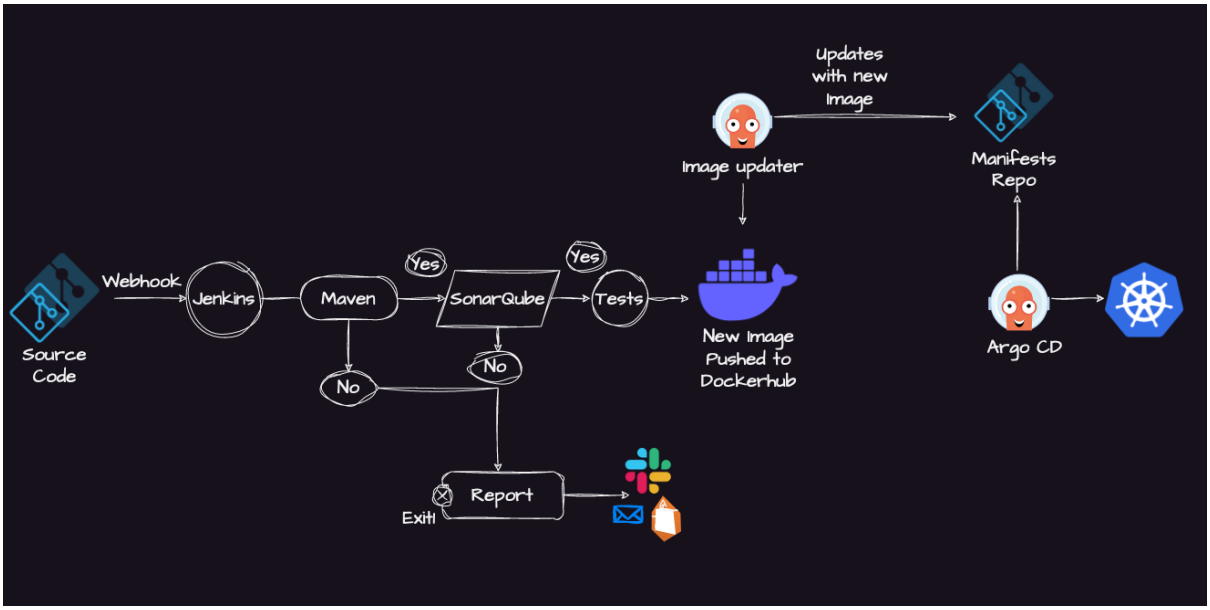
“End to End DevOps Pipeline with GitOps using ArgoCD on Kubernetes”



CI/CD Pipeline Workflow

✅ **Stage-wise Description:**

➢ **Continuous Integration (CI)**

- **Checkout**
  Fetches the source code from the main branch of the GitHub repository.
- **Build and Test**
  Navigates into the spring-boot-app directory and runs mvn clean package, which:
  - Compiles the code.
  - Runs unit tests.
- **Static Code Analysis**
  Uses SonarQube to analyze code quality.
  - Authenticates using a SonarQube token from Jenkins credentials.
- **Docker Image Build and Push**
  - Builds a Docker image from the Dockerfile located in spring-boot-app.
  - Tags the image using the current Jenkins BUILD_NUMBER.
  - Pushes the image to Docker Hub using stored credentials.

✅ **This marks the end of the CI phase — a tested, quality-checked, and packaged Docker image is now ready for deployment.**

➢ **Continuous Deployment (CD)**

- **Update Deployment File**
  - Replaces the placeholder <**replaceImageTag**> in the Kubernetes **deployment.yml** with the actual BUILD_NUMBER.
  - Commits and pushes this change back to the GitHub main branch using a GitHub token.
- **Argo CD Auto-Sync (Automated Deployment)**
  - Argo CD continuously watches the GitHub repository for changes in the YAML manifest (deployment.yml).
  - When it detects the updated image tag:
    - It **automatically pulls the change**.
    - **Applies the manifest to the Kubernetes cluster**.
    - **Deploys the new version** of your application as a pod.

🧰 Tools Used in the CI/CD Pipeline

🔧 CI (Continuous Integration) Tools

Tool	Purpose
GitHub	Source code hosting and triggering the pipeline via webhooks
Jenkins	Orchestrates the CI/CD pipeline using declarative pipelines
Maven	Builds the Java project, runs unit tests, and packages the artifact
SonarQube	Conducts static code analysis to check for code quality and security
Docker	Builds application images for containerized deployment

🐳 Containerization & Registry

Tool	Purpose
Docker	Builds Docker images from the application
DockerHub	Stores Docker images and makes them accessible for deployment

CD (Continuous Deployment) & GitOps

Tool	Purpose
Argo CD	GitOps tool that syncs Kubernetes state with the Git repository
Kubernetes	Container orchestration platform where applications are deployed

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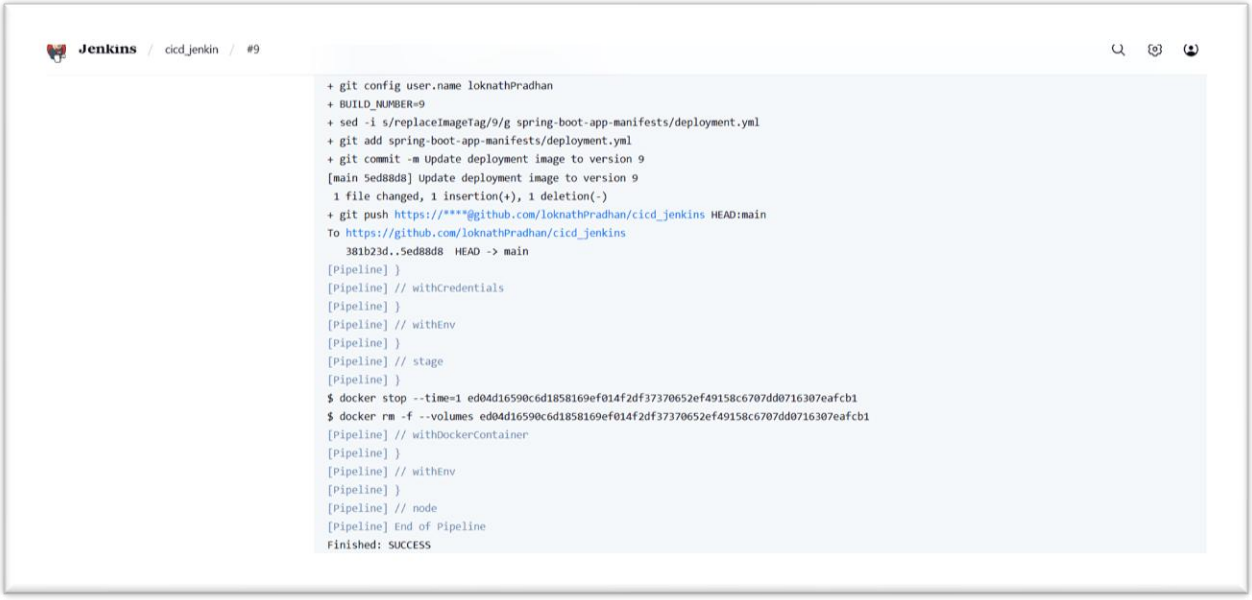
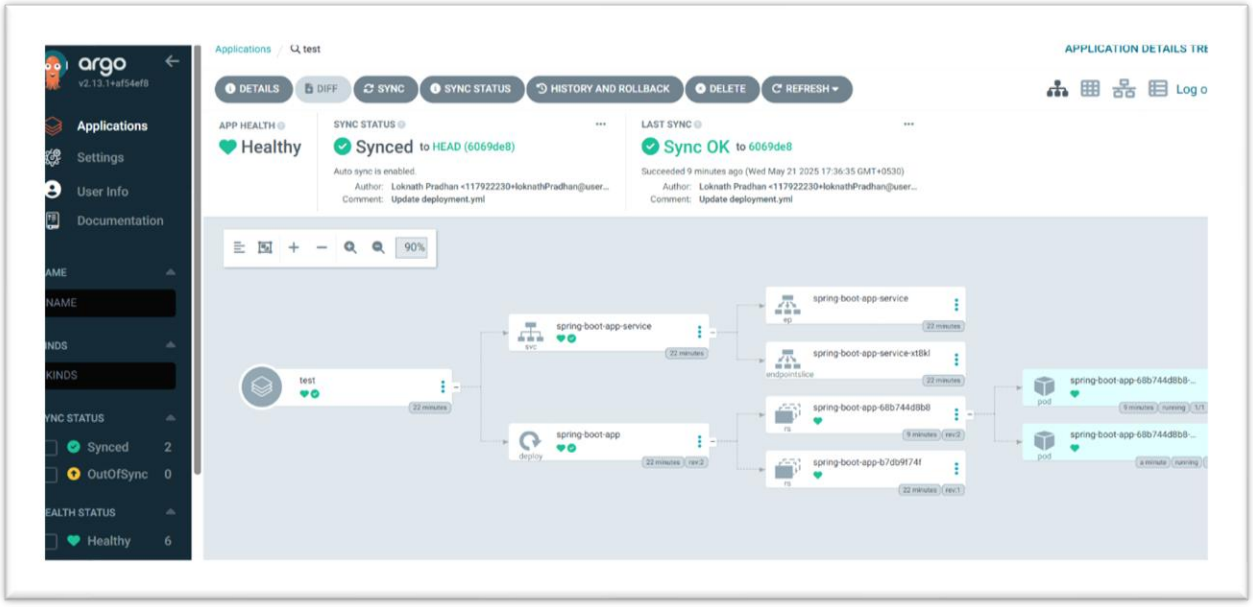
Security & Credentials

Tool/Method	Purpose
Jenkins Credentials Store	Stores secrets like SonarQube tokens, GitHub, and Docker credentials

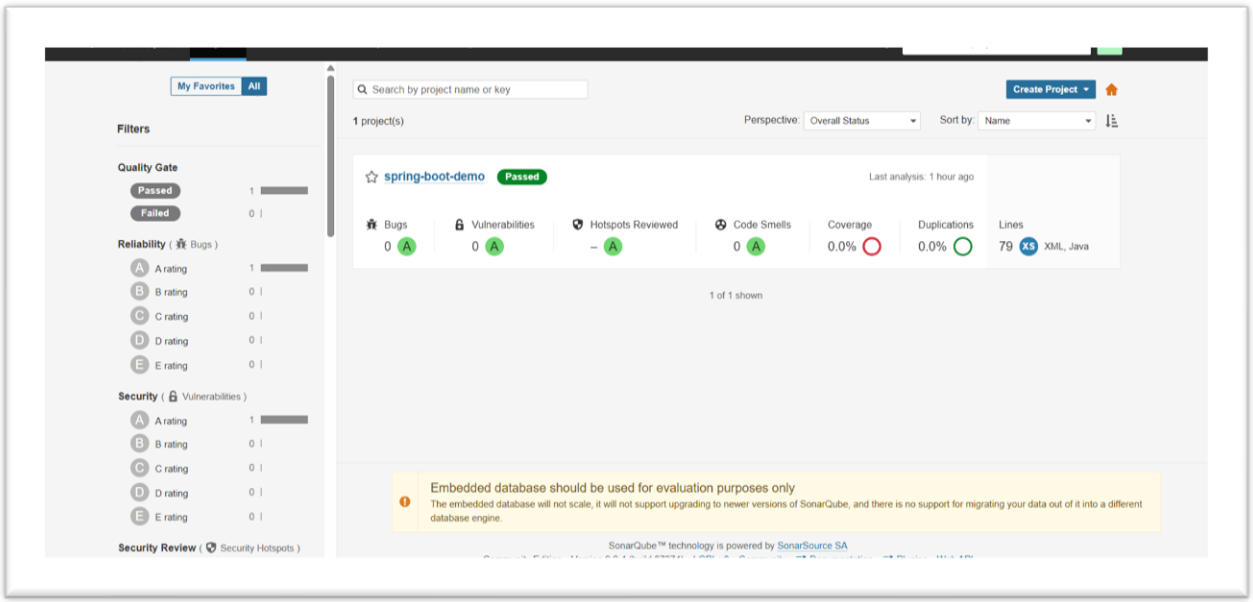
Pipeline Execution Result



ArgoCD



SonarQube - result



Folder structure