Fundamentals and Benefit Of CI/CD to Achieve, Build, and Deploy Automation for Cloud-Based Software Products (UdaPeople)

The DevOps culture of quick and frequent software releases relies heavily on automated continuous integration and continuous deployment/delivery (CI/CD) pipelines.

One important sign of DevOps maturity is the use of a CI/CD platform that automates testing, builds, and alpha/beta/production deployment. Only 38% of firms have fully implemented CI/CD processes and tooling into their DevOps systems, according to a mid-2020 survey by GitLab, one of the top CI/CD solutions.

A corporate necessity is now to reduce the time it takes for innovative new apps, features, and services to market. The transition from old software release cycles to CI/CD pipelines cannot be viewed as only an IT or operations issue, as is the case with any paradigm shift. Obtaining support for CI/CD adoption from a broad spectrum of stakeholders and business divisions is one of the keys to success.

A CI/CD Pipeline Primer

This is how we understand the many stages of the CI/CD process to make sure we're all on the same page:

- Continuous integration is the automated and seamless merging and testing of incremental code changes as they are committed to the central repository. CI ensures that the changes/additions are bug-free and don’t break the existing application.
- Continuous delivery is the hands-free preparation for release of code that has successfully made it through the CI pipeline. After automated alpha and beta testing in non-production environments, the code is then manually released to the production environment.
- Continuous deployment goes one step further and automates the deployment of code into the production environment.

When compared to historical software release cycles, where release testing is a laborious procedure that happens on a sizable codebase toward the end of the software development lifecycle, CI/CD represents a radical departure. The emphasis can be shifted to the regular release of incremental code batches, where new features and quick fixes can improve business results. According to the aforementioned GitLab poll, 60 percent of the firms who have used a CI/CD approach deploy often, often up to several times per day.

How CI/CD Captures Business Value

The following is a brief overview for business stakeholders of what CI/CD can contribute to their organization:

1. **Code is easier to manage and of better quality**: Managing smaller chunks of code on an ongoing basis makes it easier and faster to isolate problems (shorter MTTR) and reduces the risk of unintended consequences in the production environment. Automated tests can fix bugs immediately, often reducing the backlog of even non-critical issues. Also, end-users will be grateful for not being made involuntary members of your QA team.
2. **Shortens time-to-market for new products and features**: CI/CD lets the organization achieve maximum business velocity without compromising quality. Evolving end-user requirements can be addressed quickly, including on-demand releases. Both the accelerated time-to-value and the enhanced end-user satisfaction are significant competitive advantages.
3. **Creates fast feedback/failure loops:** A key CI/CD principle is that if something is going to fail, it should fail fast. With CI/CD, companies get immediate feedback from end-users on new functions and features and can respond accordingly. CI/CD also lends itself to rapid A-B testing, feature toggles and blue-green deploys of new production features prior to full release. If an update turns out to be problematic, it can be automatically rolled back with little to no downtime.
4. **Creates new communications channels within the organization:** CI/CD fosters a culture of agility and innovation throughout the entire organization. It also provides a platform for communications among developers, product managers, testers and operations admins. These teams can now collaborate seamlessly, with a sense of shared responsibility and within an environment that values responsiveness and initiative.
5. **Enhanced employee productivity and satisfaction**: Development, IT and operations teams welcome the automation of tedious repetitive tasks that often contribute to employee burnout. Thus, employees have more time for strategic initiatives that can move the business forward. Also, their enhanced productivity can reduce costs.
6. **Data-driven business decisions**: CI/CD produces a lot of valuable metrics across the entire software development life cycle, including continuous monitoring and observability data from the production environment. These metrics support data-driven business decisions regarding product roadmaps, infrastructure requirements, team performance and more.

Evaluation of CI/CD Value

Every year, $3 trillion is lost by businesses worldwide due to failed IT projects. There are various ways to fail, including not finishing something, being unable to release it, failing to properly satisfy company

needs, running over budget, and missing deadlines. Thus, the first quantifiable benefit of CI/CD pipelines is that they lower the risk and expense of IT failure by generating better code and well-targeted, highly accessible systems and products. Additionally, provisioning and testing operations are automated and optimized via CI/CD pipelines, which saves costs and decreases errors.

Business stakeholders can more precisely measure the value of CI/CD by keeping track of key performance indicators (KPIs) like deployment frequency and new request lead time, deployment failure rate, change volume and change request lead time, meeting availability and performance SLAs, mean time to recovery (MTTR), defect, escape rate and so on.

Conclusion

In an era of fierce competition for market share, staying ahead of the curve is essential. The jury is in and the verdict is clear — CI/CD pipelines accelerate DevOps maturity and deliver significant business value in terms of code quality, shorter time to innovation, fast feedback loops, better cross-team collaboration and enhanced productivity.

Everyone must view CI/CD as a strategic endeavor that necessitates spending money on infrastructure, hiring, training, and tooling.