

# Building Your DevOps Engine:

A Guide To Tearing Down Organizational Silos to Create More Responsive Enterprise IT



## EXECUTIVE SUMMARY

Modern enterprise IT organizations must adapt to a number of radical changes in technology, user expectations and business objectives. DevOps — a new way of thinking about the relationship between Development and Operations — offers a solution to this challenge.

This white paper will give enterprise IT decision-makers a comprehensive overview of the DevOps model and the value it provides. It will look at the challenges modern IT organizations must address, why traditional IT processes are inadequate, and why DevOps represents a compelling alternative. It will also look at Rackspace's successful use of DevOps, and it will give IT decision-makers a set of recommendations for implementing DevOps within their own organizations.

## INTRODUCTION: WHAT IS DEVOPS?

There's a new approach to software development that is transforming the modern enterprise IT organization. It's a new way of working, of thinking and of doing business. It's an approach that has as much to do with process and culture as it does with tools and technology.

Welcome to the world of DevOps.

DevOps is an IT organizational model in which system administrators work side-by-side with developers in a single, coordinated, agile environment. DevOps brings together functions that once worked by emphasizing the role that communication, collaboration, and integration play

*DevOps breaks down organizational walls and promotes a fundamentally different way of solving IT problems*



in delivering solid, stable business applications. DevOps also breaks down organizational walls, and it promotes a fundamentally different way of solving IT problems.

This change has been a long time coming. The rise of cloud computing, and the pressures on enterprise IT to change how it works with business users, has forced both groups to rethink this approach.

In practice, DevOps requires developers to pay closer attention to deployment scripts, configuration files, load and performance testing, and other activities usually associated with an Operations group. Developers also pay more attention to how the code they write will perform in a distributed, cloud-based environment. It's an important and necessary evolution, as developers face more platform options than ever before and more pressure to build high-quality, user-focused applications that deliver immediate business value.

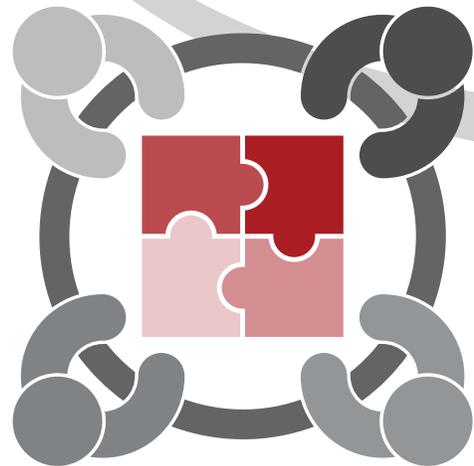
As the name suggests, however, DevOps is a two-way street: Operations gives the developers constant feedback, troubleshooting information, and other data from the production environment that shows how code performs in real-world conditions. Operations provides critical knowledge about an application's impact on the business and end-user experience, and it works hand-in-hand with Development to resolve problems and deliver a quality product. This allows each party to learn more about the other's job.

"DevOps is about building a support structure for collaboration between your Development and Operations functions so that you're now communicating more closely," said Brian Jawalka, Manager, Strategy and Architecture — Enterprise Cloud Solutions at Rackspace. "They're aligned to similar goals and really working toward the same outcomes. That means Operations gets a deeper understanding of what the applications requires, and developers understand how what they're doing impacts infrastructure. We believe that collaboration incites innovation, and DevOps is the key to making that possible."

**A new view of IT collaboration.** Agile methodologies (see sidebar) are key to being successful with the DevOps model. Combined, they can focus on rapid, incremental releases; gather feedback, correct problems quickly, focus on quick wins and move on to the next release cycle. Most IT organizations are already familiar with Agile methods and principles, and it's a logical next step to apply these methods to a single, tightly integrated DevOps process.

Yet DevOps is not simply another exercise in Agile methods. It is also a major cultural shift for many IT organizations. It requires Developers and Operations specialists to rethink their day-to-day working relationships. **DevOps also demands strong leadership from IT executives who are committed to breaking down the silos that used to separate Development and Operations.**

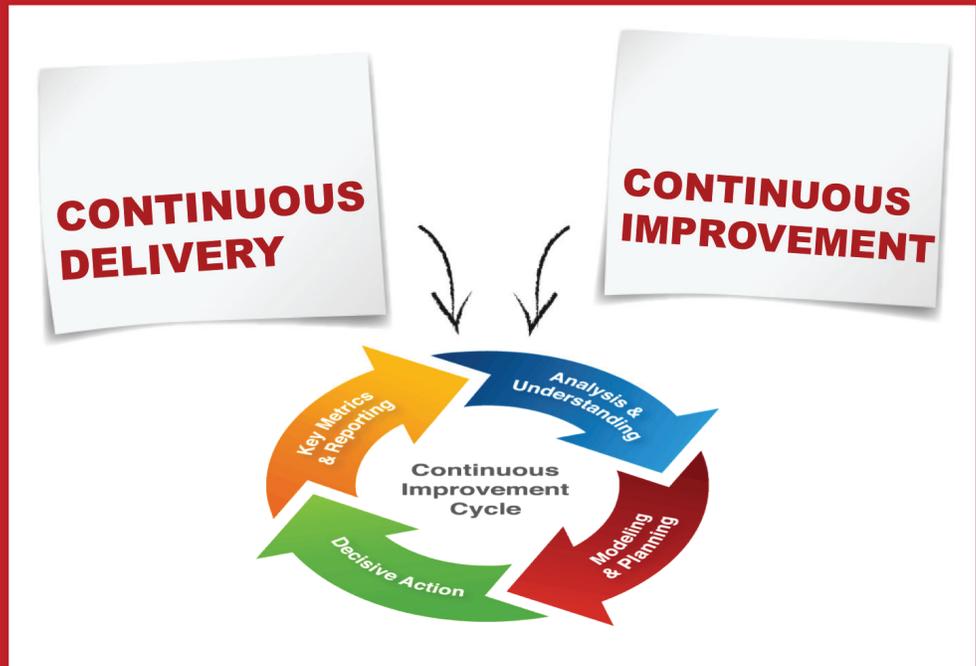
*DevOps is not simply another exercise in Agile methods. It is also a major cultural shift for many IT organizations.*



This white paper will explore the evolution of DevOps and the IT challenges that it is designed to address. It will also explain the relationship between the cloud computing revolution and the DevOps model, and how both contribute to a new business model for today's enterprise IT organizations. Finally, we will look at Rackspace's approach to DevOps and discuss some key lessons that other IT organizations can adapt to their own DevOps initiatives.

## How Rackspace Turns Shadow IT Into An Opportunity

Agile software development uses an iterative and incremental approach to development. It is heavily focused on collaboration, including taking advantage of cross-functionality to bring together complementary skill sets and multiple points of view. Whereas previous development models took a highly structured and siloed approach to projects, Agile methods create a continuous feedback loop allowing IT organizations to spot and address potential problems before they impact the development process.



## THE EVOLUTION OF DEVOPS

Traditionally, software development and IT operations weren't just different jobs. They were different organizations with their own goals, priorities and points of view:

- **Developers embrace change.** In fact, developers often encourage change by constantly looking for new and better ways to do things, and they embrace new tools and platforms. This approach encourages innovation, but it often plays down objectives such as scalability, reliability and repeatability.
- **Operations focuses on stability.** A system administrator gets paid to keep things running and protect the business against unplanned downtime. While Operations professionals aren't opposed to innovation, they are wary of changes that introduce uncertainty and risk.

Development and Operations don't just have different priorities. They use different tools and methodologies;

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production environments are often very different than those used for development and QA activities. Developers and sys admins report to different managers, and in many cases they even work at different locations.

## The traditional approach to writing and running code.

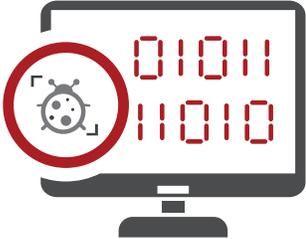
What happens when these two groups go through a traditional application release cycle? The process often looks something like this:



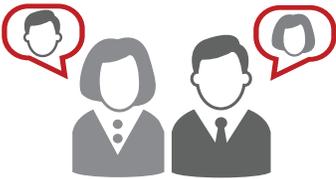
1. Developers write and test new code in their Dev/QA environment. When it's ready, they toss it "over the wall" to Operations to deploy.



2. Operations discovers that the deployment scripts and configuration files do not work in the current production environment. They're forced to make a number of unplanned changes to adapt the release for production use.



3. Some of these changes crash production systems when they're deployed, and there's a mad scramble to fix the deployment and get things running again.



4. Each side blames the other for yet another painful, time-consuming release cycle.

"Developers build the application, and then it gets tossed over the fence for the Operations to run, but there's little communication," said Jawalka. "Developers say 'I'm going to write whatever is most efficient for us to write,' and Operations doesn't have a deep understanding of the application."

*Thanks to cloud computing, Development and Operations teams feel growing pressure to rethink their approach to collaboration, to align their goals and priorities, and to adopt shared toolsets.*

## COPING WITH CHANGE IN TODAY'S ENTERPRISE IT ORGANIZATION

When virtualization technology came on the scene a little over a decade ago, this dynamic between Development and Operations shifted.

Operations could consolidate physical computing assets for more efficiency. Virtualized platforms also made it easier for Development and Operations to build and deploy applications in more standardized environments. Because the virtualization layer only impacts infrastructure, not the development platform, Development and Operations remained islands.

With the introduction of cloud computing, three unique traits were added to the enterprise IT mix: a new application platform, a new model for consuming IT services, and a foundation for new business models. Now, Development and Operations are rethinking their approach to collaboration, to align their goals and priorities, and to adopt shared toolsets.

In the cloud, the entire infrastructure stack, from storage to networking to servers, can be virtualized. Software plays a vital role in managing these virtual environments. As a result, the entire IT organization must take collective ownership of managing this automation. “Many of the traditional Operations activities have to be built into the code,” observes Jawalka in assisting Rackspace IT with their cloud transformation.

**Changing the business of enterprise IT.** User expectations are rising; they need applications to evolve quickly and to deliver new features almost on demand. IT organizations have the opportunity to evolve from cost centers into business enablers. To do so, enterprise IT must:

- Learn how to become a service provider to its business users;
- Move quickly — in many cases instantly — to meet changing business requirements;
- Enable a self-service approach to selecting and provisioning IT services;
- Create security “guard rails” for a self-service approach to IT through the use of service catalogs;
- Do more with less, even as the demand for IT services continues to increase.

Accomplishing this transformation requires a new approach to how Development and Operations collaborate using shared goals and methodologies: the DevOps model.

## HOW DEVOPS ACCELERATES APPLICATION DELIVERY

How can DevOps make it possible for an enterprise IT organization to evolve and adapt to this new reality? Here are some key considerations for Development and Operations:

- **Scalable applications.** It’s no longer enough to develop and test applications using a single-server environment. Applications must be able to scale in distributed environments with hundreds or even

*Faster release cycles, combined with massively scalable cloud environments, demand the ability to automate every aspect of the release process.*



thousands of servers; the ability to deploy these applications must be automated, reproducible and programmatic.

- **Stateless applications.** Stateful applications, able to retain session data within the application regardless of what infrastructure serves the application, are difficult to scale, often lack portability and require more network bandwidth to operate. This requires the ability to manage user sessions — and maintain a high user experience — across virtualized, multi-server environments.
- **Continuous learning.** It’s not enough for Development and Operations to agree to work together. They must also agree on the processes for experimentation and continuous improvement in delivering new applications and deploying updates to existing applications. DevOps works together to select and implement which platforms provide the best foundation for key activities — such as automation and self-service delivery models.

- **Platform-based development.** Platform as a service (PaaS) cloud computing services provide the entire infrastructure — from hardware and operating systems to databases and middleware — required to develop and run applications. Developers can build applications faster and cheaper using a platform-based approach, but doing so requires the right tools and the right understanding of how to adapt their code to a PaaS environment.
- **Automation.** Faster release cycles, combined with massively scalable cloud environments, demand the ability to automate every aspect of the release process. Tools such as Puppet and Chef eliminate manual processes and replace them with simpler, standardized and highly repeatable software deployment methods.
- **Scripting and coding.** Many system administrators are already comfortable using tools like Perl- a tool that was actually developed as a programming language for automating system administration. Today, the ability to use a wide range of scripting and coding tools is even more important, given the role these play in automating software release cycles and creating scalable IT management processes.
- **Infrastructure via APIs.** Infrastructure APIs give Operations a standard framework for provisioning and configuring cloud-based infrastructure components. By offering access to these components, infrastructure APIs simplify the process of deploying and managing cloud-based applications allowing programmatic changes to the infrastructure.

As Jawalka points out, all of these considerations serve a single purpose. “Within our group, we found that in order for us to build truly cloud-aware applications, many of the usual things that are considered by the typical applications support team post-deployment would have to be factored into the design of the code itself,” he said. “This includes self-provisioning, auto-scaling, self-healing and recovery, and API-based monitoring mechanisms. In order to factor all of these capabilities into the design of the application,

*The Rackspace IT story offers a great example of why DevOps is so important to transforming the business of enterprise IT.*



you need a very high degree of collaboration and integration between the Development and Operations.”

“We’re not necessarily saying that the developers are now running infrastructure or the infrastructure guys are writing code,” added Jawalka. “But there’s awareness and understanding of how they work together.”

## DEVOPS IN ACTION AT RACKSPACE

The Rackspace IT story offers a great example of why DevOps is so important to transforming the business of enterprise IT. Rackspace IT also faced challenges around serving a fast-growing business using a traditional dedicated infrastructure model, along with a traditional division of labor between separate Developer and Operations groups.

This model left Rackspace IT at a disadvantage for several reasons:

- It had a limited ability to deploy software releases; each release cycle was a separate process that might require months to complete.

- The release process did not scale effectively, relying heavily on manual, non-standard processes.
- The resulting long lead times hindered Rackspace's ability to innovate and to compete in a fast-moving business environment.
- Heavy CapEx expenditures were consuming scarce resources and limiting investment in potentially promising new applications.

*"We're now able to do releases every hour. Instead of a single new release every month, we're doing 15 releases a day to our public cloud."*

– Brian Jawalka, Manager, Strategy & Architecture  
Rackspace Enterprise Cloud Solutions

A shift to a DevOps model played a critical role in allowing Rackspace IT to reposition itself as a business-focused organization and to use the Open Cloud as a platform for innovation. This included:

- Adopting a continuous delivery model that supports fast, incremental software releases, as well as constant feedback on software functionality and features.
- Deploying new cloud-based services almost instantly, enabling a self-service IT model.
- Driving down IT delivery costs with a utility pricing model.

"We're now able to do releases every hour," said Jawalka. "Instead of a single new release every month, we're doing 15 releases a day to our public cloud. We're improving the

quality of our applications, moving more quickly to address new business needs and ultimately delivering a better product to our customers. All of this is possible because of the collaboration that is really enabled through DevOps."

According to Jawalka, the shift to DevOps is critical to the company's long-term success. "Rackspace is growing at a tremendous pace. IT is an enabler — we need to keep up with the business and help drive growth," he explained. "The traditional model was really not adequate for us to keep up with the company's business needs. We had to get to a model where we could go from, say, doing a [release] drop a week to multiple drops a day. Now, we are partnering with the business and getting instant feedback."

## DevOps In Action: The View From The Trenches

Some of the strongest endorsements of the Rackspace DevOps model come from the IT professionals charged with implementing it. "From a day-to-day perspective, we get a much better sense of the project goals we're working towards — not just the application requirements, but the impact on users and the business as a whole," said one Rackspace developer. "There's also a huge productivity impact, since we're sitting with the folks that deploy and support our code, and we get a much better understanding of what it takes to put code into production."

A Rackspace Operations specialist offers a similar perspective on the DevOps process. "The amount of time and effort required to implement any new feature using our old model was frustrating," she explained. "There was a lot of wasted time just trying

to communicate about deployment issues and code revisions. When we're in the same room and part of the same goal, it's much easier to share insights about things like deployment and application configuration choices, and to work together to address those issues, rather than taking a them-versus-us attitude.

DevOps can boost both employee morale and work culture — two major concerns for front-line IT staff. "DevOps isn't just a process — it's an attitude," said another Rackspace developer. "We see the real-world impact of what we do, and we're freed up to take action and get results — not just argue about where to put the blame when something goes wrong. There's too much of that happening in some IT shops, and it's hard to explain how good it feels to find a better way."

## BUILDING YOUR DEVOPS ENGINE: KEYS TO SUCCESS

A growing number of enterprises understand how DevOps works in theory, but what does it take to run a successful DevOps model in practice? The Rackspace IT team found several considerations that stand out:

**Set a long-term strategy.** “In my opinion, this is the number one thing necessary for success,” said Jawalka. “Where do we want to be in 12 or 18 months? Without that, we don’t have a way to outline a roadmap or to start working on organizational alignments.”

**Focus on organizational alignment.** According to Jawalka, the most successful DevOps models focus on organizational issues, including leadership. “They have Operations and Development functions that are really all reporting to the same managers,” he said. “They’ve split up Operations so that they have a few Operations personnel on each Development project, allowing them to share knowledge and really foster collaboration.”

Mark Majewski, Architect, Enterprise Cloud Solutions at Rackspace, added that successful DevOps make collaboration a part of their organizational DNA: “It’s not just the cross-pollination of talent but that cultural mind shift, that willingness to share experiences.”

**Leverage internal talent.** Does your IT organization need to acquire the talent required to implement a



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DevOps model? According to Jawalka, it’s often easier and more efficient to identify members that already have the right skills to build a DevOps engine. Server and storage infrastructure support personnel, for example, are probably already well-versed in the scripting, configuration management and automation skills required to drive the “ops” side of DevOps.

**Create a continuous feedback loop.** In order to support continuous delivery and integration of applications, DevOps must also put the processes in place to collect and apply feedback – and not just from IT staff. “We want to have feedback from the business users,” said Jawalka. “We put the tools and processes into place to enable continuous integration and delivery so that we can have that instant feedback from our customers.”

### Building Your DevOps Toolbox

**Over the past few years, a variety of new tools have emerged that are ideal for DevOps environments. Examples include:**

- Configuration management: Puppet, Chef
- IT infrastructure monitoring: Nagios
- Cloud infrastructure management: Enstratus, Rightscale
- Continuous integration: Jenkins, Hudson
- Performance management and monitoring: New Relic
- Network investigation and debugging: Netcat
- Version control system: Git

## CONCLUSION: WHAT WILL YOUR ORGANIZATION ACCOMPLISH WITH DEVOPS?

Cloud computing gives your enterprise IT organization the ability to rethink how it serves and adds value the business. DevOps, in turn, makes it possible to build software development, deployment and improvement processes that take full advantage of the cloud's efficiency and productivity benefits.

In fact, according to Majewski, DevOps is an essential piece of a cloud-enabled IT business model. "It's a mind shift around not only how applications and services are consumed, but also around how the infrastructure itself operates and how the applications interact with that infrastructure." Without DevOps to provide a foundation for this shift, it's impossible for IT organizations to realize the full value of cloud computing — or to meet the growing expectations placed upon them by their business users.

Find more DevOps-related resources from Rackspace:

- [DevOps Blog](#) — DevOps-related information and insights
- [Rackspace Developers Center](#) — Tools and guidance for developers using Rackspace products
- [Preparing for Dev/Ops Success](#) — Webinar and presentation on building your DevOps engine
- [Rackspace Open Cloud Community](#) — Connect with other technophiles to get advice, share your genius, or solve problems
- [Enterprise Cloud Services resources](#) — Whitepapers, videos, and webinars around managing enterprise cloud management

*DevOps supports a software development, deployment and improvement process that takes full advantage of the cloud's benefits.*





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### About Rackspace Enterprise Cloud Solutions

Powered by an elite team of Sr. IT Strategists, Architects, Solution Engineers and Sr. IT Consultants, the Rackspace Enterprise Cloud Solutions enables enterprises to harness the power of the hybrid cloud. Our extensive **Advisory & Professional Services** portfolio offers end-to-end solutions for our customers. Begin your Fanatical Support® experience with a complimentary **IT Evolution Workshop**, where our strategists help to define a cloud strategy and actionable roadmap that will propel your organization toward its optimized solution. Contact us at 1-800-440-1249 or send us an email at [advisory\\_services@rackspace.com](mailto:advisory_services@rackspace.com) to schedule your workshop today.

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