Node Properties
Disable deferred wipeout on this node ?
Disk Space Monitoring Thresholds
Environment variables
Tool Locations
Save

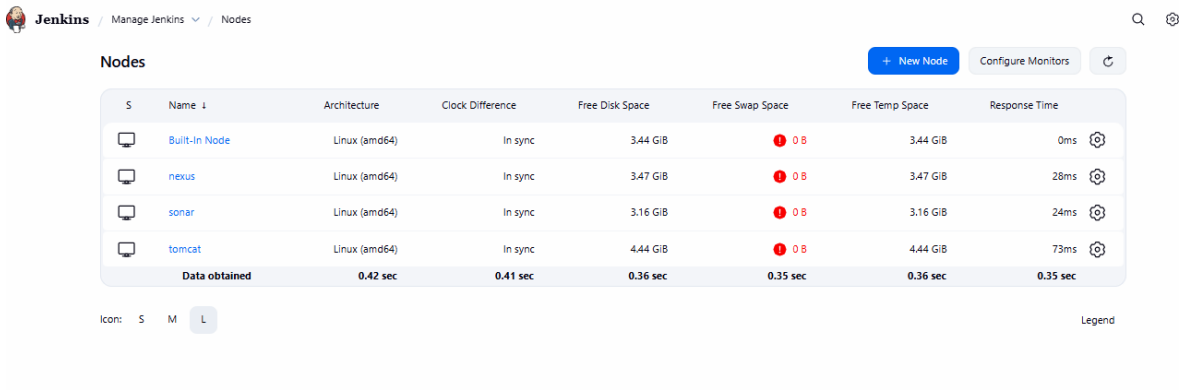

Jenkins / Manage Jenkins / Nodes
Nodes
+ New Node
Configure Monitors
S
Name ↓
Architecture
Clock Difference
Free Disk Space
Free Swap Space
Free Temp Space
Response Time
Built-In Node
Linux (amd64)
In sync
3.58 GiB
0 B
3.58 GiB
0ms
sonar
Linux (amd64)
In sync
3.17 GiB
0 B
3.17 GiB
35ms
Data obtained
3 sec
3 sec
3 sec
3 sec
3 sec
3 sec
Icon: S M L
Legend

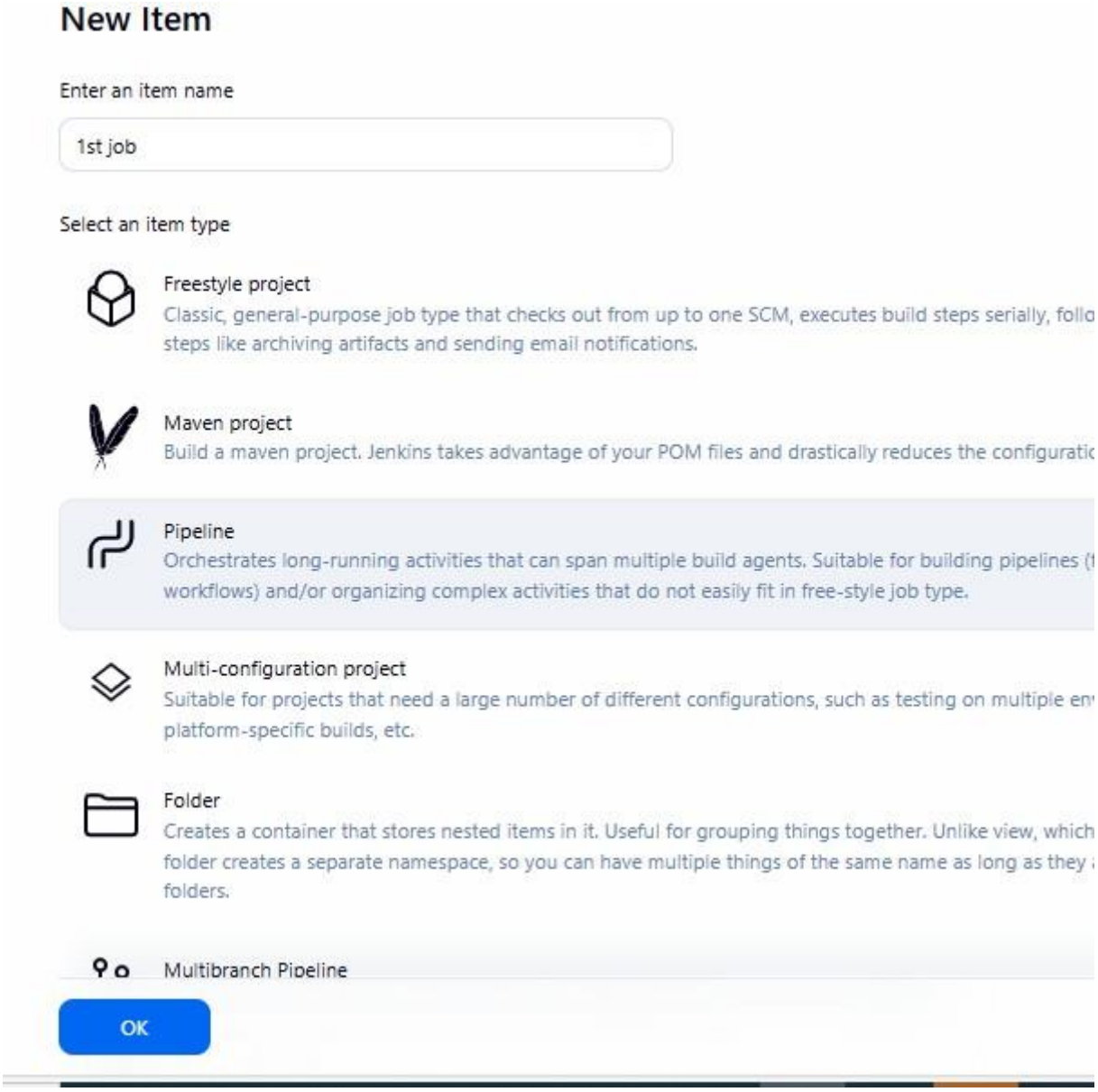
sudo apt install openjdk-17-jre-headless

sudo wget https://download.sonatype.com/nexus/3/nexus-3.85.0-03-linux-x86_64.tar.gz

tar -xvf nexus-3.85.0-03-linux-x86_64.tar.gz







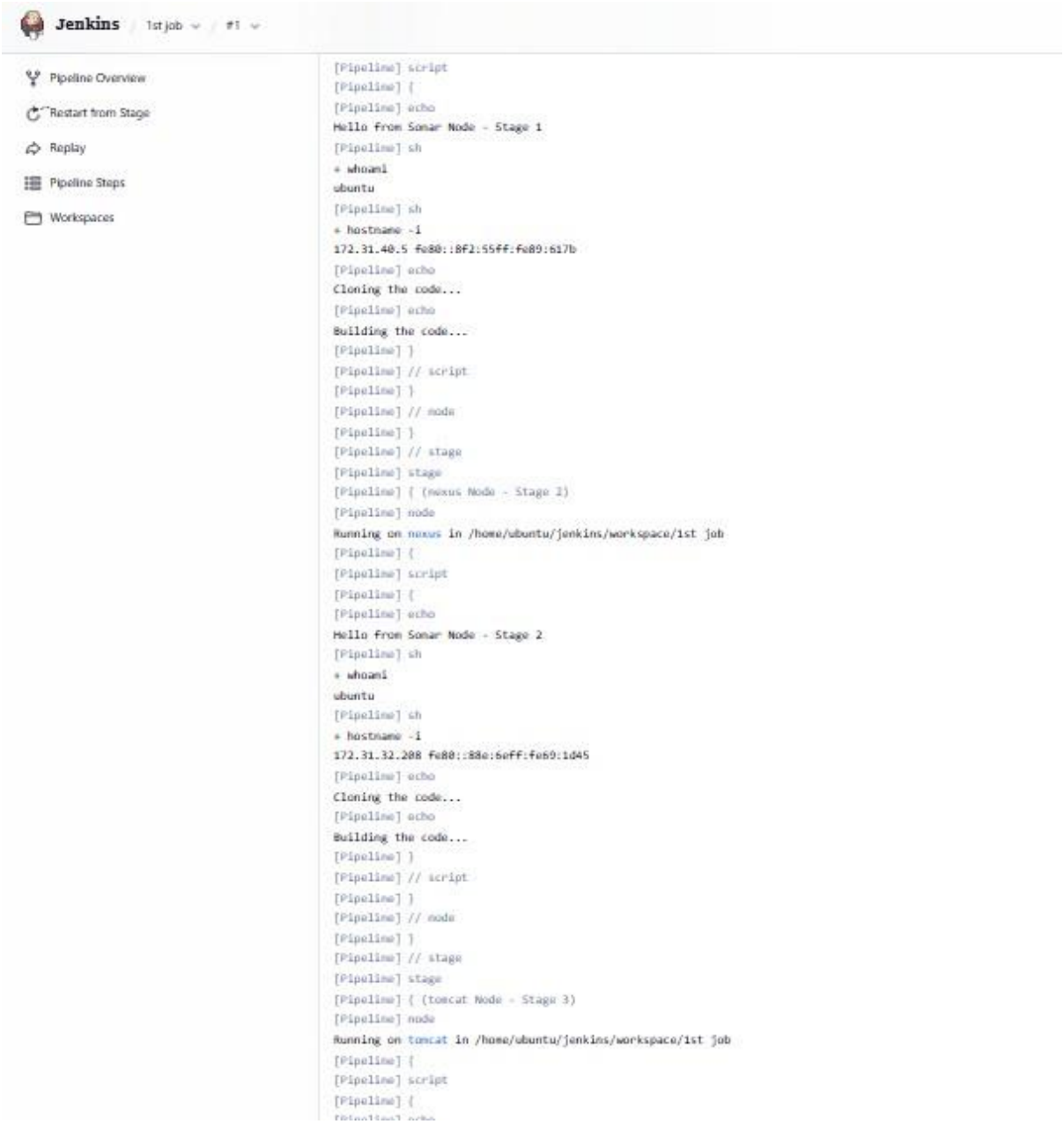
pipeline { agent { label 'sonar' }

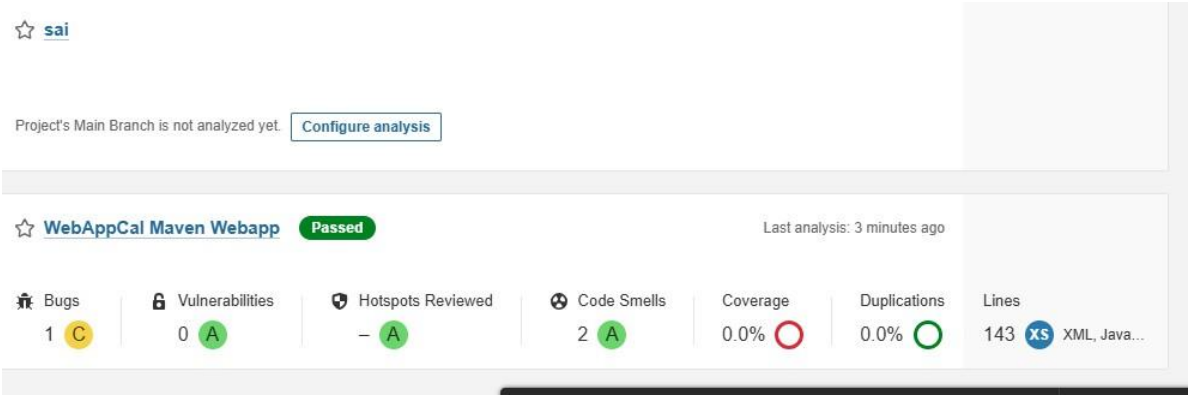
```
tools {
    jdk 'JDK17'
    maven 'Maven'
}

environment {
    SONARQUBE_SERVER = 'sonar'       // Must match Jenkins → Configure
System → SonarQube name
```

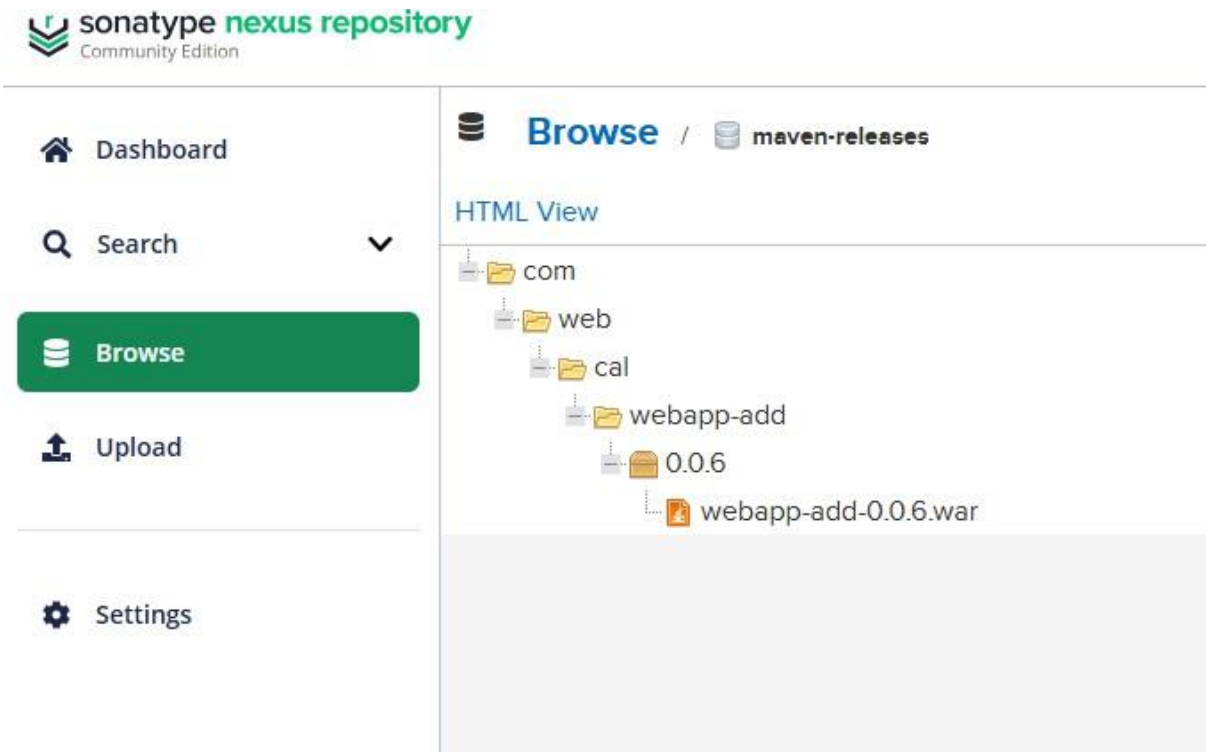
```
    MVN_SETTINGS = '/etc/maven/settings.xml'
    NEXUS_URL = 'http://13.62.99.225:8081'
    NEXUS_REPO = 'maven-releases'
    NEXUS_GROUP = 'com.web.cal'
    NEXUS_ARTIFACT = 'webapp-add'
    TOMCAT_URL = 'http://16.170.35.175:8082/manager/text'
}

stages {

    /* === Stage 1: Checkout Code === */
    stage('Checkout Code') {
        steps {
            echo '📥 Cloning source from GitHub...'
            checkout([
                $class: 'GitSCM',
                branches: [[name: '*/main']],
                userRemoteConfigs: [[
                    url: 'https://github.com/mrtechreddy/Java-Web-
Calculator-App.git'
                ]]
            ])
        }
    }

    /* === Stage 2: SonarQube Analysis === */
    stage('SonarQube Analysis') {
        steps {
            echo '🔍 Running SonarQube static analysis...'
            withSonarQubeEnv("${SONARQUBE_SERVER}") {
                sh 'mvn clean verify sonar:sonar -DskipTests --settings
${MVN_SETTINGS}'
            }
        }
    }

    /* === Stage 3: Build Artifact === */
    stage('Build Artifact') {
        steps {
            echo '⚙️ Building WAR...'
            sh 'mvn clean package -DskipTests --settings ${MVN_SETTINGS}'
            sh 'echo ✅ Build Completed!'
            sh 'ls -lh target/*.war || echo "No WAR file found."'
        }
    }

    /* === Stage 4: Upload Artifact to Nexus === */
    stage('Upload Artifact to Nexus') {
        steps {
```

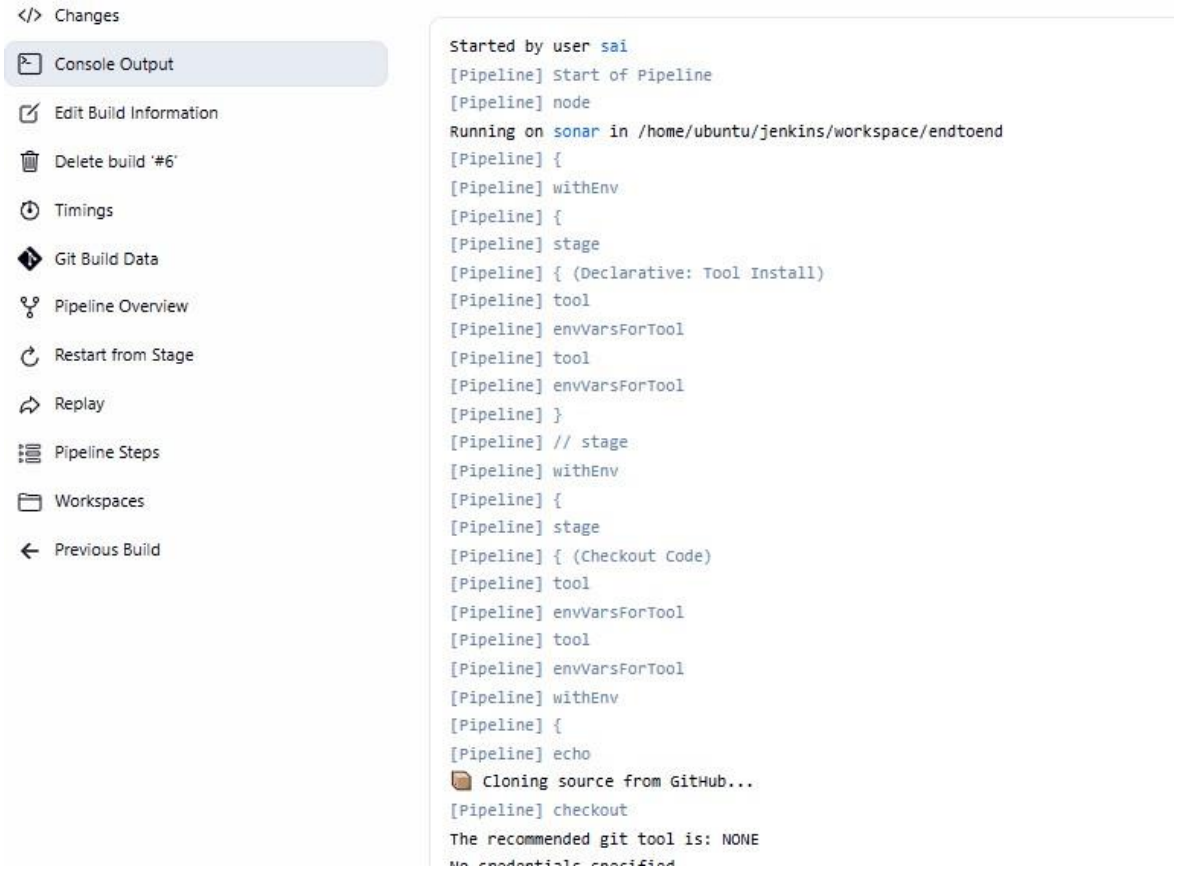
```
            withCredentials([usernamePassword(credentialsId: 'nexus',
usernameVariable: 'NEXUS_USR', passwordVariable: 'NEXUS_PSW')]) {
                sh '''#!/bin/bash
                    set -e
                    WAR_FILE=$(find target -type f -name "*.war" | head -
n1)
                    if [[ ! -f "$WAR_FILE" ]]; then
                        echo "+ No WAR file found in target/"; exit 1
                    fi

                    FILE_NAME=$(basename "$WAR_FILE")
                    VERSION="0.0.${BUILD_NUMBER}"
                    GROUP_PATH=$(echo "${NEXUS_GROUP}" | tr '.' '/')

                    echo "📤 Uploading $FILE_NAME to Nexus as version
$VERSION..."
                    curl -f -u "${NEXUS_USR}:${NEXUS_PSW}" --upload-file
"$WAR_FILE" \

"${NEXUS_URL}/repository/${NEXUS_REPO}/${GROUP_PATH}/${NEXUS_ARTIFACT}/${V
ERSION}/${NEXUS_ARTIFACT}-${VERSION}.war"
                    echo "✅ Artifact uploaded successfully to Nexus!"
                '''
            }
        }
    }

    /* === Stage 5: Deploy to Tomcat === */
    stage('Deploy to Tomcat') {
        agent { label 'tomcat' }
        steps {
            withCredentials([
                usernamePassword(credentialsId: 'nexus', usernameVariable:
'NEXUS_USR', passwordVariable: 'NEXUS_PSW'),
                usernamePassword(credentialsId: 'Tomcat',
usernameVariable: 'TOMCAT_USR', passwordVariable: 'TOMCAT_PSW')
            ]) {
                sh '''#!/bin/bash
                    set -e
                    cd /tmp || exit 1
                    rm -f *.war

                    VERSION="0.0.${BUILD_NUMBER}"
                    GROUP_PATH=$(echo "${NEXUS_GROUP}" | tr '.' '/')

WAR_URL="${NEXUS_URL}/repository/${NEXUS_REPO}/${GROUP_PATH}/${NEXUS_ARTIF
ACT}/${VERSION}/${NEXUS_ARTIFACT}-${VERSION}.war"

                    echo ℹ️ Downloading WAR from Nexus: $WAR_URL"
```

```
                    curl -u "${NEXUS_USR}:${NEXUS_PSW}" -O "$WAR_URL"

                    WAR_FILE=$(basename "$WAR_URL")
                    APP_NAME="${NEXUS_ARTIFACT}"

                    echo "🗑️ Undeploying old app (if exists)..."
                    curl -u "${TOMCAT_USR}:${TOMCAT_PSW}"
"${TOMCAT_URL}/undeploy?path=/${APP_NAME}" || true

                    echo "🚚 Deploying new WAR to Tomcat..."
                    curl -u "${TOMCAT_USR}:${TOMCAT_PSW}" --upload-file
"$WAR_FILE" \

"${TOMCAT_URL}/deploy?path=/${APP_NAME}&update=true"

                    echo "✅ Deployment successful! Application updated."
                '''
            }
        }
    }
}

post {
    success {
        echo '🎉 Pipeline completed successfully — Application live on
Tomcat!'
    }
    failure {
        echo '❌ Pipeline failed — Check Jenkins logs.'
    }
}


}
```


Jenkins
1st job
#1
Pipeline Overview
Restart from Stage
Replay
Pipeline Steps
Workspaces
[Pipeline] script
[Pipeline] {
[Pipeline] echo
Hello from Sonar Node - Stage 1
[Pipeline] sh
+ whoami
ubuntu
[Pipeline] sh
+ hostname -i
172.31.40.5 fe80::8f2:55ff:fe89:617b
[Pipeline] echo
Cloning the code...
[Pipeline] echo
Building the code...
[Pipeline] }
[Pipeline] // script
[Pipeline] }
[Pipeline] // node
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (nexus Node - Stage 2)
[Pipeline] node
Running on nexus in /home/ubuntu/jenkins/workspace/1st job
[Pipeline] {
[Pipeline] script
[Pipeline] {
[Pipeline] echo
Hello from Sonar Node - Stage 2
[Pipeline] sh
+ whoami
ubuntu
[Pipeline] sh
+ hostname -i
172.31.32.208 fe80::88e:6eff:fe69:1d45
[Pipeline] echo
Cloning the code...
[Pipeline] echo
Building the code...
[Pipeline] }
[Pipeline] // script
[Pipeline] }
[Pipeline] // node
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (tomcat Node - Stage 3)
[Pipeline] node
Running on tomcat in /home/ubuntu/jenkins/workspace/1st job
[Pipeline] {
[Pipeline] script
[Pipeline] {


sai
Project's Main Branch is not analyzed yet.
Configure analysis
WebAppCal Maven Webapp
Passed
Last analysis: 3 minutes ago
Bugs
1 C
Vulnerabilities
0 A
Hotspots Reviewed
– A
Code Smells
2 A
Coverage
0.0%
Duplications
0.0%
Lines
143 XS XML, Java...


sonatype nexus repository
Community Edition
Dashboard
Search
Browse
Upload
Settings
Browse / maven-releases
HTML View
com
web
cal
webapp-add
0.0.6
webapp-add-0.0.6.war

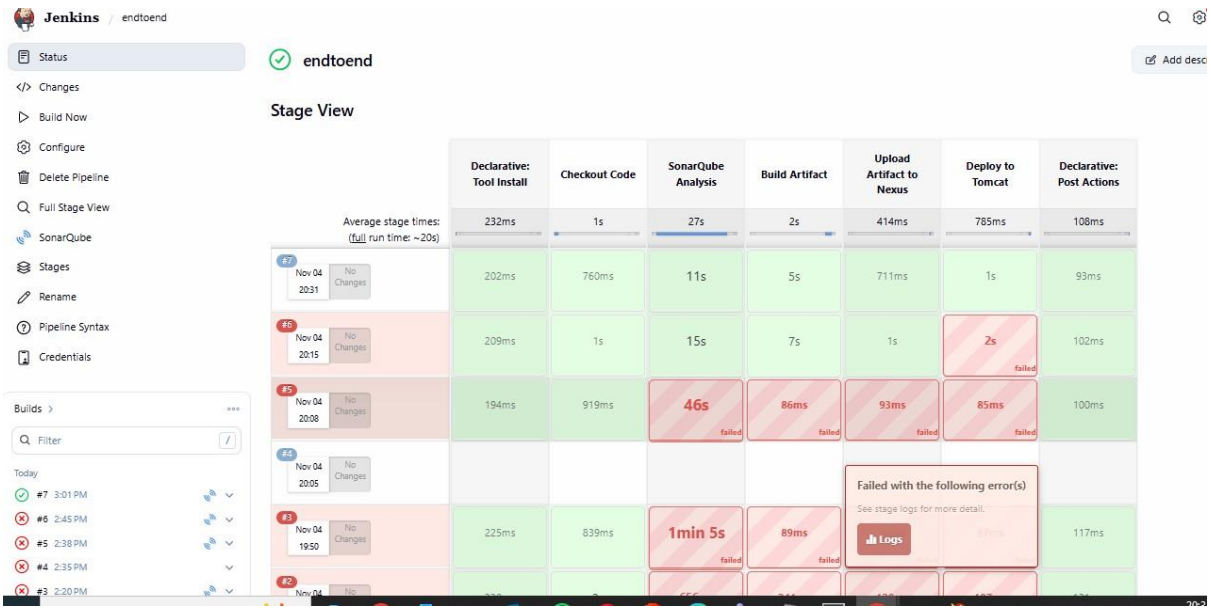

Changes
Console Output
Edit Build Information
Delete build '#6'
Timings
Git Build Data
Pipeline Overview
Restart from Stage
Replay
Pipeline Steps
Workspaces
Previous Build
Started by user sai
[Pipeline] Start of Pipeline
[Pipeline] node
Running on sonar in /home/ubuntu/jenkins/workspace/endtoend
[Pipeline] {
[Pipeline] withEnv
[Pipeline] {
[Pipeline] stage
[Pipeline] { (Declarative: Tool Install)
[Pipeline] tool
[Pipeline] envVarsForTool
[Pipeline] tool
[Pipeline] envVarsForTool
[Pipeline] }
[Pipeline] // stage
[Pipeline] withEnv
[Pipeline] {
[Pipeline] stage
[Pipeline] { (Checkout Code)
[Pipeline] tool
[Pipeline] envVarsForTool
[Pipeline] tool
[Pipeline] envVarsForTool
[Pipeline] withEnv
[Pipeline] {
[Pipeline] echo
Cloning source from GitHub...
[Pipeline] checkout
The recommended git tool is: NONE

```
[⍰[1;34mINFO⍰[m] 14:45:18.150 Sensor Java CPD Block Indexer (done) | time=13ms
[⍰[1;34mINFO⍰[m] 14:45:18.154 SCM Publisher SCM provider for this project is: git
[⍰[1;34mINFO⍰[m] 14:45:18.155 SCM Publisher 5 source files to be analyzed
[⍰[1;34mINFO⍰[m] 14:45:18.242 SCM Publisher 5/5 source files have been analyzed (done) | time=86ms
[⍰[1;34mINFO⍰[m] 14:45:18.245 CPD Executor Calculating CPD for 2 files
[⍰[1;34mINFO⍰[m] 14:45:18.251 CPD Executor CPD calculation finished (done) | time=6ms
[⍰[1;34mINFO⍰[m] 14:45:18.329 Analysis report generated in 73ms, dir size=136.7 kB
[⍰[1;34mINFO⍰[m] 14:45:18.345 Analysis report compressed in 16ms, zip size=25.2 kB
[⍰[1;34mINFO⍰[m] 14:45:18.929 Analysis report uploaded in 583ms
[⍰[1;34mINFO⍰[m] 14:45:18.932 ANALYSIS SUCCESSFUL, you can find the results at: http://13.62.98.135:9000/dashboard?
[⍰[1;34mINFO⍰[m] 14:45:18.932 Note that you will be able to access the updated dashboard once the server has proces
[⍰[1;34mINFO⍰[m] 14:45:18.932 More about the report processing at http://13.62.98.135:9000/api/ce/task?id=AZpPVFezI
[⍰[1;34mINFO⍰[m] 14:45:18.956 Analysis total time: 8.853 s
[⍰[1;34mINFO⍰[m] ⍰[1m------------------------------------------------------------------------⍰[m
[⍰[1;34mINFO⍰[m] ⍰[1;32mBUILD SUCCESS⍰[m
[⍰[1;34mINFO⍰[m] ⍰[1m------------------------------------------------------------------------⍰[m
[⍰[1;34mINFO⍰[m] Total time:  12.901 s
[⍰[1;34mINFO⍰[m] Finished at: 2025-11-04T14:45:18Z
[⍰[1;34mINFO⍰[m] ⍰[1m------------------------------------------------------------------------⍰[m
[Pipeline] }
[Pipeline] // withSonarQubeEnv
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Build Artifact)
```

```
[⍰[1;34mINFO⍰[m]
[⍰[1;34mINFO⍰[m] ⍰[1m--- ⍰[0;32mmaven-war-plugin:3.3.2:war⍰[m ⍰[1m(default-war)⍰[m @ ⍰[36mwebapp-add⍰[0;1m ---⍰[m
[⍰[1;34mINFO⍰[m] Packaging webapp
[⍰[1;34mINFO⍰[m] Assembling webapp [webapp-add] in [/home/ubuntu/jenkins/workspace/endtoend/target/webapp-add-0.0.2]
[⍰[1;34mINFO⍰[m] Processing war project
[⍰[1;34mINFO⍰[m] Copying webapp resources [/home/ubuntu/jenkins/workspace/endtoend/src/main/webapp]
[⍰[1;34mINFO⍰[m] Building war: /home/ubuntu/jenkins/workspace/endtoend/target/webapp-add-0.0.2.war
[⍰[1;34mINFO⍰[m] ⍰[1m------------------------------------------------------------------------⍰[m
[⍰[1;34mINFO⍰[m] ⍰[1;32mBUILD SUCCESS⍰[m
[⍰[1;34mINFO⍰[m] ⍰[1m------------------------------------------------------------------------⍰[m
[⍰[1;34mINFO⍰[m] Total time:  4.095 s
[⍰[1;34mINFO⍰[m] Finished at: 2025-11-04T14:45:26Z
[⍰[1;34mINFO⍰[m] ⍰[1m------------------------------------------------------------------------⍰[m
[Pipeline] sh
+ echo ✅ Build Completed!
✅ Build Completed!
[Pipeline] sh
+ ls -lh target/webapp-add-0.0.2.war
-rw-rw-r-- 1 ubuntu ubuntu 3.9K Nov  4 14:45 target/webapp-add-0.0.2.war
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // stage
```

```
  0     0    0     0    0     0      0      0 --:--:-- --:--:-- --:--:--     0
100  3984    0     0  100  3984      0  24124 --:--:-- --:--:-- --:--:-- 24145
✅ Artifact uploaded successfully to Nexus!
[Pipeline] }
[Pipeline] // withCredentials
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Deploy to Tomcat)
[Pipeline] node
Running on tomcat in /home/ubuntu/jenkins/workspace/endtoend
[Pipeline] {
[Pipeline] tool
[Pipeline] envVarsForTool
[Pipeline] tool
```

```
✅ Deployment successful! Application updated.
[Pipeline] }
[Pipeline] // withCredentials
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // node
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Declarative: Post Actions)
[Pipeline] echo
🚀 Pipeline completed successfully — Application live or
[Pipeline] }
[Pipeline] // stage
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // node
[Pipeline] End of Pipeline
Finished: SUCCESS
```


Jenkins
endtoend
Status
Changes
Build Now
Configure
Delete Pipeline
Full Stage View
SonarQube
Stages
Rename
Pipeline Syntax
Credentials
Builds
Filter
Today
#7 3:01 PM
#6 2:45 PM
#5 2:38 PM
#4 2:35 PM
#3 2:20 PM
endtoend
Add desc
Stage View
Declarative: Tool Install
Checkout Code
SonarQube Analysis
Build Artifact
Upload Artifact to Nexus
Deploy to Tomcat
Declarative: Post Actions
Average stage times:
(full run time: ~20s)
232ms
1s
27s
2s
414ms
785ms
108ms
#7 Nov 04 20:31 No Changes
202ms
760ms
11s
5s
711ms
1s
93ms
#6 Nov 04 20:15 No Changes
209ms
1s
15s
7s
1s
2s
failed
102ms
#5 Nov 04 20:08 No Changes
194ms
919ms
46s
failed
86ms
failed
93ms
failed
85ms
failed
100ms
#4 Nov 04 20:05 No Changes
Failed with the following error(s)
See stage logs for more detail.
Logs
#3 Nov 04 19:50 No Changes
225ms
839ms
1min 5s
failed
89ms
failed
117ms
#2 Nov 04 No