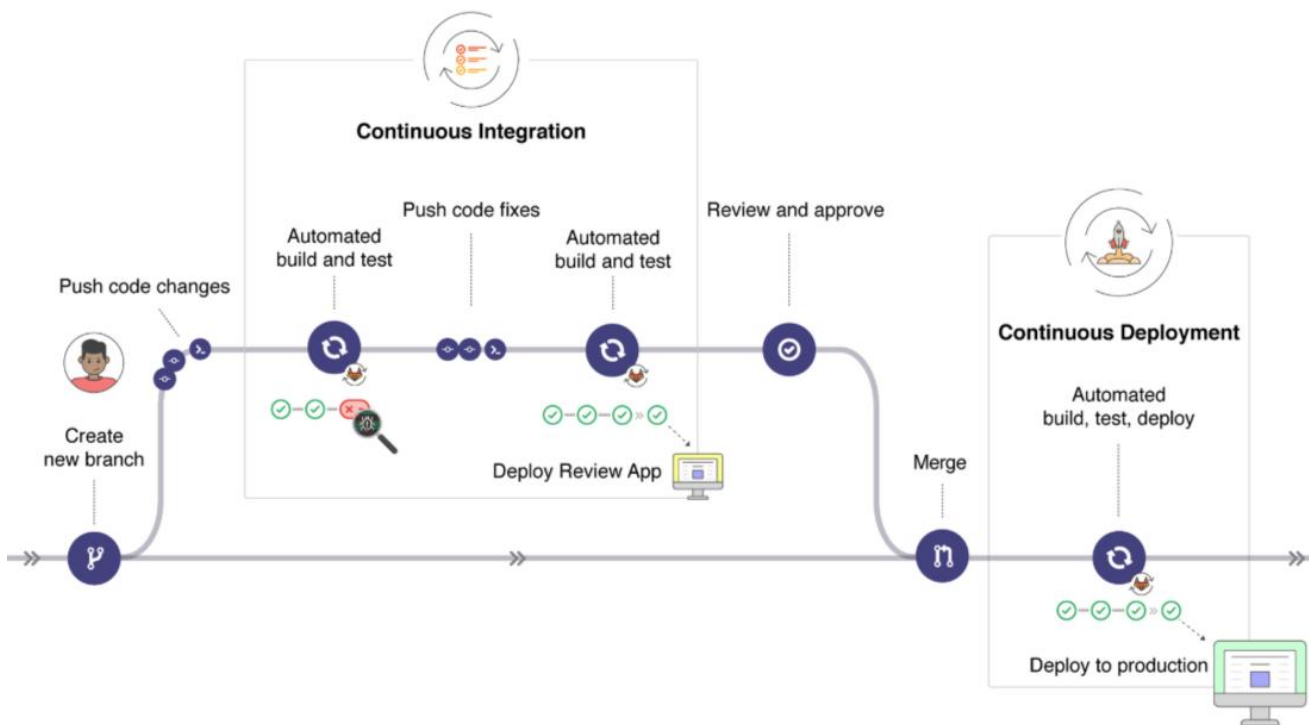


# CI/CD PIPELINES



## Continuous Integration (CI)

Continuous Integration is the practice where developers frequently integrate their code changes into a shared repository, often multiple times a day. Each integration triggers automated builds and tests.

### Key Aspects of CI

- **Automated Builds** – Every code push is automatically compiled into build artifacts.
- **Automated Testing** – Unit, integration, and regression tests run automatically.
- **Early Bug Detection** – Issues are identified at the development stage.

- **Collaboration** – Multiple developers can work on the same project seamlessly.

## Continuous Delivery & Continuous Deployment (CD)

After CI ensures that code is properly integrated and tested, the next step is deployment.

- **Continuous Delivery (CD):** The code is automatically prepared for release. Deployment to production requires manual approval.
- **Continuous Deployment:** Every change that passes automated tests is deployed automatically to production without human intervention.

## Benefits of CD

- **Faster Time to Market** – New features reach users quickly.
- **Reduced Risks** – Small and frequent releases lower the chance of failure.
- **Improved Quality** – Automated tests ensure stable releases.

## Typical CI/CD Workflow

A standard CI/CD pipeline consists of the following stages:

1. **Code Commit** – Developers push code to Git (GitHub, GitLab, Bitbucket).
2. **Build** – The application is compiled and packaged.
3. **Test** – Automated tests run (unit, integration, functional).
4. **Deploy** – Code is deployed to staging/production environments.
5. **Monitor** – Application health and logs are continuously monitored.

## Popular CI/CD Tools

There are many tools available to implement CI/CD pipelines:

- **Jenkins** – Open-source automation server, highly customizable.
- **GitHub Actions** – Integrated with GitHub repositories.
- **GitLab CI/CD** – Complete DevOps platform with built-in CI/CD.
- **CircleCI** – Cloud-based CI/CD with fast scaling.
- **Azure DevOps Pipelines** – Microsoft's CI/CD service.
- **AWS CodePipeline** – Managed CI/CD service by Amazon.

## Advantages of CI/CD Pipelines

- **Automation** – Reduces manual intervention.
- **Speed** – Faster feedback and quicker release cycles.
- **Quality** – Continuous testing ensures stability.
- **Collaboration** – Teams work together seamlessly.
- **Scalability** – Pipelines can handle small projects or large enterprise applications.

## Conclusion

CI/CD pipelines are essential in modern software development. They automate repetitive tasks, reduce errors, and accelerate delivery cycles. By integrating CI/CD into the DevOps process, organizations achieve:

- Faster delivery of high-quality software.
- More reliable releases with reduced risks.
- Enhanced collaboration between teams.

In today's competitive digital environment, adopting CI/CD pipelines is no longer optional—it's a necessity for businesses aiming to scale efficiently and stay ahead.