# CICD Benefits UdaPeople

# What is CI/CD

- CI (Continuous Integration) :-

The practice of merging all developers working copies to a shared mainline several times a day.

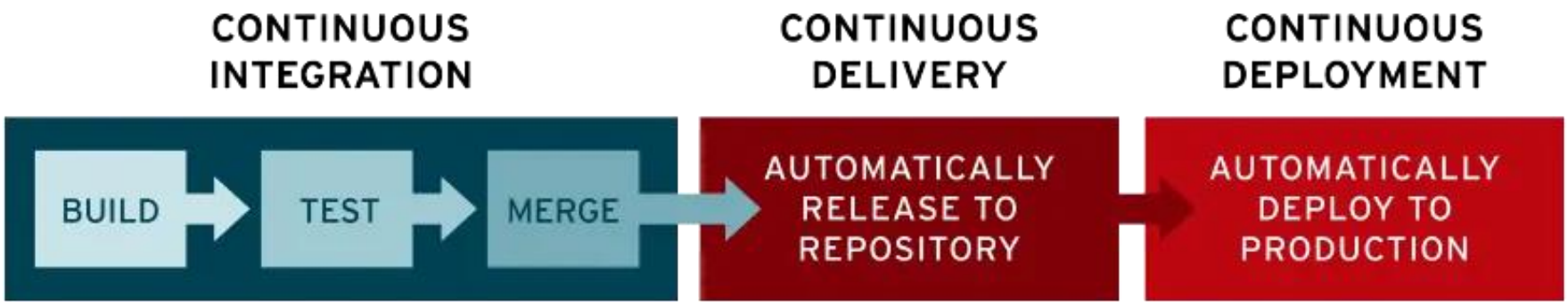
- CD (Continuous Delivery) :-

A developer’s changes to an application are automatically bug tested and uploaded to a repository (like GitHub or a container registry), where they can then be deployed to a live production environment by the operations team. It’s an answer to the problem of poor visibility and communication between dev and business teams. To that end, the purpose of continuous delivery is to ensure that it takes minimal effort to deploy new code.

# What is CI/CD

- CD (Continuous Deployment) :-

Refer to automatically releasing a developer's changes from the repository to production, where it is usable by customers. It addresses the problem of overloading operations teams with manual processes that slow down app delivery. It builds on the benefits of continuous delivery by automating the next stage in the pipeline.



# CI/CD fundamentals

There are eight fundamental elements of CI/CD that help ensure maximum efficiency for your development lifecycle. They span development and deployment. Include these fundamentals in your pipeline to improve your DevOps workflow and software delivery:

1. **A single source repository**
   Source code management (SCM) that houses all necessary files and scripts to create builds is critical. The repository should contain everything needed for the build. This includes source code, database structure, libraries, properties files, and version control. It should also contain test scripts and scripts to build applications.

2. **Frequent check-ins to main branch**
   Integrate code in your trunk, mainline or master branch — i.e., trunk-based development — early and often. Avoid sub-branches and work with the main branch only. Use small segments of code and merge them into the branch as frequently as possible. Don't merge more than one change at a time.

3. **Automated builds**
   Scripts should include everything you need to build from a single command. This includes web server files, database scripts, and application software. The CI processes should automatically package and compile the code into a usable application.

4. **Self-testing builds**
   CI/CD requires continuous testing. Testing scripts should ensure that the failure of a test results in a failed build. Use static pre-build testing scripts to check code for integrity, quality, and security compliance. Only allow code that passes static tests into the build.

# CI/CD fundamentals

5. **Frequent iterations**
   Multiple commits to the repository results in fewer places for conflicts to hide. Make small, frequent iterations rather than major changes. By doing this, it's possible to roll changes back easily if there's a problem or conflict.

6. **Stable testing environments**
   Code should be tested in a cloned version of the production environment. You can't test new code in the live production version. Create a cloned environment that's as close as possible to the real environment. Use rigorous testing scripts to detect and identify bugs that slipped through the initial pre-build testing process.

7. **Maximum visibility**
   Every developer should be able to access the latest executables and see any changes made to the repository. Information in the repository should be visible to all. Use version control to manage handoffs so developers know which is the latest version. Maximum visibility means everyone can monitor progress and identify potential concerns.

8. **Predictable deployments anytime**
   Deployments should be so routine and low-risk that the team is comfortable doing them anytime. CI/CD testing and verification processes should be rigorous and reliable, giving the team confidence to deploy updates at any time. Frequent deployments incorporating limited changes also pose lower risks and can be easily rolled back.

# Why CI/CD is important ?

CI/CD automates the process of integrating, releasing, and deploying software while removing traditional roadblocks. It supports the larger goal of agile methodology to accelerate the software development lifecycle, and it supports the DevOps approach of aligning development and operations teams.

- **Ship software quickly and efficiently**: CI/CD pipelines move applications from the coding to deployment phases at scale, ensuring that the pace of development matches the needs of the business.
- **Increase productivity**: By implementing automated processes, development and operations teams are no longer spending time merging, building, testing, releasing, and deploying software manually. Instead, they can focus on writing better code and monitoring deployments for issues.
- **Reduce risk on delivery**: Testing every change before it's deployed ensures that the result will be a higher quality product and lower the rate of bugs in production. Customers will receive a better product, and the development team will spend less time fixing urgent defects discovered after release.
- **Incorporate user feedback faster**: CI/CD removes traditional roadblocks for development and operations teams, enabling the faster release of new features to meet users' needs. This will increase customer satisfaction and provide valuable insights into the capabilities that users value for future projects.
- **Standardize processes**: Automating the merge, test, delivery, and deployment processes means that they will always follow the same structure. This standardizes the pipeline, whereas manual execution of these tasks always comes with the risk of human error, such as executing tests in a different order.