Red Hat is Helping Organizations Optimize Private Cloud Service Delivery

An IDC White Paper, Sponsored by Red hat

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IDC ANALYZE THE FUTURE

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Business Value Highlights

591%
five-year ROI

5 months
to payback

33%
faster fulfillment of service requests

13%
more productive application development

59%
faster rollout of new applications

53%
reduced infrastructure costs

$18.6M
total revenue gained per year

33
hours saved per user per year in fulfillment

99%
reduction in unplanned downtime

Red Hat is Helping Organizations Optimize Private Cloud Service Delivery

EXECUTIVE SUMMARY

The growth of modern hyperscale public clouds has driven many enterprise customers to pursue similar architectures and services on-premise with private clouds. In the early days of private clouds, such clouds were built largely using custom code that enterprises developed and maintained themselves. The rise of the OpenStack open source project allowed users to leverage an open and collaborative model for private cloud, just as they had with Linux and other open source projects. The industry quickly consolidated around OpenStack as the platform to deliver modern API-driven, programmable private cloud infrastructure.

IDC interviewed multiple organizations that were using Red Hat OpenStack Platform to provide private cloud capabilities. Based on the data gathered and applying a Business Value methodology, IDC found that these organizations were realizing significant benefits by leveraging these capabilities and making them the core of their private cloud operations in support of a variety of Red Hat products and services. Based on IDC's calculations, the companies surveyed realized total discounted annual benefits worth $6.81 million per organization by:

- Driving faster fulfillment of service requests by IT teams
- Improving the overall productivity of application development teams
- Enabling faster rollout of new applications
- Reducing incidences of unplanned downtime

Situation Overview

As public clouds began to grow in adoption, they brought new ideas about how infrastructure could be managed and provisioned. These concepts began to be adopted for on-premise use in private clouds. These clouds differed from server virtualization in many ways. Self-provisioning was one very visible way, but this could also be implemented on top of traditional virtualization and the differences with cloud went much deeper. Modern clouds are highly API-driven, creating programmable infrastructure and enabling infrastructure as code operations. They also had highly scalable and flat architectures, instead of the cluster-by-cluster approach of traditional virtualization. These changes enabled operators to build clouds that were more scalable, agile, and cost efficient than previous generations of infrastructure.

OpenStack is an open source project aimed at developing software to build clouds that grew quickly and attracted a large, diverse community.

Many customers initially began to develop their own enterprise cloud platforms to build a private cloud. But developing and maintaining custom code requires a lot of expertise and the burden of maintaining the code over time is significant. OpenStack is an open source project aimed at developing software to build clouds that grew quickly and attracted a large, diverse community. OpenStack quickly grew to become the only viable open source cloud platform due to several factors:

- OpenStack follows modern cloud design principles and was technically superior to projects that came before it.
- OpenStack is highly modular, allowing the platform to scale and adopt innovations quickly.
- OpenStack was the most transparent and open project, governed by the independent OpenStack Foundation. Thus, it attracted most of the industry to participate and built widespread support.
- OpenStack has an open driver interface, allowing the community to build compatibility with nearly any kind of compute, storage, and networking infrastructure.

Today, OpenStack is a mature project and the only viable open option to build modern infrastructure clouds. It is widely supported across the industry and many customers have deployed large OpenStack clouds. OpenStack clouds were primarily deployed to support agile software development, DevOps, and distributed, cloud native applications. Support for legacy applications was also built into OpenStack over time and these applications also became part of the mix of workloads used on OpenStack.

The keys to successful OpenStack implementations are the deployment and management tools. Red Hat provides the Red Hat OpenStack Platform director for managing the OpenStack lifecycle. It also containerizes OpenStack services, simplifying lifecycle operations such as upgrades.

Private Cloud With Red Hat Openstack Platform

Red Hat OpenStack Platform is a commercial, production-ready distribution of OpenStack. It is a hardened, tested distribution that is built with the same principles that made Red Hat a success in commercial enterprise open source with Linux:

- Red Hat provides an ecosystem of hardware, software, and services partners to help customers build and deploy robust OpenStack-based clouds.
- Red Hat backs Red Hat OpenStack Platform with enterprise-level support and training/certification materials.
- Red Hat provides a long support life cycle for certain releases of OpenStack – currently three years of production with two years of optional extended support for a total of five years.
- Red Hat is a leader in the OpenStack community and has consistently been a top code contributor to the project since it joined.

OpenStack still needs a hypervisor and an operating system underneath and Red Hat provides these with the Red Hat Virtualization KVM hypervisor and its well-known commercial Linux distribution Red Hat Enterprise Linux. KVM serves as OpenStack compute nodes, and Linux is a host server OS for OpenStack services and a guest VM OS for users. Both of these are based on time-tested and hardened, enterprise distributions of Linux (KVM is based on the Linux kernel) that Red Hat has built its legacy on.

The keys to successful OpenStack implementations are the deployment and management tools. Red Hat provides the Red Hat OpenStack Platform director for managing the OpenStack lifecycle. It also containerizes OpenStack services, simplifying lifecycle operations such as upgrades. Red Hat OpenStack Platform also integrates with CloudForms, Satellite and Ansible to provide additional management capabilities.

Red Hat OpenStack Platform also integrates with other Red Hat infrastructure technologies. Red Hat Ceph Storage can provide enterprise file, block and object storage for OpenStack. Red Hat OpenShift provides a container application platform that can run on top of Red Hat OpenStack Platform's cloud infrastructure.

However, though OpenStack is a highly stable and feature-rich cloud infrastructure platform, it is still inherently complex. Red Hat, as it has long done with open source technologies, removes risk and complexity by taking on the burden of code

maintenance, testing and the development of supporting tools required to operate OpenStack in the enterprise. Of course, Red Hat's enterprise support and training are crucial to enabling enterprise teams to embrace OpenStack technology as well. As enterprises face increasing pressure to create a more flexible and agile infrastructure to support modern apps, OpenStack is a crucial platform to enable cloud infrastructure in on-premise private clouds.

The Business Value of Private Cloud With Red Hat Openstack Platform

Study Demographics

IDC interviewed eight organizations for this study, asking survey respondents a variety of quantitative and qualitative questions about the impact on their IT operations, businesses and costs of deploying a private cloud with Red Hat OpenStack Platform and services. The average number of employees in the organizations interviewed was 20,889. In terms of IT organizational profiles, the average number of IT staff was 2,245 and these IT teams served and supported an average of 20,744 internal end users and 1,300 business applications. From a vertical industries standpoint, these organizations represent the financial services, manufacturing, financial technology, information technology, medical research, automotive, education, and healthcare sectors (see Table 1).

TABLE 1

Demographics of Interviewed Organizations

	Average	Median	Range
Number of employees	20,889	1,550	450 to 145,000
Number of IT staff	2,245	28	4 to 17,000
Number of IT users	20,744	1,525	449 to 145,000
Number of business applications	1,300	26	5 to 10,000
Industries	Financial Services, Manufacturing, Financial Technology, Information Technology, Medical Research, Automotive, Education, Healthcare		

n = 8
Source: IDC, 2019

"Red Hat capability is a combination of infrastructure as a service and platform as a service. We saw more convenience with that and liked having a capability that was more fluid. We are expecting to start running a hybrid cloud from a private cloud, and, with Red Hat, it's going to be very easy to do that migration."

"We put a lot of our data on a private cloud because we deal with a lot of student data. Red Hat fits with our cloud strategy because they secure our network better than what we had in place. It also helped us by increasing our storage space because we save a lot of information from various departments."

Organizational Use of Private Cloud with Red Hat OpenStack Platform

Study participants described company usage patterns of their private cloud with Red Hat OpenStack Platform as well as provided a snapshot of overall IT and business environments that were supported. Interviewed Red Hat customers also discussed both the value proposition and rationale behind their choice to build their private cloud with Red Hat OpenStack Platform. These selection criteria included factors such as having a robust product mix and cost savings attained as the result of virtualizing resources. Other study participants emphasized the benefit of having a highly scalable solution and centralizing backup and recovery capabilities. Study participants made specific observations about these benefits:

- **The right product mix.** *"Red Hat capability is a combination of infrastructure as a service and platform as a service. We saw more convenience with that and liked having a capability that was more fluid. We are expecting to start running a hybrid cloud from a private cloud, and, with Red Hat, it's going to be very easy to do that migration."*
- **Scalability and business enablement.** *"With our cloud strategy, we are looking to support customers willing to try our products and subsequently convert to a purchase. Our strategy is to support all of our internal applications on the cloud such that they can be accessed via any location worldwide. Meanwhile backup, recovery, and disaster centers can be centralized. Red Hat is very scalable so it fits to our growing business needs."*
- **Security and storage benefits.** *"We put a lot of our data on a private cloud because we deal with a lot of student data. Red Hat fits with our cloud strategy because they secure our network better than what we had in place. It also helped us by increasing our storage space because we save a lot of information from various departments."*

As shown in Table 2, the companies that IDC surveyed are using Red Hat Openstack Platform for their private cloud to support a number of other Red Hat products. These include:

- Red Hat Enterprise Linux (RHEL)
- Red Hat CloudForms
- Red Hat Virtualization
- Red Hat OpenStack Platform
- Red Hat Satellite
- Red Hat Insights

TABLE 2

Organization Usage of Red Hat products

	Average
Red Hat Enterprise Linux (RHEL)	88%
Red Hat CloudForms	75%
Red Hat Virtualization	88%
Red Hat OpenStack Platform	100%
Red Hat Satellite	38%
Red Hat Insights	25%

n = 8
Source: IDC, 2019

Table 2 also shows that most of these products were in substantial use across all companies and provides usage specifics.

TABLE 3

Private Cloud with Red Hat OpenStack Environment

	Average	Median
Number of physical servers	248	8
Number of virtual servers	850	33
Number of business applications	283	10
Number of self-service users	3,857	317
Number of templates	13	4
Number of services	8	5

n = 8
Source: IDC, 2019

Table 3 provides granular data on the IT environments that characterized surveyed companies as well as specifics on how their private cloud with Red Hat OpenStack was being deployed. For example, the average number of physical and virtual instances were 248 and 850, respectively. In addition, the average number of self-service users was documented at 3,857 and these users were engaged in the use of 283 business applications. Additional usage patterns are presented in the table.

"Red Hat has been mounting new technology for a while. Red Hat is more promising in terms of staying ahead of the technology curve. We see their innovation edge when we look at what the company is doing, and we see the reports of others who have been satisfied with the Red Hat OpenStack Platform for their private cloud."

"We had Red Hat in-house to support our Linux platforms for quite a while. And we were happy with the cost and performance of the product… When evaluating various cloud suites, it came down to ease and cost. So we evaluated total cost of ownership, quicker time to market, and how virtualization would enable savings on hardware involved."

Business Value Analysis

Interviewed organizations are using Red Hat OpenStack Platform for their private cloud to provide the levels of performance and automation they need to support their growing business operations. IDC found that deployment of the Red Hat solution had significant service fulfillment benefits including faster fulfilment of service requests, shorter development lifecycles for new applications, and higher quality applications. These benefits had positive ripple effects throughout the organizations surveyed, resulting in reduced IT capex and opex, improved operations for DevOps, application development, and IT admin teams, and less downtime. Using baseline survey data, IDC quantified these benefits using a robust methodology. Based on IDC's calculations, the companies surveyed realized total discounted annual benefits worth $8.61 million organization by:

- Driving higher IT staff productivity to provide faster fulfillment of service requests
- Improving the overall lifecycle involved in the rollout of new applications
- Fostering more productive rollout of new applications
- Reducing incidences of unplanned downtime

Study participants spoke in greater detail about these benefits:

- **Red Hat's technology edge driving customer satisfaction.** *"Red Hat has been mounting new technology for a while. Red Hat is more promising in terms of staying ahead of the technology curve. We see their innovation edge when we look at what the company is doing, and we see the reports of others who have been satisfied with the Red Hat OpenStack Platform for their private cloud."*
- **TCO and virtualization benefits.** *"We had Red Hat in-house to support our Linux platforms for quite a while. And we were happy with the cost and performance of the product…When evaluating various cloud suites, it came down to ease and cost. So we evaluated total cost of ownership, quicker time to market, and how virtualization would enable savings on hardware involved."*

Cloud-based Efficiencies Improve Service Fulfillment

Red Hat customers benefited from the fact that Red Hat OpenStack Platform's mix of open source tools or "projects" use pooled virtual resources to build and manage private cloud infrastructure. These projects included core cloud-computing services such as compute, networking, storage, identity, and image services. OpenStack uses APIs to abstract virtual resources into pools that enable and support standard cloud computing tools for both administrators and users. These pools of virtual resources can then be automatically provisioned through self-service interfaces

"Red Hat has helped our application development teams become more efficient. This cuts the time that they normally take to develop applications."

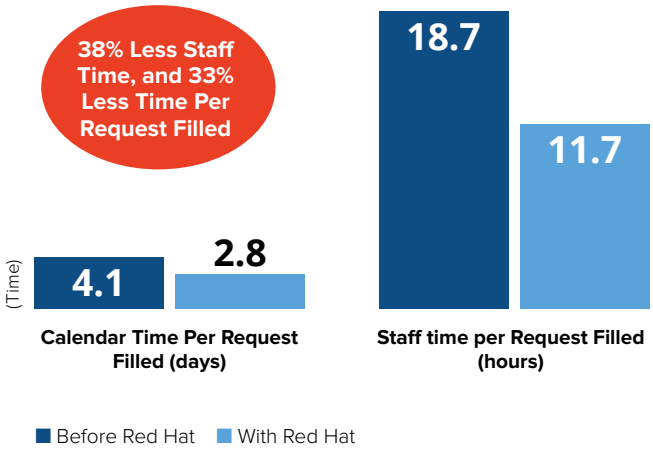
leading to much improved service fulfillment and application development capabilities. Study participants spoke about how a private cloud with Red Hat OpenStack Platform improves service fulfillment and application development operations:

- **Faster application development.** *"Red Hat has helped our application development teams become more efficient. This cuts the time that they normally take to develop applications."*
- **Faster access to data.** *"Red Hat helped us streamline a lot of our resources. We had a lot of our systems integrated into another vendor because every department had their own systems. OpenStack helped us to integrate those systems because we could hold everything on the same network. I think it's helped the productivity of the end user because we don't have to access a lot of stuff from our legacy systems. So the data is more quickly accessible for anyone that needs it. That saved these employees about an hour a day."*

Figure 1 presents the benefits that IDC quantified as related to the improved service fulfillment efficiencies associated with Red Hat OpenStack Platform. As shown, these improvements related to both the time it took to fulfill requests and the amount of staff time spent engaged in various tasks associated with this process. As shown, the Red Hat solution reduced the amount of time it took to fulfill a request from 4.1 hours to 2.8 hours, resulting in a 33% improvement. In addition, the staff time required for this task was reduced from 18.7 to 11.7 hours, representing a 38% improvement.

FIGURE 1

Service Fulfillment Agility Impact

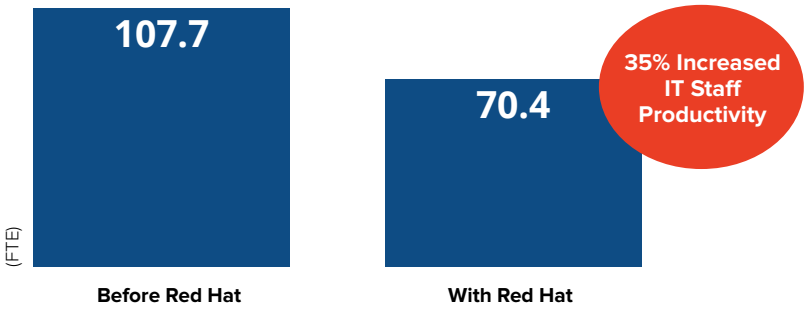


Source: IDC 2019

Figure 2 shows a different but equally important aspect of improved service fulfillment efficiencies made possible by Red Hat's OpenStack Platform: IT staff time impacts in terms of FTE equivalence. As shown, there was a 35% increase in staff productivity after the platform was deployed.

FIGURE 2

Service Fulfillment IT Staff Impact

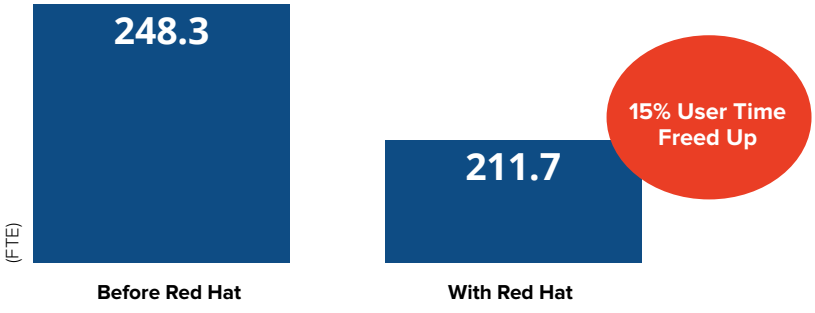


Source: IDC 2019

Figure 3 shows a third aspect of improved service fulfillment efficiencies related to positive impacts on user productivity. Again, in terms of FTE equivalence, there was 15% more user time freed up after deploying Red Hat OpenStack Platform.

FIGURE 3

Service Fulfillment User Impact



Source: IDC 2019

"We're seeing an impact on quality of applications we're developing. Our applications are more operable than with our previous vendor. The application development was not as clear or efficient as it is with Red Hat. Our developers are really doing much better, and are also developing more features."

IT Development Teams: Increased Efficiencies

Red Hat OpenStack Platform helped Red Hat customers utilize private cloud resources that are deployed and managed on a third-party basis. Surveyed companies benefited from the fact that private clouds extend capabilities beyond traditional virtualization by providing increased capacity to handle large compute and storage demands. In addition, surveyed companies also benefited from having on-demand services with self-service user interfaces and policy-based management thereby providing efficient resource allocation for business users.

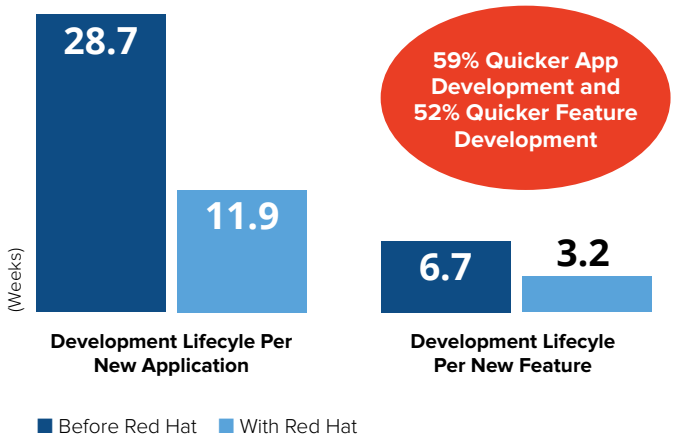
These capabilities also provided benefits to enterprises with understaffed or under-skilled IT teams by optimizing private cloud services and infrastructure. Highly automated processes and easier to use technology features and enhancements served to make application development teams and other IT teams more efficient in the day-to-day performance of tasks. Study participants spoke with IDC specifically about these benefits:

- **Improved application and features quality.** *"We're seeing an impact on quality of applications we're developing. Our applications are more operable than with our previous vendor. The application development was not as clear or efficient as it is with Red Hat. Our developers are really doing much better, and are also developing more features."*
- **Faster time to market.** *"Provisioning is definitely faster with our DevOps teams…We're becoming more and more of an agile development environment because it helps us stay on track in terms of getting our products out faster. Red Hat has really helped us implement this type of infrastructure and offers the on-demand capabilities we're looking for."*

Figure 4 presents metrics on the ability of a private cloud with Red Hat OpenStack Platform to foster faster and more efficient application development. Applications were developed 59% more quickly while features were developed 52% more quickly.

FIGURE 4

Application Development Impact



Source: IDC 2019

Study participants also spoke about the productivity impacts a private cloud with Red Hat OpenStack Platform has on DevOps and application development teams. As shown in Table 4, prior to deployment, the amount of time these teams devoted to their workloads as measured in developer time per 100 users (hours per year) was 682. Deployment of the Red Hat solution set yielded an improvement of 596.9 hours, and this change represented a 13% level of improvement. Similarly, DevOps and application developer staff realized the same level of improvement as equivalent FTEs were reduced from 75.3 to 65.9, also a 13% improvement.

TABLE 4

DevOps and Application Development Teams Productivity Impact

	Before Red Hat	With Red Hat	Difference	% Benefit
DevOps and App Developer Time per 100 users (Hours per year)	682.1	596.9	85.3	13%
DevOps and App Developer Staff, equivalent FTEs	75.3	65.9	9.4	13%

Source: IDC, 2019

Study participants also spoke about the productivity impacts on IT infrastructure administrator time. Prior to deployment of Red Hat OpenStack Platform, the amount of time these teams devoted to their workloads as measured in time spent per 100 users was 58.6 hours per year (see Table 5). Deployment of the Red Hat solution set decreased that amount to 26.3 hours, a 55% level of improvement. In addition, equivalent FTEs also showed a 55% level of improvement.

TABLE 5

IT Infrastructure Management Impact

	Before Red Hat	With Red Hat	Difference	% Benefit
IT Infrastructure Administrator Time per 100 users (Hours/year)	58.6	26.3	32.3	55%
IT Infrastructure Administrator Staff, equivalent FTEs	6.5	2.9	3.6	55%

Source: IDC, 2019

Impacts on Unplanned Downtime

Red Hat customers also spoke to IDC about positive impacts on unplanned downtime and business productivity. Surveyed organizations were able to reduce the incidence of outages as a result of deploying Red Hat OpenStack Platform as their private cloud foundation. This benefit extended to line of business (LOB) users and affected business outcomes overall as well.

Unplanned downtime impacts for a private cloud with Red Hat OpenStack Platform are displayed in Table 6. As shown, the time to resolve, measured in hours, showed a substantial level of improvement (50%). In addition, the frequency of outages was diminished, a 23% level of improvement. Especially noteworthy is the fact that the FTE impact of lost productivity due to unplanned outages showed a 99% improvement.

TABLE 6

Unplanned Downtime Productivity Impact

	Before Red Hat	With Red Hat	Difference	% Benefit
Frequency per year	3.4	2.6	0.7	23%
Time to resolve (hours)	5.2	2.6	2.6	50%
Hours per year per 100 users	50.6	0.1	50.5	99%
FTE impact, lost productivity due to unplanned outages	5.6	0.01	5.6	99%

Source: IDC, 2019

Similar to unplanned downtime, these organizations realized significant benefits on their help desk operations. These impacts are shown in Table 7. The time to resolve help desk trouble tickets, measured in hours, was almost cut in half, a substantial level of improvement (48%). In addition, the number of call tickets in play on a weekly basis was also diminished, a 44% level of improvement. These benefits translated to financial impacts and staff time savings of $571,277, a 36% level of improvement.

TABLE 7

Help Desk Impact

	Before Red Hat	With Red Hat	Difference	% Benefit
Calls/Tickets per week	198.0	111.0	87.0	44%
Time to resolve (hours)	7.3	3.8	3.5	48%
Help Desk staff, FTE Impact	15.8	10.1	5.7	36%
Staff time cost per year	$1,578,624	$1,007,347	$571,277	36%

Source: IDC, 2019

Improvements for Line of Business Users and Operations

As described, study participants spoke to IDC about how Red Hat OpenStack Platform offered improved performance for many of the core IT tasks that supported business operations in their companies. Further, they discussed how this array of improvements resulted in higher levels of employee productivity, ultimately leading to positive business outcomes and increased revenue. Also as described, the IT tasks that received the most benefit included DevOps functions, application development, help desk operations, and IT administration. Improvements in application development resulted in more applications being rolled out to LOB users, accelerated life cycles, higher quality applications, and improvements in the ability to innovate. LOB benefits included better sales operations and improved collaboration with the customer base of each company. Study participants spoke specifically about these benefits:

- **Growing sales through better efficiency.** *"Our sales conversion process is faster because the performance of the apps is faster. We could actually envision a real-time conversion rather than going through manual processes. Summing up, our processes scaled and streamlined significantly."*

"Red Hat gave us the opportunity to innovate and come out with competitive products and services in a timely manner."

- **Faster time-to-market with new innovation.** *"Red Hat gave us the opportunity to innovate and come out with competitive products and services in a timely manner."*
- **Better business stability.** *"The business side now has a stable system. We've always looked at Red Hat as being a major player with us because they are trusted in the industry. Red Hat is enabling the business in the introduction and innovation of new products and services."*
- **Better collaboration with customers.** *"Red Hat OpenStack brings a lot of efficiencies for some of our external partners. For example, our Quality Assurance teams would have to share certain documents with external partners and work on these documents together. The OpenStack platform makes that process a lot smoother, and we can work on comments and other processes much more efficiently. Our teams are more productive because they are on OpenStack."*

Table 8 presents quantified benefits for business operations and user impact after deployment of the Red Hat OpenStack Platform private cloud. As shown, total additional annual revenue was significant and calculated at $18,592,245 on a per organization basis ($89,629 per 100 users).

TABLE 8

Business Operations, Revenue Impact

	Per Organization	Per 100 Users
Total additional revenue per year	$18,592,245	$89,629
Total recognized revenue*, IDC model, per year	$2,788,837	$13,444

*The IDC model assumes a 15% operating margin for all additional revenue.
Source: IDC, 2019

Lower Cost of Operations

A private cloud using Red Hat OpenStack Platform is designed to be a cost-effective architecture. In general, when more compute resources are needed, companies can either purchase new site hardware or rent infrastructure from a third-party vendor. Leveraging off-premise vendor-owned private clouds means that companies can avoid buying new hardware as their resource needs evolve. Study participants spoke to IDC about how Red Hat OpenStack Platform represented a more cost-effective solution than either previous infrastructure-based approaches

"One of the most significant benefits is the agility. IT doesn't have to wait to buy equipment, such as racks and stacks, in order to add capacity."

"Red Hat OpenStack Platform will save us a lot of money. We won't have to go to outside consultants to help us on some projects because we can implement most projects in-house."

or commercial alternatives considered. They cited cost savings resulting from a number of factors including:

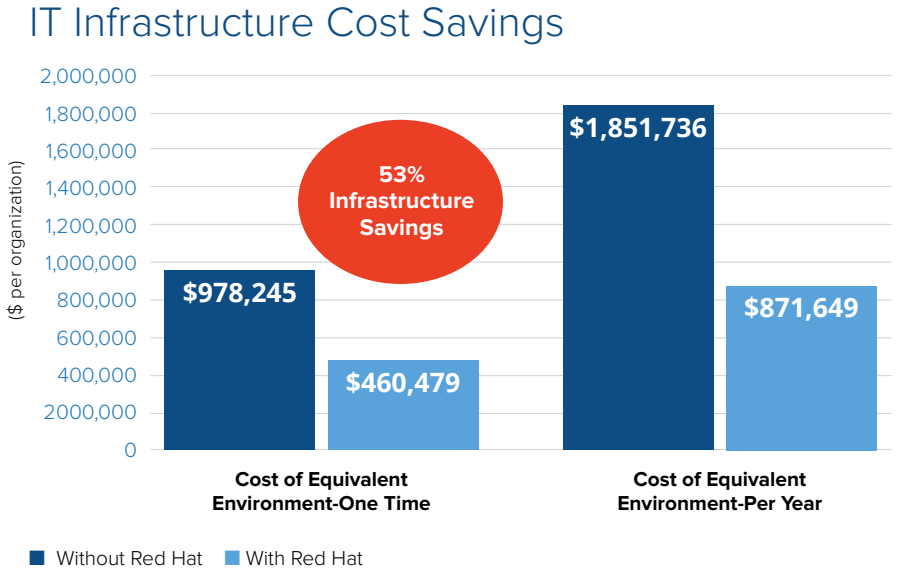
- Having a scalable solution that can adjust to varying work requirements quickly
- Avoiding the use of outside resources and consultants
- Reductions in server hardware based on the use of virtualized resources

Study participants spoke in detail about these benefits:

- **Reduced infrastructure cost.** *"The cost savings with Red Hat involve moving to the cloud and virtualized environments. If we decided not to go to cloud, then we would just be managing more servers, and we wouldn't be as virtualized as we are today. If we didn't use Red Hat, we would probably need to double the number of servers we run today, and network cost would go up exponentially."*
- **More affordable to scale up.** *"One of the most significant benefits is the agility. IT doesn't have to wait to buy equipment, such as racks and stacks, in order to add capacity."*
- **Capex and opex control.** *"We wanted a mix of better capex and opex solutions. Based on our cost analysis, the optimal approach was the cloud route because it's highly scalable and offers lower cost. Based on our internal assessments, in the long run Red Hat would help us the most from a cost perspective. Our choice was based on both competitive pricing and the features and capabilities that we assessed were at a higher level."*
- **Fostering in-house capability.** *"Red Hat OpenStack Platform will save us a lot of money. We won't have to go to outside consultants to help us on some projects because we can implement most projects in-house."*

Figure 5 presents metrics related to IT infrastructure savings comparing pre- and post-deployment environments. As shown in the figure, annual infrastructure cost savings were significant and amounted to 53%.

FIGURE 5



Source: IDC 2019

ROI Analysis

Table 9 presents IDC's analysis of the benefits and costs related to surveyed organizations' use of a Red Hat OpenStack Platform private cloud. IDC projects that these organizations will, over five years, realize discounted benefits of $34 million per organization ($164,038 per 100 internal users). When compared against a discounted investment of $4.9 million per organization ($23,725 per 100 internal users), these organizations will see an ROI of 591% and a breakeven on their investment in 5 months.

TABLE 9

ROI Analysis

	Per Organization	Per 100 Users
Benefit (discounted)	$34.0 million	$164.0K
Investment (discounted)	$4.9 million	$23.7K
Net present value (NPV)	$29.1 million	$140.3K
Return on investment (ROI)	591%	591%
Payback period (months)	5	5
Discount rate	12%	12%

Source: IDC, 2019

Challenges and Opportunities

Challenges

- Complexity is an issue with any private cloud platform, including OpenStack. Private cloud is inherently complex as it operates over a broad section of the datacenter. Customers need staff that is skilled in OpenStack and more importantly, cloud operations. These skills are in high demand and often in short supply today.
- Adoption of private clouds such as OpenStack requires more than technology. It requires a cultural and process change to transform into being a cloud services operator. This is often more challenging than the technology itself.
- OpenStack faces competition from many fronts. On the on-premise side, it faces an inertia challenge, where customers may simply stick with their current traditional server virtualization deployments and add some elements to that to make it more cloud like. On the cloud side, people are often faced with the question of whether they should take on the task of building and operating a cloud at all, or use a public cloud instead. Containers are also another area of consideration as the next generation of compute. While containers run well on OpenStack, they also run well on bare metal, virtualized servers, and public clouds and container orchestration, and management is also handled at a level above OpenStack.

Opportunities

- OpenStack is now a mature open source software project. Most of the early issues with feature gaps, stability, etc., have been addressed and many of the installers, life cycle management tools, etc., have been improved dramatically to make deploying and operating OpenStack smoother and easier than ever before. Commercial distributors such as Red Hat have done much of the work to evolve OpenStack and these distributions have long support cycles, large ecosystems, and integrated robust tooling. While these can't completely abstract away all the complexities of private cloud, building a cloud with OpenStack is much different than even just a couple years ago. Together, the maturation of OpenStack and Red Hat's leadership in commercial open source brings an opportunity to offer a robust enterprise cloud platform to customers.
- OpenStack private cloud fills a gap in the market. Customers who need a modern API-driven cloud infrastructure can't get by with their existing traditional virtualization deployments, and others also can't adopt public cloud for many workloads for various reasons. OpenStack is one of the very few truly modern cloud platforms, and it is also an open platform that has broad support from the industry, putting it on the short list for customers seeking this functionality on-premise.

» Containers aren't necessarily a replacement for OpenStack. Kubernetes doesn't deal with infrastructure at a low level and assumes that a robust infrastructure is provided for it. OpenStack can be an effective software-defined infrastructure underneath large-scale container deployments. There are other infrastructure options as well, and OpenStack will have to compete on the merits of its infrastructure, yet for highly agile and large-scale container environments, OpenStack could be a highly complementary solution.

Summary and Conclusion

Since 2010, OpenStack has emerged as the leading open source cloud platform, attracting a large community and evolving the code to be feature-rich with enterprise stability. Enterprises are under pressure to deliver services with a cloud-like experience and speed, leading many to pursue private clouds on-premise with OpenStack. OpenStack became a popular choice due to its openness, modern cloud architecture, and broad compatibility. Red Hat is one of the largest contributors to OpenStack and produces one of the leading commercial enterprise distributions.

As illustrated in this white paper, the result for Red Hat's customers is that Red Hat OpenStack Platform is enabling better agility, flexibility, and scalability for their private cloud environment. The business value for these organizations is expressed in areas such as increased staff productivity (through better self-service fulfillment and development operations), improved risk mitigation, boosted business results, and reduced IT infrastructure costs. When these benefits are combined, IDC determined these organizations are realizing an average return of nearly six to one on their overall investment into Red Hat OpenStack Platform.

Appendix - Methodology

IDC's standard ROI methodology was utilized for this project. This methodology is based on gathering data from current users of private cloud with Red Hat OpenStack as the foundation for the model. Based on interviews with organizations using private cloud with Red Hat OpenStack Platform, IDC performed a three-step process to calculate the ROI and payback period:

1. Gathered quantitative benefit information during the interviews using a before-and-after assessment of the impact of a private cloud with Red Hat OpenStack Platform. In this study, the benefits included staff time savings and productivity benefits, and operational cost reductions.

2. Created a complete investment (five-year total cost analysis) profile based on the interviews. Investments go beyond the initial and annual costs of using Red Hat and can include additional costs related to migrations, planning, consulting, and staff or user training.

3. Calculated the ROI and payback period. IDC conducted a depreciated cash flow analysis of the benefits and investments for the organizations' use of a Red Hat OpenStack Platform private cloud reports over a five-year period. ROI is the ratio of the net present value (NPV) and the discounted investment. The payback period is the point at which cumulative benefits equal the initial investment.

IDC bases the payback period and ROI calculations on a number of assumptions, which are summarized as follows:

- Time values are multiplied by burdened salary (salary + 28% for benefits and overhead) to quantify efficiency and manager productivity savings. For purposes of this analysis, based on the geographic locations of the interviewed organizations, IDC has used assumptions of an average fully-loaded $100,000 per year salary for IT staff members, and an average fully-loaded salary of $70,000 for non-IT staff members. IDC assumes that employees work 1,880 hours per year (47 weeks x 40 hours).

- The net present value of the five-year savings is calculated by subtracting the amount that would have been realized by investing the original sum in an instrument yielding a 12% return to allow for the missed opportunity cost. This accounts for both the assumed cost of money and the assumed rate of return.

- Further, because IT solutions require a deployment period, the full benefits of the solution are not available during deployment. To capture this reality, IDC prorates the benefits on a monthly basis and then subtracts the deployment time from the first-year savings.

Note: All numbers in this document may not be exact due to rounding.

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