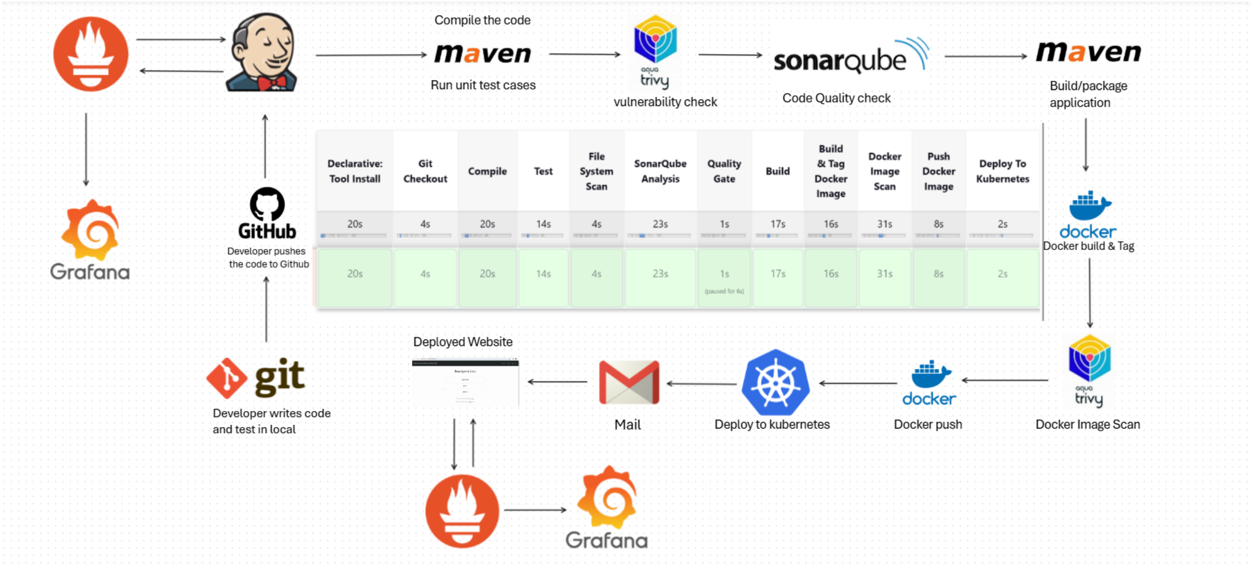
Synopsis: DevOps CI/CD Pipeline for Automated Deployment



Declarative: Tool Install	Git Checkout	Compile	Test	File System Scan	SonarQube Analysis	Quality Gate	Build	Build & Tag Docker Image	Docker Image Scan	Push Docker Image	Deploy To Kubernetes
20s	4s	20s	14s	4s	23s	1s	17s	16s	31s	8s	2s
20s	4s	20s	14s	4s	23s	1s (paused for 6s)	17s	16s	31s	8s	2s

Objective

This project aims to implement a fully automated CI/CD pipeline using Jenkins, Git, Docker, Kubernetes, SonarQube, Trivy, Prometheus, and Grafana. The pipeline ensures seamless code integration, testing, security checks, and deployment.

Pipeline Workflow

1. **Code Development & Version Control**
   a. Developers write and test code locally using Git.
   b. Code is pushed to a GitHub repository.
2. **Continuous Integration (CI)**
   a. **Jenkins** triggers the pipeline upon code push.
   b. **Maven** compiles the code and runs unit tests.
   c. **Trivy** scans for vulnerabilities.
   d. **SonarQube** performs code quality analysis.

3. **Containerization & Image Scanning**
    a. **Maven** builds and packages the application.
    b. **Docker** is used to build and tag container images.
    c. **Trivy** scans the Docker image for vulnerabilities.
4. **Continuous Deployment (CD)**
    a. The Docker image is pushed to a container registry.
    b. Kubernetes deploys the application using the latest image.
    c. Notification emails are sent upon successful deployment.
5. **Monitoring & Logging**
    a. **Prometheus** collects system metrics.
    b. **Grafana** visualizes monitoring data.
    c. Logs and performance data are analyzed to ensure system health.

Key Benefits

- **Automated Testing & Quality Checks**: Ensures high-quality, secure, and stable releases.
- **Scalability with Kubernetes**: Enables efficient deployment and management of containerized applications.
- **Security Integration**: Uses Trivy for vulnerability scanning.
- **Real-time Monitoring**: Prometheus and Grafana provide insights into system performance.

Conclusion

This DevOps CI/CD pipeline provides a robust mechanism for automating the software development lifecycle, ensuring faster, reliable, and secure application deployments.