# Fundamentals and Benefits of CI/CD to achieve, build, and deploy automation for cloud-based software products

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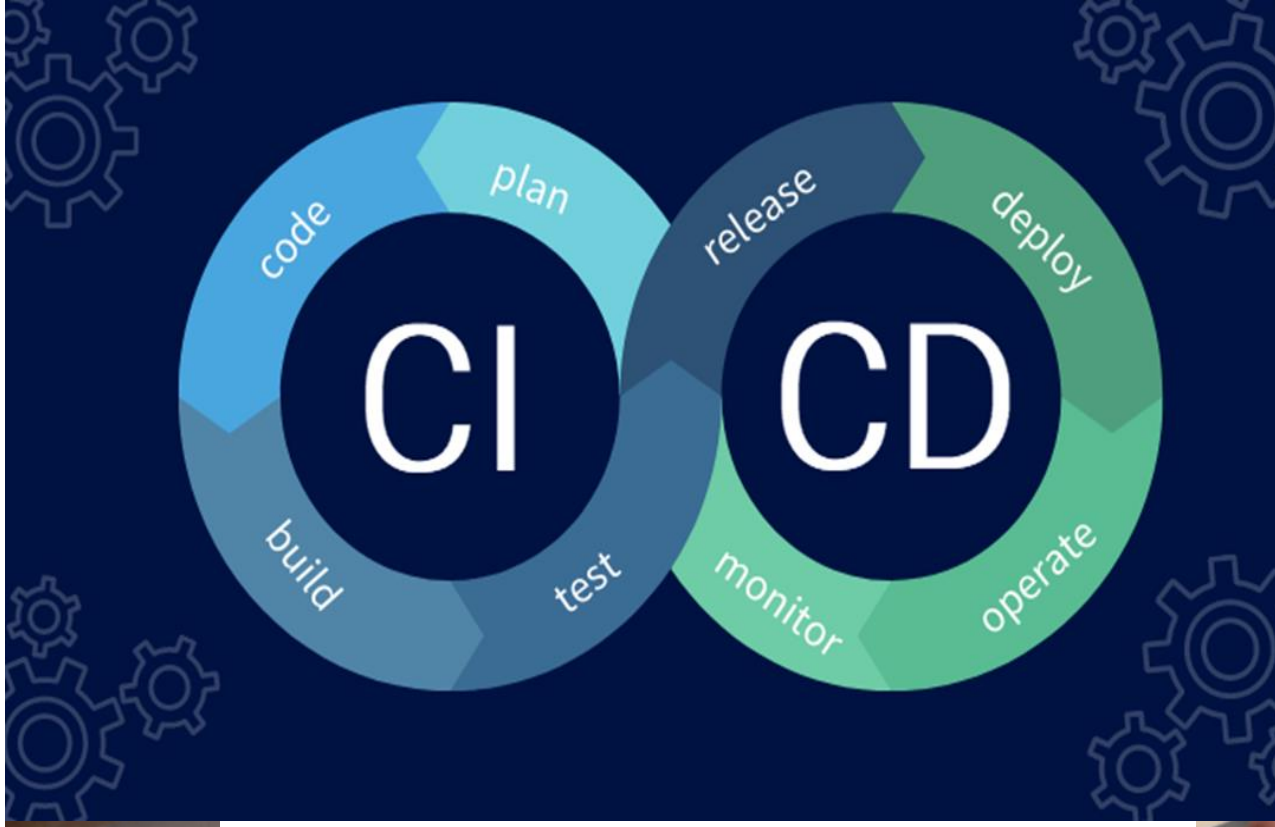
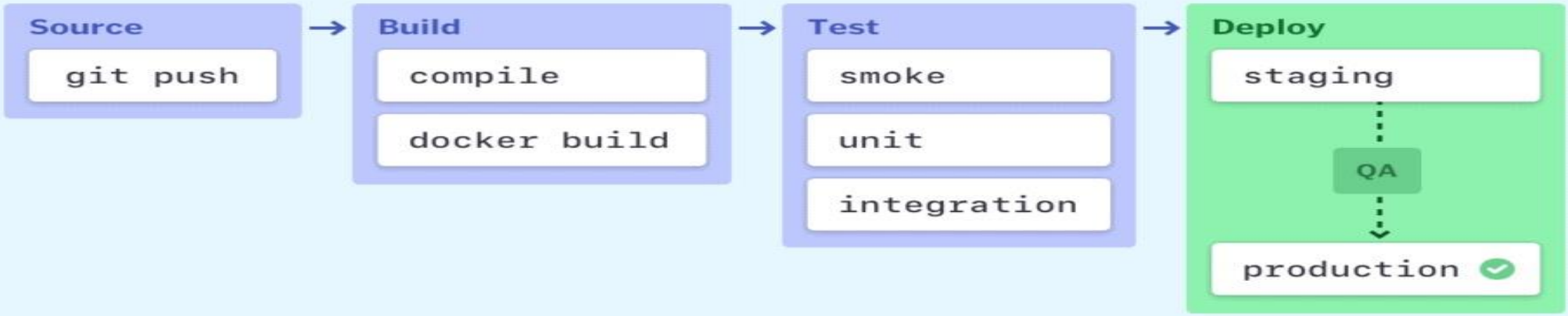
A CI/CD pipeline automates your software delivery process. The pipeline builds code, runs tests (CI), and safely deploys a new version of the application (CD).

Automated pipelines remove manual errors, provide standardized feedback loops to developers, and enable fast product iterations.




A CI/CD pipeline may sound like overhead, but it isn't. It's essentially a runnable specification of the steps that any developer needs to perform to deliver a new version of a software product. In the absence of an automated pipeline, engineers would still need to perform these steps manually, and hence far less productively.

Most software releases go through a couple of typical stages as seen above.
Failure in each stage typically triggers a notification—via email, Slack, etc.—to let the responsible developers know about the cause. Otherwise, the whole team receives a notification after each successful deployment to production.

# Benefits of Implementing a CI/CD Pipeline

- To stay competitive in the current market, companies strive release features as fast as possible. The platform that best enables these rapid release cycles is a seamless CI/CD pipeline.
- The pipeline consists of different sets of tools and frameworks that help developers, testers, operations teams, and other people involved in the project to deliver software to the end-users. It provides teams more opportunities to be agile and helps to increase the overall efficiency of the software delivery process.
- The groundwork for implementing a pipeline can be time-consuming and may involve a steep learning curve, but the benefits outweigh the time, cost, and effort spent on this endeavor.
- Let's look at five benefits of implementing a CI/CD pipeline to understand why many organizations have shifted toward this approach.
- ## 1. Reduce risk
- Finding and fixing bugs late in the development process is expensive and time-consuming. This is especially true when there are issues with features that have already been released to production.
- With a CI/CD pipeline, you can test and deploy code more frequently, giving testers the ability to detect issues as soon as they occur and to fix them immediately. You are essentially mitigating risks in real time.
- ## 2. Deliver faster
- Organizations are moving toward releasing features multiple times a day. This is not an easy task; only a handful of companies like Netflix, Amazon, and Facebook have been able to achieve this goal. But, with a seamless CI/CD pipeline, multiple daily releases can be made a reality.
- Teams can build, test and deploy features automatically with almost no manual intervention. This is accomplished using various tools, frameworks, and systems like Travis CI, Docker, Kubernetes, and LaunchDarkly.
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- ## 3. Expend less manual effort

- **To align with the shift-left paradigm, we need automation right from the start. This is also a vital component of having a successful CI/CD implementation. Once you build features and check in code, tests should be automatically triggered to make sure that the new code does not break existing features and that the new features are working correctly.**

- **After the tests run, the code gets deployed to different environments, including QA, staging and production. Throughout this process, you will be getting constant notifications through different channels, giving you plenty of information about the build, test and deploy cycles.**

- ## 4. Generate extensive logs

- **Observability is one of the biggest aspects of DevOps and CI/CD integration. If something is wrong, you need to understand why. You need a mechanism to study the system in production over time and identify key performance metrics. Observability is a technical solution that helps in this effort.**

- **One key aspect of observability is logging information. Logs are a rich source of information to understand what is happening beneath the UI and study application behavior.**

- **With a CI/CD pipeline, extensive logging information is generated in each stage of the development process. There are various tools available to analyze these logs effectively and get immediate feedback about the system.**

- ## 5. Make easier rollbacks

- **One of the biggest advantages of a CI/CD pipeline is you can roll back changes quickly. If any new code changes break the production application, you can immediately return the application to its previous state. Usually, the last successful build gets immediately deployed to prevent production outages.**

- **The world is moving toward rapid release cycles, and CI/CD pipelines have accelerated the release rate. With careful planning and implementation, such a pipeline can help you find defects faster, implement fixes immediately, and increase overall customer satisfaction.**