Unlock the full potential of DevOps

How to integrate Oracle database development into your DevOps workflow for maximum agility

WHY IT'S CRITICAL TO BRING DATABASE DEVELOPMENT INTO THE DEVOPS WORKFLOW

Organizations today are under tremendous pressure to quickly deploy new software and updates to their production applications in order to cope with intensely competitive markets and the rapidly evolving technology landscape. To meet this challenge, more and more organizations are turning to DevOps — a set of practices that emphasize collaboration and communication between development, operations and other functional areas to enable the building, testing and release of software in a rapid and reliable fashion.

However, there is often one huge bottleneck in the otherwise agile DevOps workflow: database development. Because of the sensitive nature of production databases and the complexity of the database development process, database development has historically been separate from application development, and organizations have been largely unable to integrate it into their build automation processes. For example, they cannot easily integrate functional testing of Oracle PL/SQL code or schema compare and sync into the DevOps workflow, or implement scripts to physically deploy database changes. As a result, they have been unable to fully achieve their goals of faster release cycles and reliably high-quality code.

But it doesn't have to be that way. This white paper explores what DevOps is and the benefits it offers, as well as the key factors in successful adoption. Then it dives into the critical question of how database development can be integrated into your agile workflow, so you can unlock the full potential of DevOps.

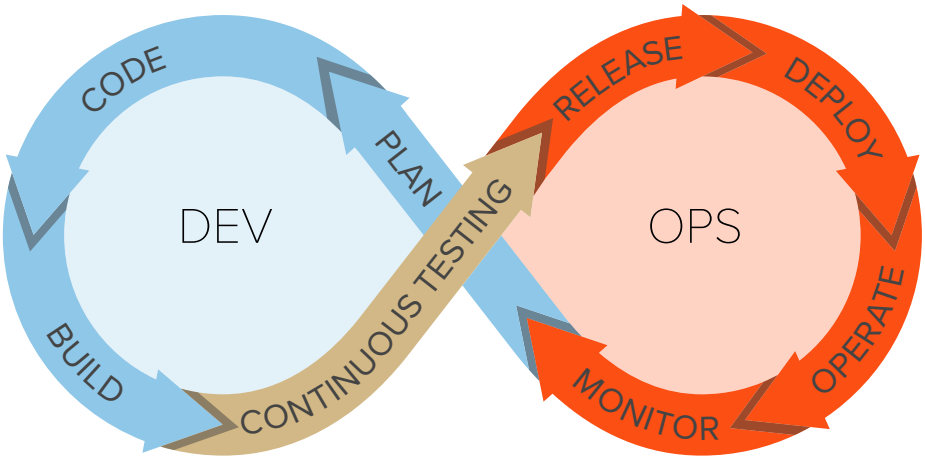

Figure 1. DevOps applies automation and strict monitoring throughout the development lifecycle to enable shorter development cycles and higher quality releases.

DevOps is best understood as a business initiative: to improve communication and collaboration among stakeholders in order to increase the speed and quality of software deployment.

WHAT IS DEVOPS?

Often, DevOps is described as a set of processes, such as continuous integration (CI) and continuous deployment (CD), or as a set of tools, such as Jenkins or Bamboo. However, these processes and tools are means to an end, not the end itself. DevOps is best understood as a business initiative: to improve communication and collaboration among stakeholders in order to increase the speed and quality of software deployment. To achieve these goals, DevOps requires cultural changes, automated processes and investment in the right technologies (see Figure 1).

Three of the most important terms in the DevOps world are the following:

- **Agile development —** A development methodology for releasing smaller sets of changes into production more frequently
- **Continuous integration —** A process in which check-in of code changes triggers an automatic build process to test and QA
- **Continuous delivery —** A process for releasing code into production automatically

WHAT BENEFITS DOES DEVOPS OFFER?

The successful implementation of a DevOps culture offers a wealth of benefits for both IT teams and the business, including these:

- More frequent software deployments
- Faster time to market for new features
- Shorter times between software fixes
- Better application quality and performance
- Better and faster response to deployment errors
- Increased operational efficiency
- Reduced risk
- Lower costs

The 2017 State of DevOps Report bears out these benefits. According to this survey of 3,200 people around the world in a wide range of industries, high-performing organizations that effectively utilize DevOps principles are able to ship code as the business demands (multiple deploys per day), while for low performers, deployment is significantly less frequent — somewhere between once a week and once a month. Similarly, lead time for changes (the time required to go from code commit to code successfully running in production) is less than an hour for highly effective teams, as compared to between one week and one month for low performers. And high performers' changes fail only 7.5 percent of the time — instead of 38.5 percent. Figure 2 illustrates these and other key statistics from this report.

Moreover, the survey found that an effective DevOps process enables organizations to automate significantly more

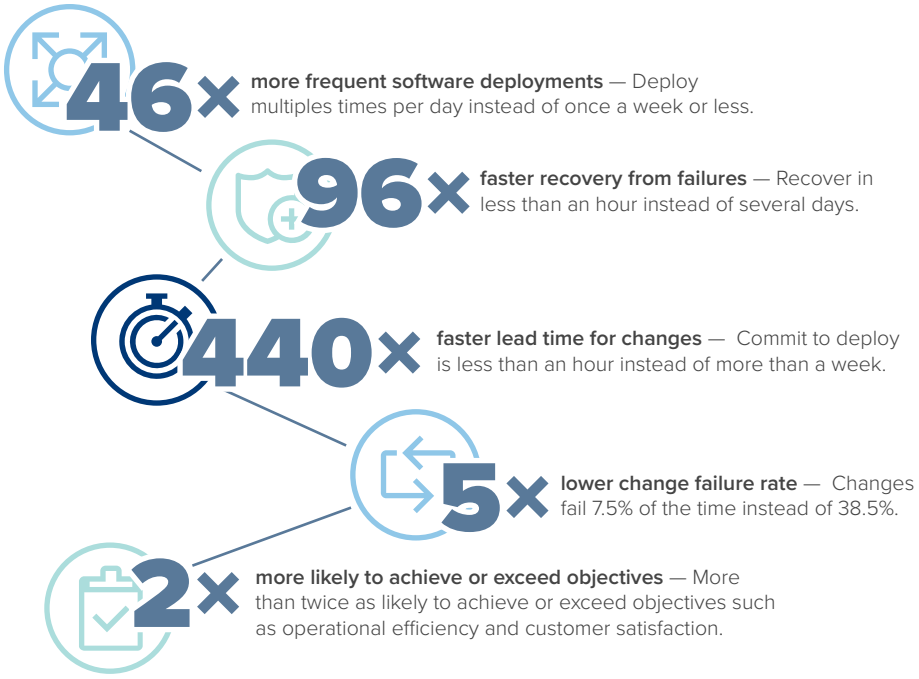

Figure 2. Organizations with high-performing DevOps teams report significant benefits in both development speed and code quality.

of their configuration management, testing, deployment and change approval processes. This reduction in manual effort enables both a faster feedback cycle and more time for innovation. As a result, they are more than twice as likely to achieve or exceed objectives like operational efficiency and customer satisfaction.

HOW QUICKLY ARE ORGANIZATIONS ADOPTING DEVOPS?

A 2016 survey of more than 1,000 IT professionals, conducted by Unisphere and sponsored by Quest Software, found that less than half of the respondents were currently using DevOps. But interest in the approach is clearly growing — more than a quarter of respondents indicated that they planned to use the DevOps approach within a year. Similarly, although only 10 percent of respondents said they were currently using DevOps on more than 75 percent of their projects, more than twice as many (25 percent) believe they will be doing so over the next two years.

The RightScale 2017 State of the Cloud Report pegs the adoption rate much higher, finding that overall DevOps adoption increased from 74 percent in 2016 to 78 percent in 2017, and noting that DevOps has become the default approach for developing cloud-based applications. It also reports that DevOps adoption is by no means limited to large organizations; while 84 percent of enterprises are adopting DevOps, so are 72 percent of small and medium businesses (SMBs).

With such strong adoption trends, it's no wonder that analysts are forecasting rapid market growth for DevOps tools. One analyst report predicts that the DevOps platform global market will grow at CAGR 19.42% through 2021. Similarly, another report expects the DevOps and microservices ecosystem to "grow globally at a robust CAGR 16% between 2017 and 2022, reaching $10 billion by 2021."

THE KEYS TO A SUCCESSFUL DEVOPS PROGRAM

Saying you have "adopted" DevOps is one thing; actually embracing DevOps practices across the organization is another. As noted in the introduction, DevOps emphasizes collaboration and communication across teams. Therefore,

A successful DevOps program can speed time to market, improve quality, and reduce effort and costs.

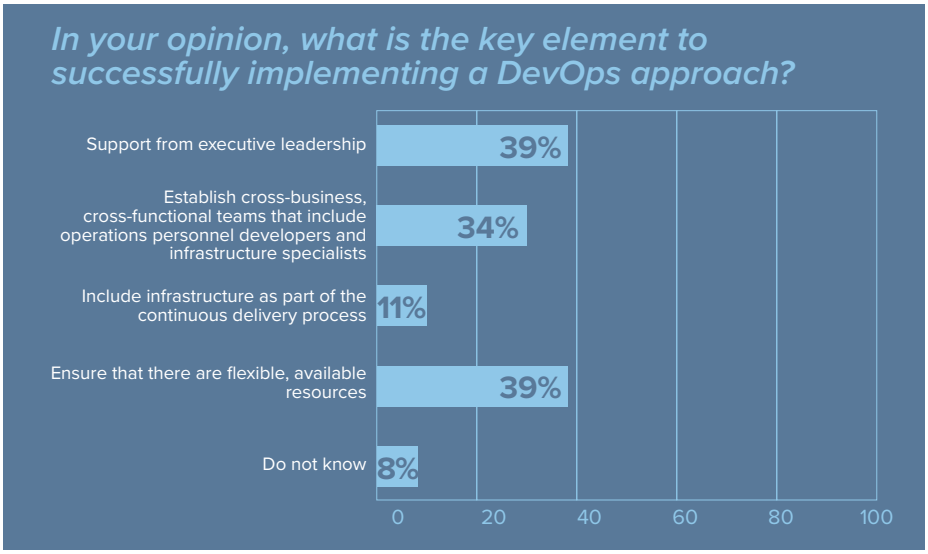

Figure 3. People — including both IT pros and executives — are the most critical element in a successful DevOps program.[1]

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Let's see what organizations that have actually been there have to say. Respondents in the Unisphere study cited earlier identified the following three keys to a successful DevOps program:

- People
- Processes
- Technologies

People

Many organizations today are siloed: Members of Individual teams, such as development or operations, work well with their group, but communication and collaboration between different teams is often both rare and difficult. Some IT pros extend the silo metaphor by saying, for example, that code is "thrown over the wall" from development to operations.

Breaking down these traditional boundaries requires a top-to-bottom commitment within the organization. In the Unisphere survey, three factors were cited nearly equally as the key element in successfully implementing DevOps:

- Support from executive leadership (39%)
- Flexible, available resources (39%)
- Cross-functional teams (34%)

In further interactions with companies that attended recent DevOps conferences, we discovered a new metaphor: There were many discussions regarding the use of "tribes" — groups of individuals in a given project team that include representatives from many functional teams (development, test, QA, operations, risk management, and so on) to streamline the delivery process. Many organizations have already made a start in this direction; 74 percent of respondents to the Unisphere survey said that their organization already had database developers and DBAs working together on the same team to facilitate application development.

Processes

The goal of DevOps is to enable the building, testing and release of software in a rapid and reliable fashion. Many application development teams already use source control and have reliable, repeatable processes for unit testing their code. But software applications often rely on a database back end — and the database development and release process often lacks the same automation

1 "The current state and adoption of DevOps" by Unisphere Research, September 2016. https://www.quest.com/docs/the-current-state-and-adoption-of-devops-white-paper-23548.pdf

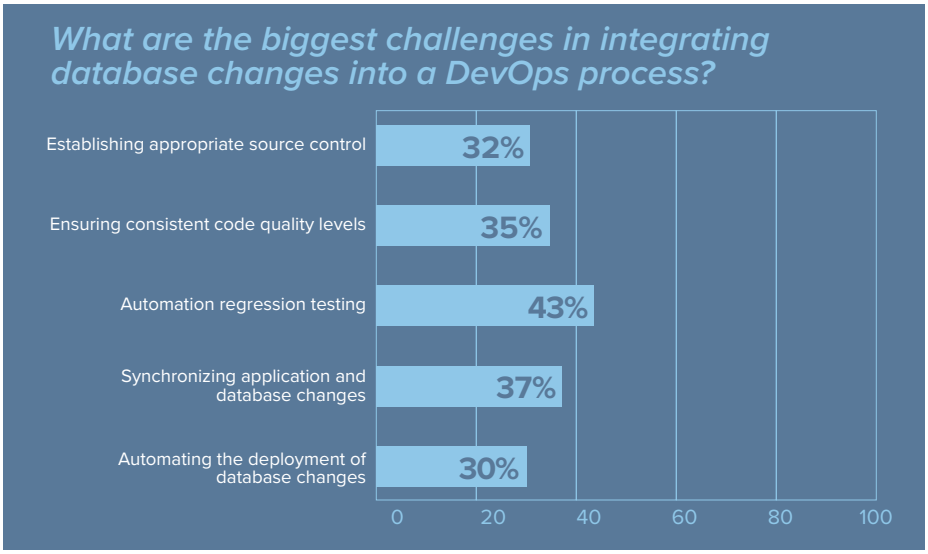

Figure 4. The top challenges in integrating database development into DevOps.

and standardization. A truly successful DevOps program must bring database development into the organization's existing automated processes.

The Unisphere survey identified multiple challenges in achieving this goal, as shown in Figure 4. The biggest one is enabling database developers to automate regressing testing. That's no surprise, since Oracle PL/SQL code in particular can be quite complex, often using advanced data types. Trying to perform unit testing on this code as part of existing application testing using technologies such as JUnit and Ruby isn't really viable; you need a dedicated PL/SQL testing solution.

Another one of the top challenges that respondents identified was ensuring consistent code quality. Static code reviews are traditionally very subjective and incomplete, and lack proper depth. An automated build process requires a rules-based approach that can be applied consistently across different code to ensure that it meets a minimum quality threshold.

Technologies

Of course, technology also plays a key role in successful DevOps adoption. Many application development teams already have a version control system (VCS) in place, as well as technologies to support continuous integration and continuous deployment (such as Jenkins, Bamboo or TeamCity). But since database teams typically lack those processes, they lack the ability to leverage these supporting technologies as well.

HOW TO INTEGRATE DATABASE DEVELOPMENT INTO DEVOPS

Using this experience of real-world organizations about the keys to a successful DevOps program, we can paint a clear picture of the ideal solution for achieving maximum DevOps velocity by integrating database development tasks.

The ideal solution will enable you to execute key database development tasks within your DevOps workflow. To do that without compromising quality, performance or reliability, those database development tasks really need to be callable functions. Specifically, the ideal solution will enable you to do all of the following as part of the automated build process:

- Test PL/SQL code against pre-defined requirements to ensure functional correctness
- Review PL/SQL code to make sure it meets standards for quality and maintainability

Many application development teams already have reliable, repeatable processes for code review and testing, but database development often lacks that automation and standardization.

Toad DevOps Toolkit enables you to maximize the velocity of your DevOps pipeline — without compromising quality, performance, or reliability.

- Perform database, schema and data compare and sync to ensure integrity and mitigate risks
- Generate change scripts to deploy build artifacts into target environment
- Visualize success/failure status

More broadly, the ideal solution will:

- Facilitate collaboration
- Help ensure project deadlines can be met across application and database deployment
- Boost productivity with minimal disruption to current DevOps processes
- Integrate into virtually any continuous integration and continuous delivery tool: Jenkins, Bamboo, Team Foundation Server (TFS) and more

CONCLUSION

With both the business environment and the technology landscape changing and growing rapidly, organizations need to be nimble. DevOps helps them increase both the speed and the quality of software deployment by improving communication and collaboration among stakeholders. But for too long, database development has been a huge speed bump in their otherwise agile DevOps workflows. Therefore, the key to realizing the full potential of DevOps is being able to execute key database development tasks within your DevOps workflow.

Only one solution gives you that power. Toad® DevOps Toolkit enables you to execute all of the key Oracle database development functions identified earlier within your DevOps workflow: code testing; code review; database, schema and data compare and sync; deployment of build artifacts; and visualization of success/failure status. As a result, you can maximize the velocity of your DevOps pipeline — without compromising quality, performance, or reliability.

Moreover, Toad DevOps Toolkit is simple to install and use, and runs on a Windows machine. It integrates with Jenkins, Bamboo, TFS and most other CI and CD tools. And it comes from the Quest® development team, who have a proven record of delivering stable, comprehensive, quality products. To learn more about Toad DevOps Toolkit, please visit quest.com/products/toad-devops-toolkit or join in with the Toad DevOps Toolkit community on Toad World at toadworld.com/products/ toad-devops-toolkit.

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