

Secure DevSecops App Deployment & Real-Time Health Monitoring in Kubernetes

**CI/CD with Github , Jenkins, Docker, Kubernetes,
SonarQube and Trivy**

Presented by

SOUNDARIYA B - ECE C (3rd YEAR)



INTRODUCTION

- This project demonstrates the secure deployment of a BINGO application using a complete DevSecOps pipeline integrated with real-time health monitoring. GitHub is connected to Jenkins, which serves as the CI/CD server using a declarative pipeline to automate build and deployment into Docker containers running in a Kubernetes cluster. Two separate servers are used—one for Jenkins and DevSecOps tools, and another for Prometheus and Grafana monitoring. Gmail SMTP alerts notify the team of build status, ensuring rapid response. The project showcases secure, automated deployment with continuous monitoring in a real-time cloud-native environment.



Tools & Technologies

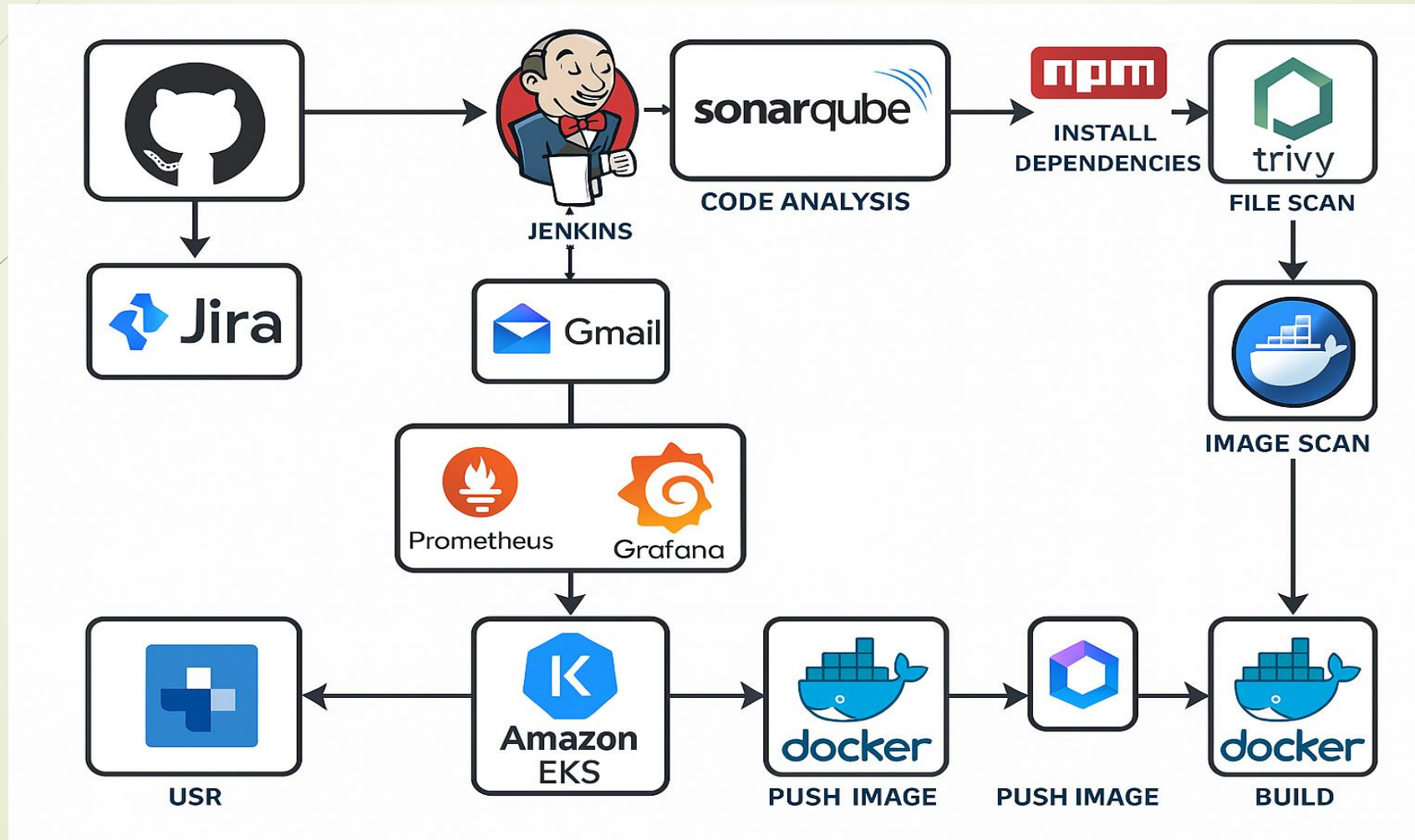
- GitHub
- Jenkins
- Docker
- Kubernetes
- SonarQube
- Trivy
- Gmail server
- Grafana
- Prometheus



Use Cases

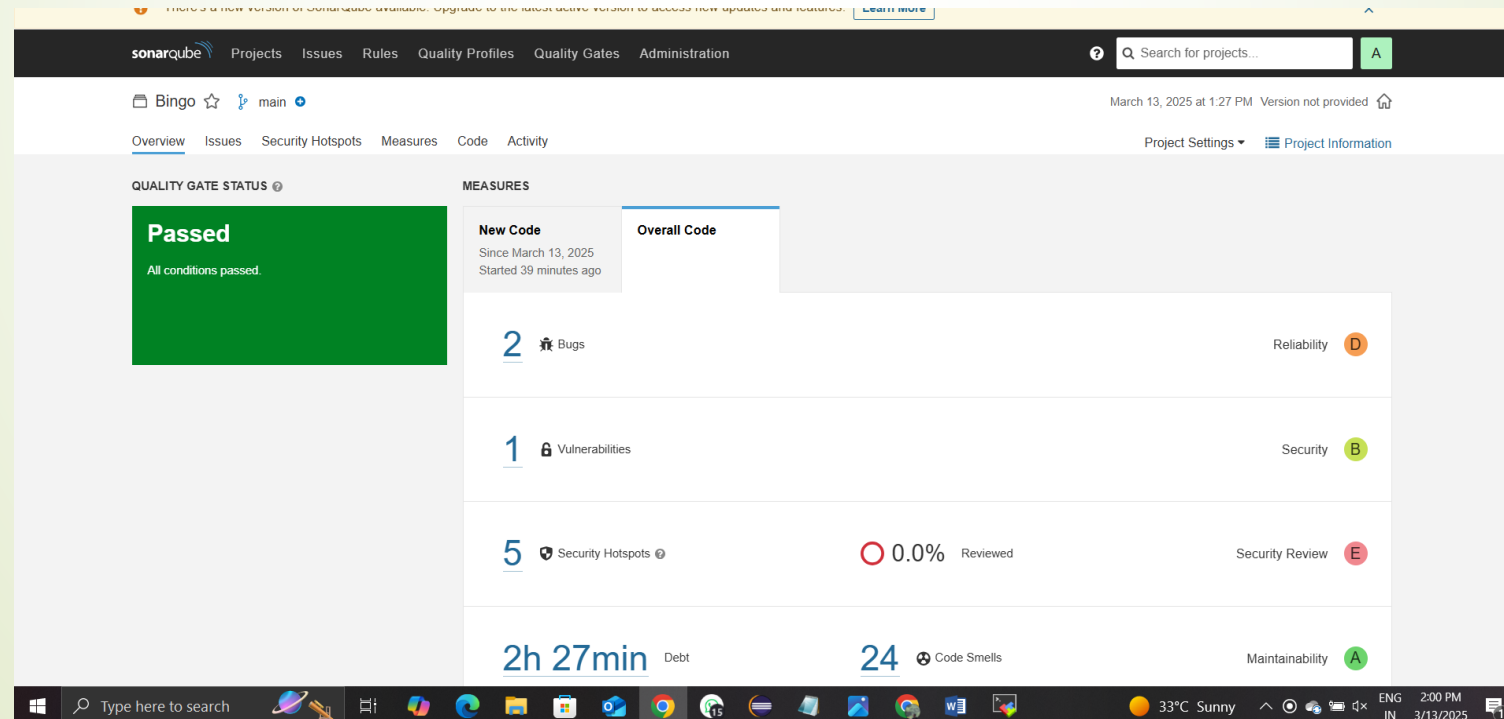
- Automated and Secure Deployment of BINGO App
- Real-Time Health Monitoring of Kubernetes Pods
- Failure Detection & Notification
- Self-Healing with Kubernetes
- Prevent Deployment of Vulnerable Builds
- Email Alerts for CI/CD Success or Failure
- Detect health issues instantly with monitoring.

ARCHITECTURE DIAGRAM




Results & Observations

- Full automation from code to production.
- Live monitoring of app health.
- Quick detection and response to issues.





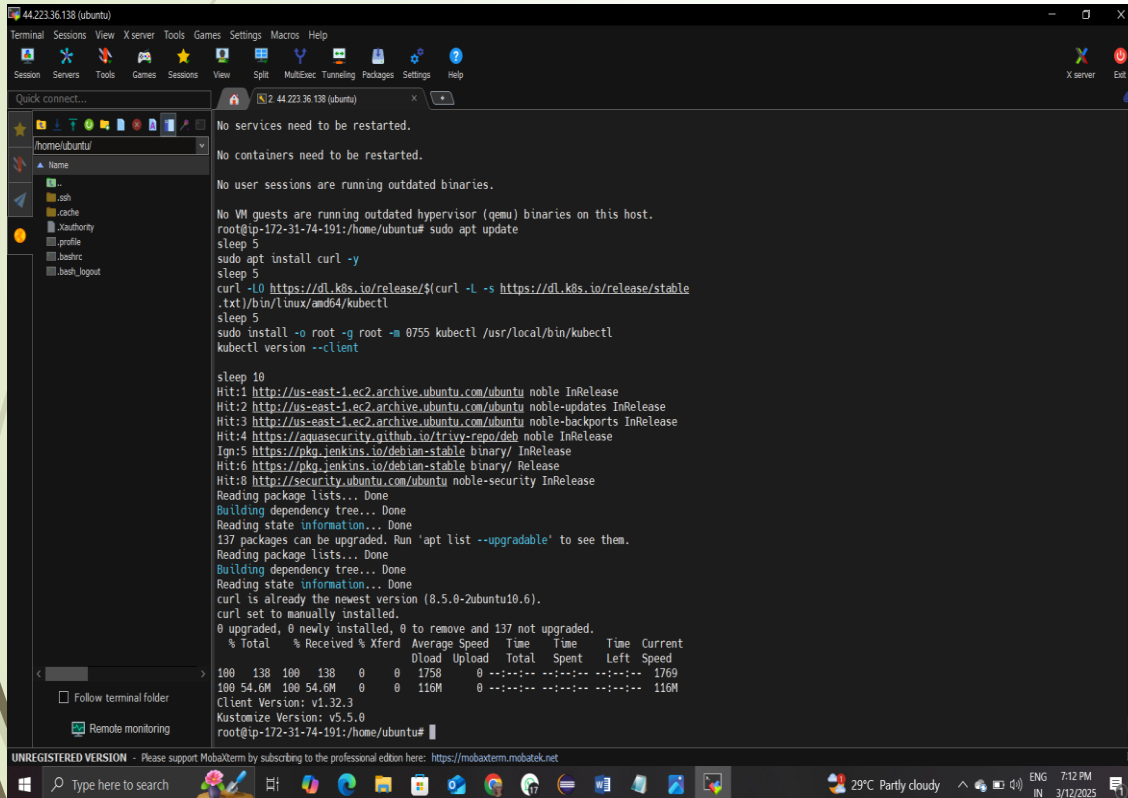
Conclusion

- The project showcases a secure and automated DevSecOps pipeline for deploying the BINGO app with real-time monitoring. From code quality checks to health alerts, every step ensures faster, safer, and more reliable deployments. It reflects modern DevSecOps practices, combining automation, security, and observability for cloud-native success.
- 



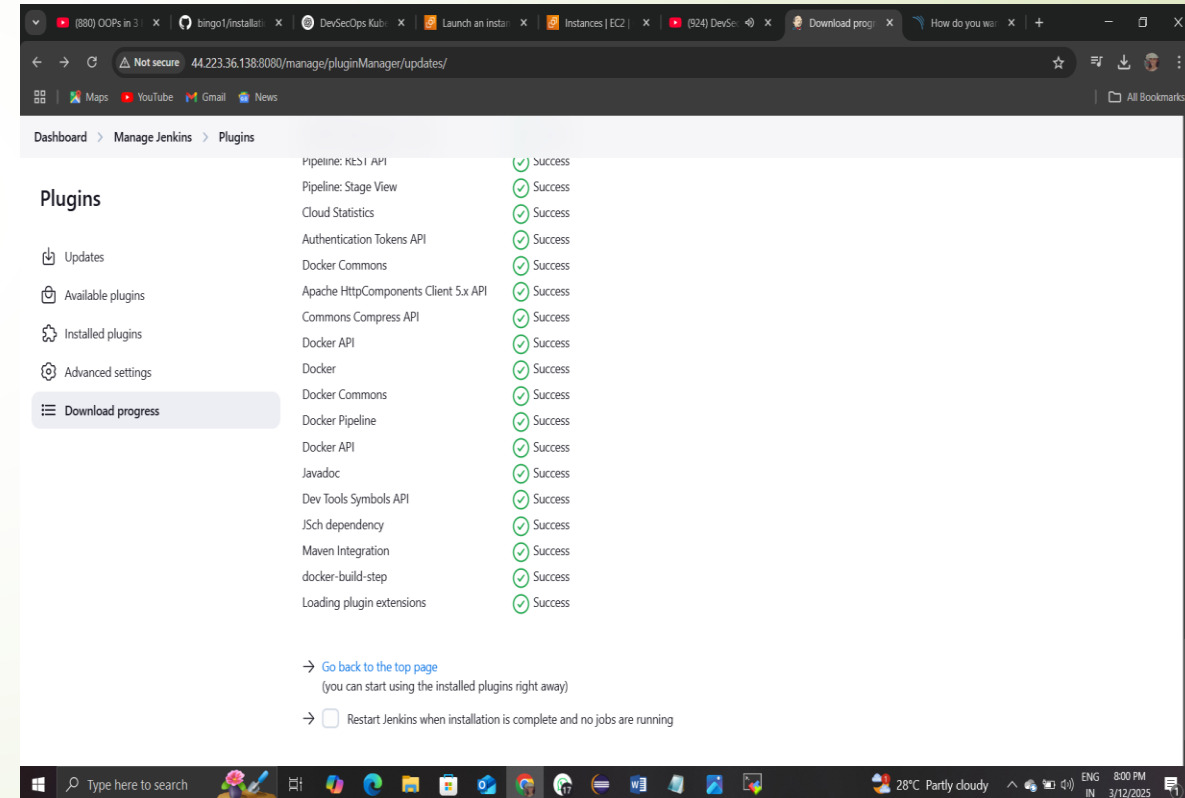
Screenshots Of Steps

Steps To Follow



```
44.223.36.138 (ubuntu)
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
No services need to be restarted.
No containers need to be restarted.
No user sessions are running outdated binaries.
No VM guests are running outdated hypervisor (qemu) binaries on this host.
root@ip-172-31-74-191:/home/ubuntu# sudo apt update
sleep 5
sudo apt install curl -y
sleep 5
curl -LO https://dl.k8s.io/release/${curl -L -s https://dl.k8s.io/release/stable.txt}/bin/linux/amd64/kubectl
sleep 5
sudo install -o root -g root -m 0755 kubectl /usr/local/bin/kubectl
kubectl version --client
sleep 10
Hit:1 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:3 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-backports InRelease
Hit:4 https://awssecurity.github.io/trivy-repo/deb noble InRelease
Ign:5 https://pkg.jenkins.io/debian-stable binary/ InRelease
Hit:6 https://pkg.jenkins.io/debian-stable binary/ Release
Hit:8 http://security.ubuntu.com/ubuntu noble-security InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
137 packages can be upgraded. Run 'apt list --upgradable' to see them.
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
curl is already the newest version (8.5.0-2ubuntu10.6).
curl set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 137 not upgraded.
% Total % Received % Xferd Average Speed Time Time Time Current
Dload Upload Total Spent Left Speed
100 138 100 138 0 0 1758 0 --:--:-- --:--:-- --:--:-- 1769
100 54.6M 100 54.6M 0 0 116M 0 --:--:-- --:--:-- --:--:-- 116M
Client Version: v1.32.3
Kustomize Version: v5.5.0
root@ip-172-31-74-191:/home/ubuntu#
```

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Dashboard > Manage Jenkins > Plugins

Plugins

- Updates
- Available plugins
- Installed plugins
- Advanced settings
- Download progress**

Plugin	Status
Pipeline: KES1 API	Success
Pipeline: Stage View	Success
Cloud Statistics	Success
Authentication Tokens API	Success
Docker Commons	Success
Apache HttpComponents Client 5.x API	Success
Commons Compress API	Success
Docker API	Success
Docker	Success
Docker Commons	Success
Docker Pipeline	Success
Docker API	Success
Javadoc	Success
Dev Tools Symbols API	Success
JSch dependency	Success
Maven Integration	Success
docker-build-step	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

Steps To Follow

Dashboard > Manage Jenkins > Tools

Docker installations

[Add Docker](#)

≡ Docker

Name

Docker

☒ Install automatically ?

≡ Download from docker.com

Docker version ?

latest

[Add Installer](#)

[Add Docker](#)

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

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#SecurityGroup:group-id=sg-075a43e0706f15abd

EC2 > Security Groups > sg-075a43e0706f15abd - launch-wizard-27

EC2

Dashboard

EC2 Global View

Events

▼ Instances

Instances

Instance Types

Launch Templates

Spot Requests

Savings Plans

Reserved Instances

Dedicated Hosts

Capacity Reservations

▼ Images

AMIs

AMI Catalog

▼ Elastic Block Store

Volumes

Snapshots

Security group name

launch-wizard-27

Security group ID

sg-075a43e0706f15abd

Description

launch-wizard-27 created 2025-03-13T04:36:19.222Z

VPC ID

vpc-044adc5468ac1ebb4

Owner

390060269269

Inbound rules count

4 Permission entries

Outbound rules count

1 Permission entry

[Inbound rules](#)

[Outbound rules](#)

[Sharing - new](#)

[VPC associations - new](#)

[Tags](#)

Inbound rules (4)

[Manage tags](#)

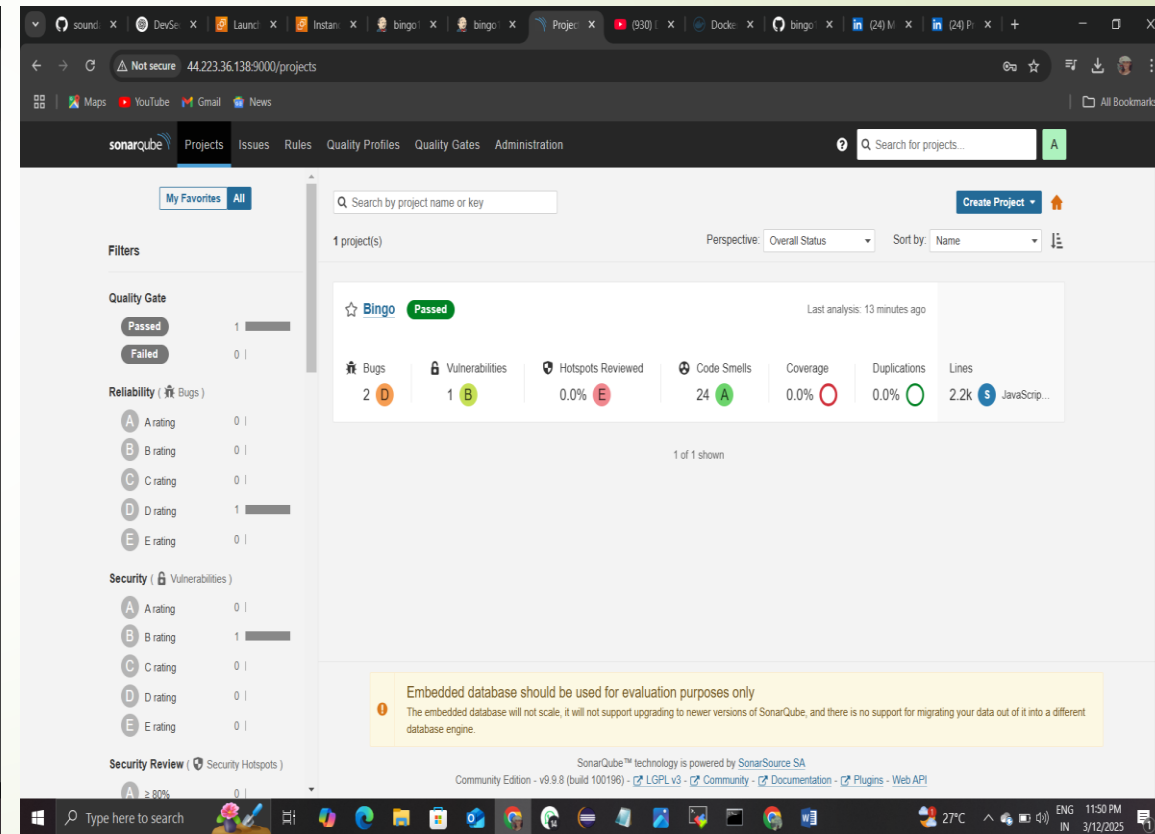
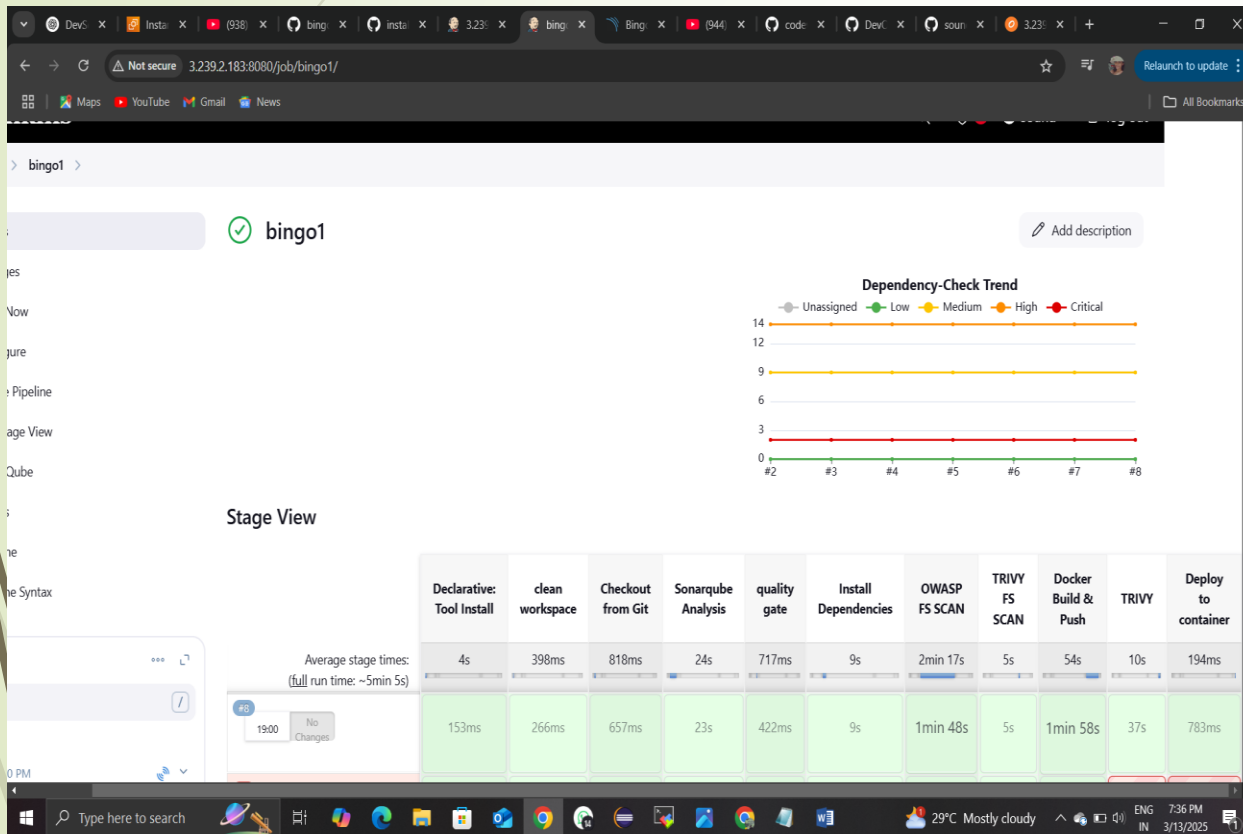
[Edit inbound rules](#)

<input type="checkbox"/>	Name	Security group rule ID	IP version	Type	Protocol	Port range
<input type="checkbox"/>	-	sgr-0a08d27499ce5bb0d	IPv4	HTTP	TCP	80
<input type="checkbox"/>	-	sgr-03ca6e6a12dce0cc8	IPv4	All traffic	All	All
<input type="checkbox"/>	-	sgr-090c81e1801463ccd	IPv4	SSH	TCP	22
<input type="checkbox"/>	-	sgr-01669aa566b86615a	IPv4	All TCP	TCP	0 - 65535

CloudShell Feedback

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Steps To Follow



Steps To Follow

The screenshot shows the SonarQube dashboard for a project named 'Bingo'. The interface includes a top navigation bar with links to Projects, Issues, Rules, Quality Profiles, Quality Gates, and Administration. A search bar is present. The main content area displays various project metrics:

- Vulnerabilities:** 1 vulnerability, Security grade B.
- Security Hotspots:** 5 hotspots, 0.0% Reviewed, Security Review grade E.
- Debt:** 2h 27min.
- Code Smells:** 24 smells, Maintainability grade A.
- Coverage:** 0.0% (386 Lines to cover).
- Unit Tests:** -.
- Duplications:** 0.0% (2.2k Lines).
- Duplicated Blocks:** 0.

A notification at the top indicates a new version of SonarQube is available for upgrade.

The screenshot shows the SonarQube interface displaying a specific issue. The issue is titled "Unexpected duplicate 'background-color'" and is located in the file `styles/ChatDisplay.module.css`. The issue is categorized as a "Bug" and is marked as "Major".

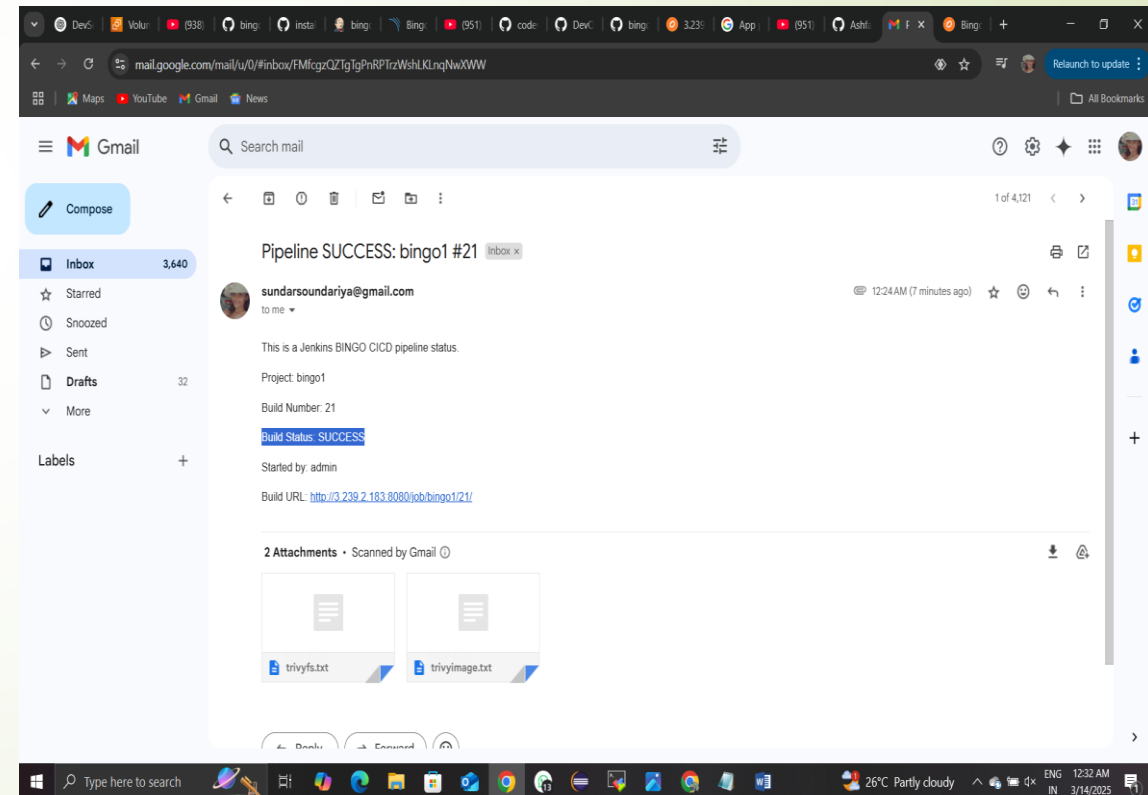
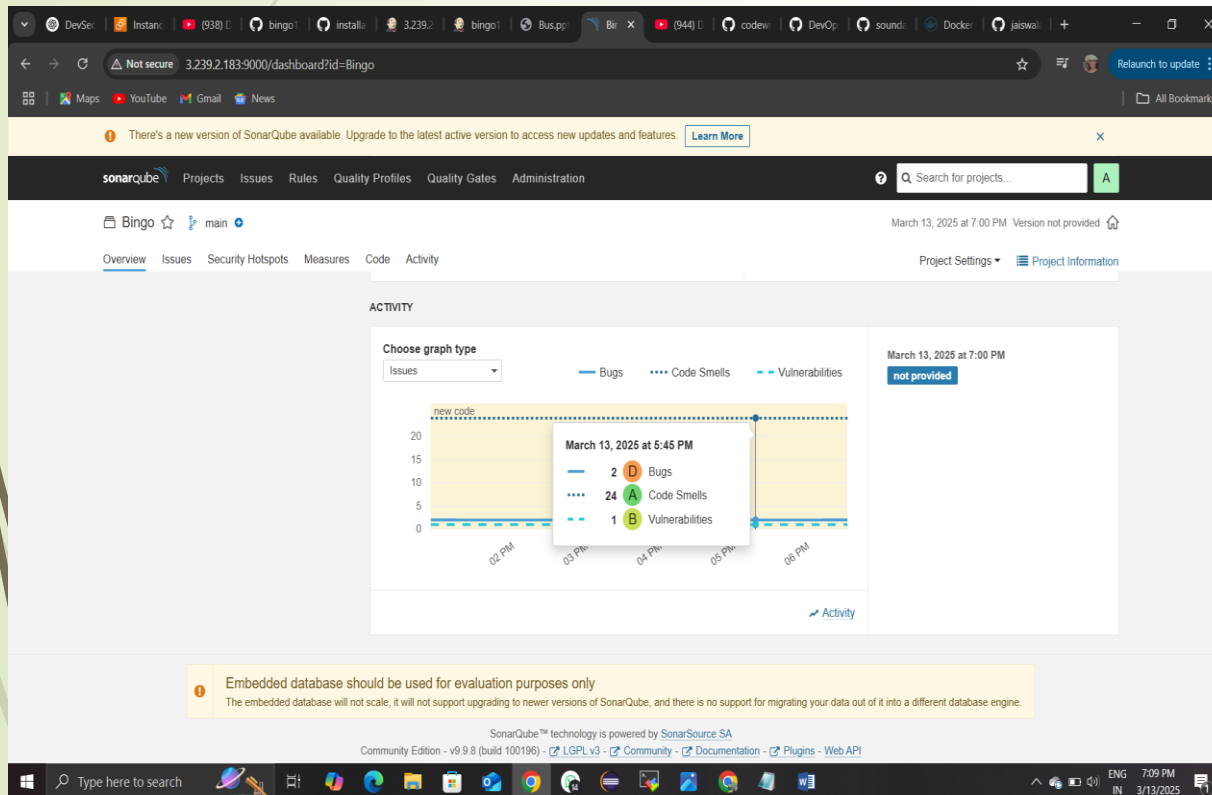
The issue details include a code snippet from `styles/ChatDisplay.module.css`:

```
3 background-color: #E5E5E5;
4 position: absolute;
5 background-color: #e5e5e5;
6
7 background-image: url("/dimension.png");
8 min-height: 100vh;
9 max-height: 100vh;
10
11 .test {
```

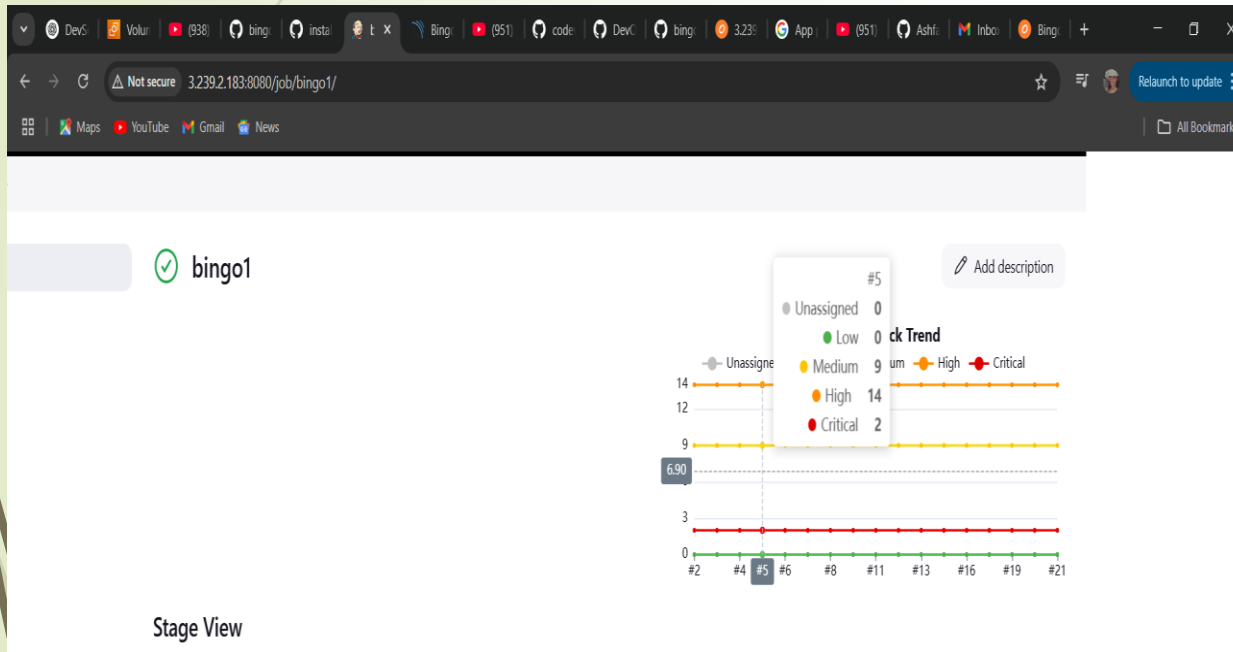
The issue is described as "Invalid type of comparison value." and is marked as a "Bug".

A note at the bottom states: "Embedded database should be used for evaluation purposes only. The embedded database will not scale, it will not support upgrading to newer versions of SonarQube, and there is no support for migrating your data out of it into a different database engine."

Steps To Follow



Steps To Follow



The screenshot shows the Amazon Elastic Kubernetes Service (EKS) console for the 'EKSHEMcluster'. The console displays the cluster's status as 'Active' and provides information about the Kubernetes version (1.31) and the support period (Standard support until November 26, 2025). The 'Cluster health issues' section shows 0 issues, while the 'Upgrade insights' section shows 3 issues and 1 critical issue. The 'Node health issues' section shows 0 issues. The console also includes tabs for Overview, Resources, Compute, Networking, Add-ons, Access, Observability, Update history, and Tags. The bottom of the console shows the API server endpoint and the OpenID Connect provider URL.

Amazon Elastic Kubernetes Service

EKSHEMcluster

Cluster info

Field	Value
Status	Active
Kubernetes version	1.31
Support period	Standard support until November 26, 2025
Provider	EKS

Cluster health issues: 0

Upgrade insights: 3 (green), 1 (red)

Node health issues: 0

Output

The screenshot shows a web browser window with the URL `1ae1ba8170b24c64b1c24829f84cd6-1486249681.ap-south-1.elb.amazonaws.com`. The page features the "Bingo!" logo and a form for creating a room. The form includes input fields for "Room ID" and "Your Name", an "Enter" button, and a "Create Room" button.

Bingo!

Room ID

Your Name

Enter

Create Room

