

WHITEPAPER

DRIVING INNOVATION WITH PLATFORM-AS-A-SERVICE

Enabling developers, operations, and businesses

Gordon Haff

“The majority of CEOs believe that investments in digital technologies have created value for their business, and around 80% say that mobile technologies and data analytics are key strands of their strategy.”

PWC 18TH ANNUAL CEO SURVEY
JANUARY 2015

[HTTP://WWW.PWC.COM/GX/EN/
CEO-SURVEY/2015/ASSETS/PWC-
18TH-ANNUAL-GLOBAL-CEO-SURVEY-
JAN-2015.PDF](http://www.pwc.com/gx/en/ceo-survey/2015/assets/pwc-18th-annual-global-ceo-survey-jan-2015.pdf)



facebook.com/redhatinc
@redhatnews

linkedin.com/company/red-hat

redhat.com

EXECUTIVE SUMMARY

It's a digital world and you're going to have to provide software services, whether to service the internal needs of your business or the demands of your customers. Doing so isn't optional. The effective use of technology delivers business value.

The underpinnings of computing infrastructure, as well as how applications are developed and operated, are changing dramatically. Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), containers, cloud management platforms, more distributed and decoupled application architectures, a culture and process for more rapid and iterative application development – these rapidly moving technologies and approaches are coming together as a new type of “fast IT”¹ that increasingly complements the still-important classic IT infrastructures on which organizations depend. In this paper we discuss:

- How these new technology areas, largely based on and shaped by open source, interrelate and can benefit you.
- Why you should consider a Platform-as-a-Service (PaaS) solution, like OpenShift by Red Hat®, to take advantage of these technologies without having to do your own integration.
- How PaaS improves both developer agility and operational efficiency so that you can deploy and operate applications more quickly, more flexibly, and with higher quality.

THE RISE OF SOFTWARE

In his 2011 essay titled “Software is Eating the World,”² venture capitalist Marc Andreessen famously argued that “more and more major businesses and industries are being run on software and delivered as online services – from movies to agriculture to national defense.” To meet the needs of both internal users and customers, companies need to deploy and operate applications – even companies that wouldn't have historically thought of themselves as being in the software business.

¹ It's increasingly common to think of enterprise IT as consisting of a “classic IT” component (emphasizing stability, efficiency, and measured change) in contrast to a cloud-native aspect (focused on the rapid and iterative deployment of new services). Gartner uses the term “bimodal” to distinguish this “mode 1” and “mode 2” IT. IDC distinguishes between the “2nd” and “3rd” platform. Other analysts and industry followers promote ideas along similar lines.

² <http://www.wsj.com/articles/SB10001424053111903480904576512250915629460>

“Most users developing cloud-native business solutions should turn to PaaS providers to facilitate these initiatives. Few will justify the burden of developing their own cloud-enabling infrastructure.”

GARTNER
YEFIM V. NATIS
THE KEY TRENDS IN PAAS, 2015
(APRIL 2015)
G00250980

Satisfying this business mandate means, in turn, helping software developers create high-quality applications quickly and efficiently. At the same time, it means helping IT operations run those applications reliably, flexibly, and at scale. It requires enabling experimentation while also continuing to support existing “systems of record” on which the business depends. It demands adopting new technologies that can support the accelerated pace of digitized businesses.

The good news is that there’s a rich set of practices and open source-driven innovations that are tackling the challenges inherent in rapidly developing and reliably managing cloud-native applications. A PaaS solution can package this innovation in a form that organizations can put rapidly into production for the benefit of both development and operations.

THE EVOLUTION OF IT

An effective PaaS solution should bring together key technologies and approaches in cloud infrastructure, containers, microservices, and DevOps.

CLOUD INFRASTRUCTURE

Consider how developers or other users traditionally gained access to IT resources. They filled out a form or sent an email to request a new server. This request then made its way through a workflow before eventually being fulfilled in a few weeks. Virtualization and hosted services helped to reduce costs and improve server utilization ratios but didn’t really lead to a more efficient and effective infrastructure for applications.

By contrast, a cloud infrastructure – whether on-premise, in a public cloud, or a hybrid environment – provides self-service so that users can gain access to necessary resources in minutes rather than weeks. The use of standard operating environments and tooling such as cloud management platforms provide the automation and governance to scale up compute resources without also scaling up operational overhead.

CONTAINERS

Linux® containers are one of the key technologies being used to enable the easy deployment and isolation of applications. Containers provide lightweight and efficient application isolation and package them with any components they require to run. This avoids conflicts between apps that otherwise rely on key components of the underlying host operating system. Containers and container packaging, together with the host operating system, also provide consistency across different environments – making applications more portable and eliminating difficult-to-fix conflicts.

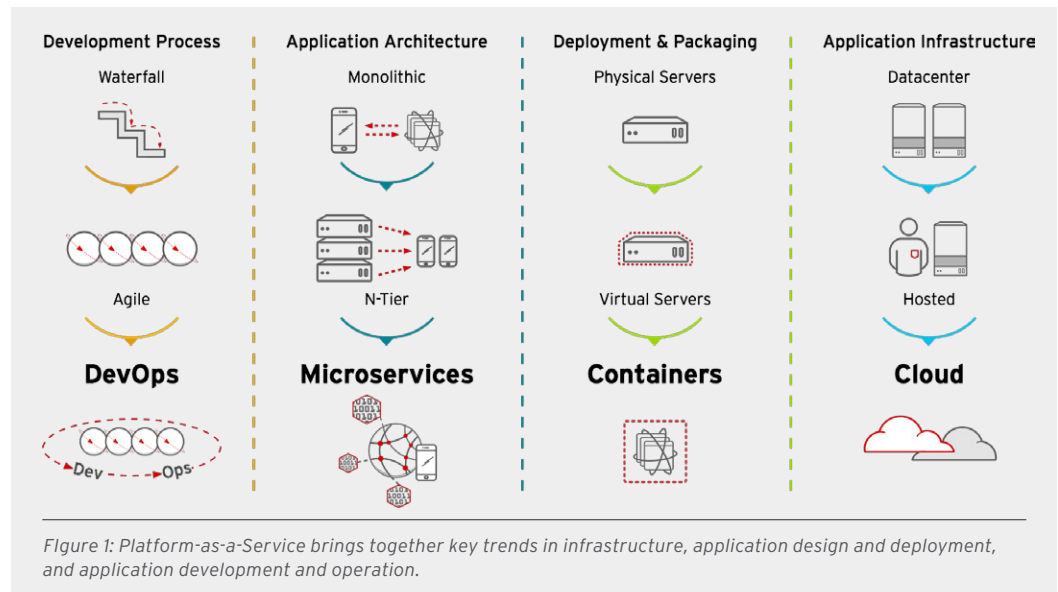
Services running in Linux containers are isolated within a single copy of the operating system running on a physical server (or, potentially, within a virtual machine). This approach stands in contrast to hypervisor-based virtualization in which each isolated service is bound to a complete copy of a guest operating system, such as Linux. The practical result is that containers consume very few system resources such as memory and impose essentially no performance overhead on the application.

Containers also help enable a hybrid cloud infrastructure by making application services portable across the full gamut of infrastructure platforms. A containerized image can run anywhere that its associated Linux kernel can run. In other words, it can run just about anywhere on a given processor instruction set architecture – whether bare-metal servers, enterprise virtualization, private clouds, or public clouds.

“Containers alone do not automate control and management. Successful container adoption will depend on the organization's ability to integrate change and release management controls at an operational level, and service models and architecture controls at a more strategic level.”

MAXIMIZE CONTAINER BENEFITS WITH
A TOP-DOWN APPROACH
A FORRESTER CONSULTING THOUGHT
LEADERSHIP PAPER COMMISSIONED BY
RED HAT, APRIL 2015

[HTTPS://WWW.REDHAT.COM/EN/
RESOURCES/MAXIMIZE-CONTAINER-
BENEFITS-TOP-DOWN-APPROACH](https://www.redhat.com/en/resources/maximize-container-benefits-top-down-approach)



MICROSERVICES

Because they provide lightweight isolation, containers can be used to package decoupled microservices that may perform only a single, simple function such as reading a sensor, aggregating some data, or sending a message.

Microservices avoid many of the pitfalls of more monolithic and complex applications in that the interfaces between the different functions are cleaner and services can be changed independently of each other by small cross-functional teams. Services are, in effect, black boxes from the perspective of other services. So long as their public interfaces don't change and they perform the requested task, they can be changed in any way the developer sees fit. Other services don't know – and should not know – anything about the inner workings of the service.

While microservices are not an architectural fit for every situation and require careful attention to service boundaries and how services interact, when they are appropriate, their attributes align well with other technology and methodology trends.

DEVOPS

The clean and independent interactions of the microservices application architectural model make it easier for small teams to work on individual services, test them, and do rapid and iterative releases. This, in turn, makes it easier to implement DevOps, an approach to culture, process, and tools for delivering increased business value and responsiveness through rapid, iterative, and high-quality service delivery. DevOps provides an opportunity for IT organizations to broadly embrace the open source culture that has proven to be an effective development methodology.

Cloud infrastructure, containers, microservices, and DevOps mutually support and enable each other to create a more flexible and efficient foundation, applications that make the best use of that infrastructure, and a process and culture that develops and deploys those applications quickly and with high quality.

THE BENEFITS OF PaaS

An effective PaaS solution can bring together all these capabilities, along with a rich set of languages, frameworks, and tools (such as continuous integration) that support them. The goal is to satisfy two overarching requirements in order to support business requirements: developer agility and operational efficiency.

DEVELOPER AGILITY

Think of PaaS and the first constituency that probably comes to mind is the developer. Developers are the ones creating the new apps, services, and features that the business requires. They need to deliver streams of these new capabilities to market as quickly as possible. And to do so, they need to be able to focus entirely on writing new code without the overhead of setting up and maintaining infrastructure, environments, and supporting services.

An effective PaaS solution should help developers become much more productive by allowing them to focus on their development experience. This means letting them focus on designing compelling user interfaces and appropriate distributed application architectures. It means giving new developers immediate access to everything they need to work on a company's mobile apps or billing services; decreasing the friction of collaboration across users, teams, and projects; providing a broad selection of languages, frameworks, and application components such as databases; automating application deployments and builds; and allowing for experimentation with new concepts. None of these essential activities should be inhibited by developers needing to configure firewall settings or tune operating system resource limits.

A developer should enter a few commands from a web console, IDE, or command line and this should trigger the platform to spin up all the pieces needed to run their application. For example, a common server infrastructure is a web application with a database. One command can run tests, perform all the networking setup and server installs, and create a repository for the code.

OPERATIONAL EFFICIENCY

Just as important though is what an effective on-premise PaaS solution can do for IT operations organizations wanting to deploy a secure, enterprise-grade, container-based application platform.

First are the services that are designed for administrators. These include advanced scheduling and automated placement with regions and zones for configuring high availability. There's also powerful declarative management for application services and the ability to manage user and team access while integrating with enterprise authentication systems.

However, at a higher level, PaaS benefits operations because it can create a bright line between what's "operations" and what's "development." Things get complicated and expensive when that line blurs: developers demand tweaks which fly in the face of any standardization or automation effort. Operations, on the other hand, creates inflexible rules for development platforms that prevent developers from doing their jobs. PaaS decouples these two, and permits each group to do what they're good at.³

³ The problem gets even worse with outsourced operations or development because any idiosyncrasies on the operations or the development side create friction when sourcing work to alternate vendors.

“FICO has reduced time to value for developing analytic solutions by up to 70% versus on-premise software.”

TONY MCGIVERN
CIO, FICO

FICO offers analytic software and tools that help organizations make smarter decisions.

To expand into the middle market, it developed FICO® Analytic Cloud, a cloud delivery channel that enables FICO to serve organizations of all sizes. The FICO Analytic Cloud provides Platform-as-a-Service (PaaS) access to the FICO® Decision Management Platform, which allows customers to use FICO tools and technology to create and deploy custom applications and services. FICO built its Decision Management Platform on OpenShift Enterprise by Red Hat, which provided the PaaS tools and support FICO needed to rapidly scale the platform and Analytic Cloud.

<https://www.redhat.com/en/success-stories/fico>



When using a PaaS solution, it’s perfectly clear who’s responsible for what. Above the PaaS line, developers can do whatever they like in the context of the PaaS platform and it will automatically comply with operations standards. Below the line, operations can implement (and change) things in whatever way makes the most sense for cost, efficiency, or other reasons. This type of approach also greatly benefits DevOps in that it creates an environment conducive for development and operations to work cooperatively rather than antagonistically.

We spend a lot of time talking about why PaaS is great for developers. But it’s just as good for operations, procurement, and budget.

INTRODUCING OPENSIFT ENTERPRISE 3

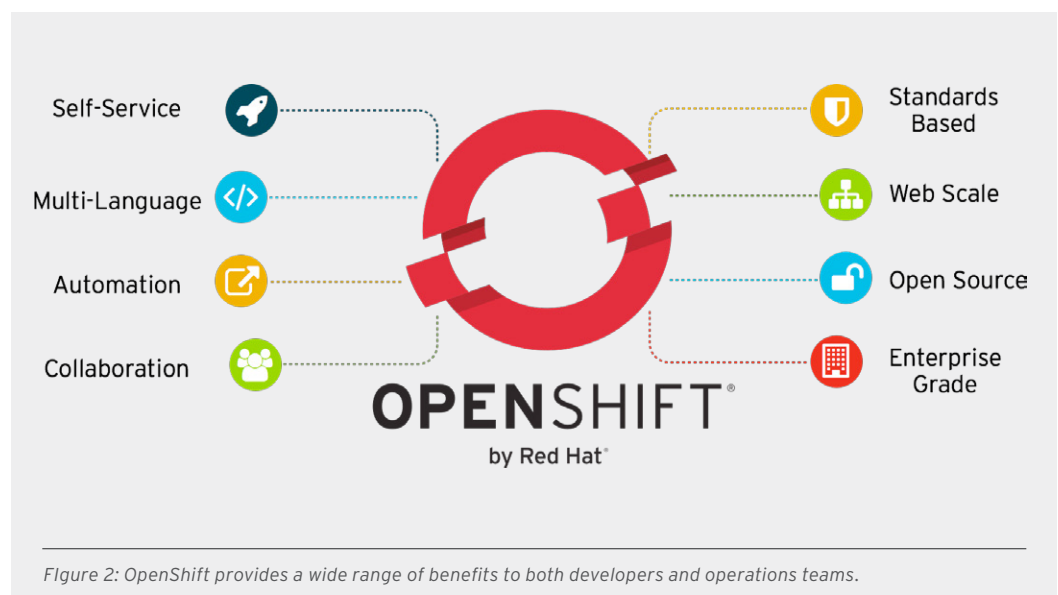


Figure 2: OpenShift provides a wide range of benefits to both developers and operations teams.

As with all other Red Hat subscription offerings, OpenShift Enterprise takes upstream open source code – in this case from the OpenShift Origin project (and the many projects that feed into OpenShift Origin) – and makes it a reliable and supported product for enterprise use. One of the key developments in the latest release of OpenShift Enterprise is that a variety of key technologies that enable PaaS and modern cloud infrastructure have started to standardize.

From its very beginning, OpenShift has used containers to isolate applications and the industry has now recognized that containers form the basis for a modern PaaS solution. With OpenShift Enterprise 3, Red Hat is adopting emerging standards in the container and helping to drive them from both a technology and adoption perspective. For example, Red Hat is among the top contributors to the Docker project which provides a portable, lightweight runtime and packaging tool. Together with Google and others, Red Hat has also contributed substantially to the Kubernetes orchestration tool in order to bring the concepts of atomic, immutable infrastructure to enterprise customers in products such as OpenShift, Red Hat Enterprise Linux, and Red Hat Enterprise Linux Atomic Host.

Organizations wanting to improve developer agility and operational efficiency can run a hardened, tested, and supported PaaS solution on-premise with OpenShift Enterprise.⁴ It brings in the relevant innovations happening in upstream communities. It's from a company that is playing a major role in driving those innovations. And it brings those innovations together in a form that's directly consumable.

CONCLUSION

Software is at the heart of modern business. It mediates interactions with customers. It plumbs actionable intelligence from data. It creates value.

The good news is that a wide range of infrastructure and tools—many of them open source—exist to help businesses rapidly develop new software and services, integrate them with new and existing business processes and workflows, and iteratively experiment within fast-changing markets. The same infrastructure and tools also enable a more efficient form of IT operations that has a more collaborative and valued relationship with the development organization than has traditionally been the norm.

Of course, there are challenges associated with attaining this new and improved state. Some are cultural. Here, the approaches of collaboration and transparency advocated by open source communities offer insight into how IT organizations—and even businesses as a whole—can transform.

At the same time, organizations need to successfully deploy and operate a technology stack that takes full advantage of the innovation taking place across the industry—without the complexity of piecing together and supporting a wide range of piece-part tools. That's where a PaaS solution like OpenShift Enterprise comes in. Such a solution integrates technologies such as containers, container packaging, orchestration, virtualization, continuous integration, cloud management, and languages/frameworks out-of-the-box.

In so doing, PaaS provides organizations with the cloud platform that they need to deliver the services that their customers and internal users demand—software services that increasingly create value.

*"We know we're doing
a good job when we
don't hear from people.
Our systems should
simply work, and that's
what OpenShift is
helping us do."*

PATRICK CASEY
MANAGER OF MIDDLEWARE SERVICES,
UNIVERSITY OF NORTH CAROLINA
AT CHAPEL HILL

[HTTP://WWW.REDHAT.COM/EN/
RESOURCES/UNC-CHAPEL-HILL-
BUILDS-OPEN-DEVELOPMENT-AND-
HOSTING-ENVIRONMENT-RED-HAT](http://www.redhat.com/en/resources/unc-chapel-hill-builds-open-development-and-hosting-environment-red-hat)



facebook.com/redhatinc
[@redhatnews](https://twitter.com/redhatnews)
linkedin.com/company/red-hat

redhat.com
INC0264084_v1_0615

⁴ Or in a public cloud with OpenShift Online.

ABOUT RED HAT

Red Hat is the world's leading provider of open source solutions, using a community-powered approach to provide reliable and high-performing cloud, virtualization, storage, Linux, and middleware technologies. Red Hat also offers award-winning support, training, and consulting services. Red Hat is an S&P company with more than 80 offices spanning the globe, empowering its customers' businesses.

NORTH AMERICA
1 888 REDHAT1

**EUROPE, MIDDLE EAST,
AND AFRICA**
00800 7334 2835
europa@redhat.com

ASIA PACIFIC
+65 6490 4200
apac@redhat.com

LATIN AMERICA
+54 11 4329 7300
info-latam@redhat.com