

White Paper

Advantages of a Common Container Platform over Cloud-Native Services

Sponsored by: Red Hat

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February 2018

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EXECUTIVE SUMMARY

A movement from on-premises datacenters to public cloud environments is inevitable for virtually every organization; some applications and workloads have already moved or are candidates to move in the immediate term. Other applications move on a longer timeline, transitioning when concerns over security, services availability, and potential lock-ins resolve themselves.

IDC sees this latter point as something that concerns CIOs and CTOs as a challenge with public cloud infrastructure and a barrier to multicloud deployments as they undertake application migration and modernization and/or refactoring. Having learned hard lessons related to lock-in from both an architectural perspective and a software perspective over the past 30 years, most executives want to avoid another round of vendor lock-in while maintaining or increasing speed and agility in delivering products.

Global enterprises such as the Royal Bank of Scotland (RBS) and TELUS have chosen to go with a multicloud solution with Red Hat's OpenShift. RBS has been able to launch multiple products demonstrating business value quickly, without concern over the cloud hosting environment. TELUS emphasized the value of using OpenShift rather than consuming cloud-native services.

With OpenShift as the common denominator, IDC sees Red Hat well positioned to help organizations address previously mentioned challenges with critical emerging technologies – such as Kubernetes, containers, DevOps processes, and management tools – for application modernization.

As customers move forward with cloud adoption and deployment, Red Hat faces the complexity of expanding its portfolio with a platform that is not based on its traditional Linux server roots but a solution that provides a deployment environment that bridges and unifies multiple clouds. Red Hat can offer integration across multiple public cloud providers by building a true ecosystem of openness and freedom of choice for customers.

The bottom line is IT executives want to be sure that they are not locked into a cloud vendor or platform simply by adopting a given vendor's proprietary managed service, especially for rapidly evolving database, container, and functions/event-driven technologies. Concerns around scale and technical limitations, as well as the rejection of long-term service-level agreements (SLAs), are driving CIOs and CTOs to embrace broad vendor support for open source initiatives such as the Open Container Initiative and the Open Service Broker API project and various other initiatives driven by foundations such as the Cloud Foundry Foundation, Linux Foundation, Mozilla Foundation, and Cloud Native Computing Foundation.

SITUATION OVERVIEW

Multicloud and Container Strategies to Accelerate Digital Transformation

As part of companywide digital transformation (DX), CIOs and CTOs are focused on creating business value and competitive solutions for their organizations. In discussions with IT leaders in the past year, IDC sees organizations actively evaluating the benefits, risks, and economics of four key decisions:

- Where to invest to accelerate digital transformation of organizations
- Use of one public cloud provider versus multiple public cloud providers, including a hybrid cloud environment
- The optimal strategy for adopting containers and Kubernetes orchestration for both existing applications and new cloud-native applications
- The appropriate level of investment in vendor-specific technologies and services versus open source, cross-platform solutions

These decisions have long-term and interconnected impacts and are critical for enabling a successful digital transformation that delivers new offers, new business models, and new customer experiences.

Accelerating Digital Transformation

IDC defines the DX platform as a technology architecture enabling the rapid creation of externally facing digital products, services, and experiences while aggressively modernizing the internal IT environment toward an intelligent core. IDC believes that successful DX requires a consistent platform approach in methodology, architecture, and best practices within a complex environment of technology (cloud and on-premises, process, and data integration), information (enterprise and third party), people (business and IT), and process (enterprise and partner).

In these early days of DX activity, CIOs and CTOs can see and have seen business benefit from adopting multiple "sandboxes" or point solutions and bespoke open source tool and platform implementations that address specific needs. However, IDC believes that a successful long-term DX strategy will embrace a move to a more consistent platform approach across business divisions, public and private clouds, and application architectures.

Companies are already moving DX out of the sandbox and into the core of their business. Our research finds that today 70% of CIOs have a "cloud first" strategy, and nearly all IT buyers are reconsidering their IT best practices to embrace hybrid and multicloud construction and DevOps processes, secure data management, end-to-end governance, updated IT skills, and improved multivendor sourcing.

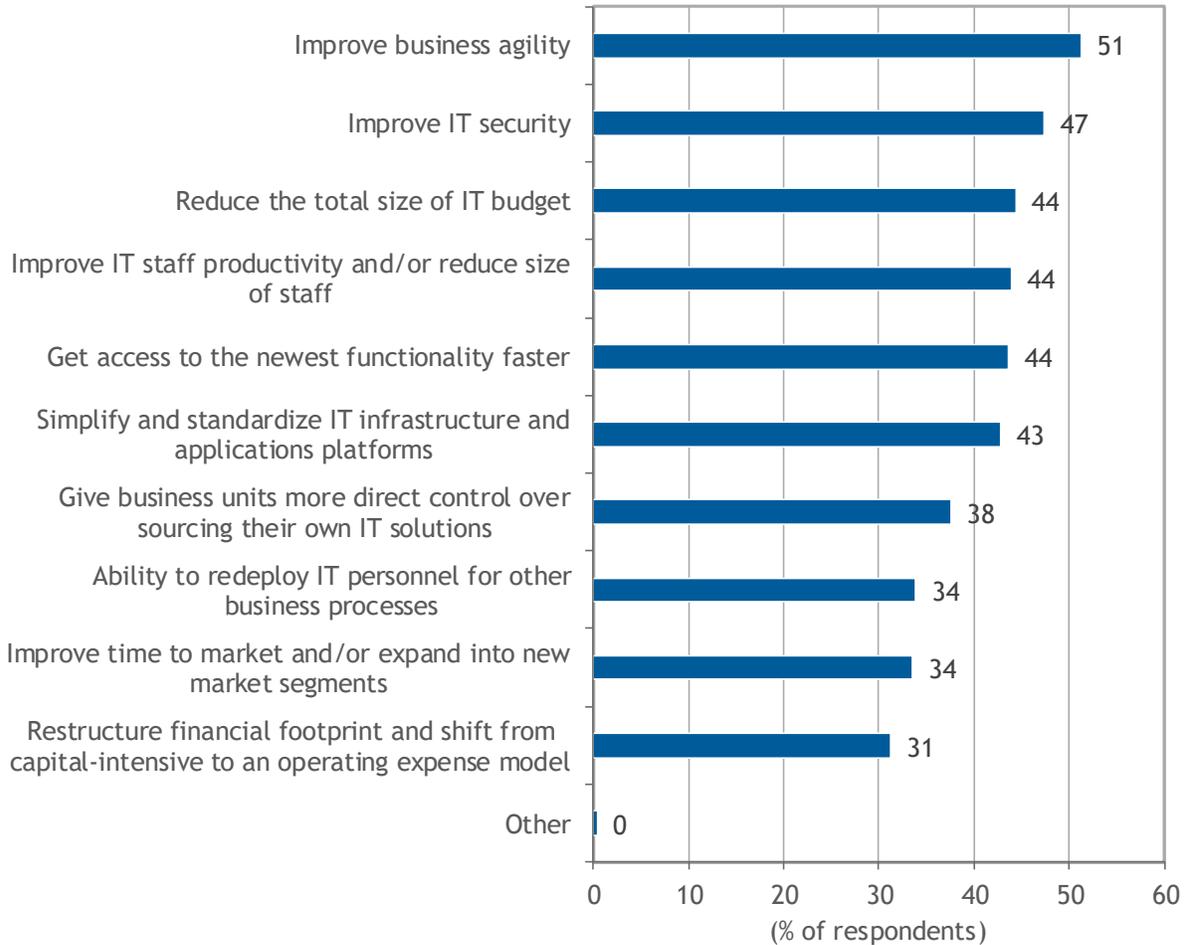
A successful cloud-first strategy translates to positive business outcomes such as faster time to market for a new product, reduction in capital and capex, the ability to analyze data and make decisions faster while maintaining low fixed costs when trying a new concept, and the ability to scale dynamically in response to unanticipated (or anticipated) traffic from an online marketing campaign.

Figure 1 presents data from IDC's 2017 *CloudView Survey* showing the expected benefits associated with moving to a cloud deployment model.

FIGURE 1

Expected Benefits of Public Cloud Use

Q. Of the following potential benefits of public cloud, which of the following do you expect to achieve as a result of your cloud strategy?



n = 1,520

Source: IDC's *CloudView Survey*, 2017

Clouds Everywhere

Multicloud used to refer to the use of a private cloud and a single public cloud provider such as Amazon Web Services (AWS), Microsoft Azure, or Google Cloud. Multicloud now also refers to the use of multiple public cloud providers in addition to a private cloud. Multicloud preferences are continuing to grow among customers looking to reduce risk from a single provider. Meanwhile, the term *hybrid cloud* has come to be associated with an on-premises private cloud that is federated with a public cloud in some way.

Because of the technical complexity, hybrid cloud implementations today are less common than multicloud implementations in large enterprises. Hybrid cloud implementations typically involve having a first cloud that contains one set of data or applications that actively interacts with and is tightly coupled (in terms of networking, security, and management) with a second cloud to deliver a service.

Hybrid clouds often are implemented because of security, compliance, or latency requirements, allowing an organization to selectively place some application content and data on private cloud resources, linked with public cloud resources for other application content. Because of the inherent complexity of this approach, customers often turn to vendors to provide design guidance, support and management of hybrid solutions, or platform features that abstract away the complexity of implementing hybrid architectures.

The way in which vendors are overcoming this complexity is changing, with some vendors offering on-premises products designed to extend to an operationally similar public cloud environment. In the case of Red Hat and its OpenShift technology, the OpenShift environment helps provide that bridge so that the demarcation lines that divide the two environments become far less visible.

For many customers, growth of commercially supported solutions that help span hybrid cloud infrastructure and multicloud environments has come at a time when native solutions are also seeing significant interest in the industry. However, we note that the complexity of configuring, managing, and "life cycling" cloud-native technologies such as Kubernetes orchestration systems and cluster configuration and management is something that draws organizations back to a model of becoming infrastructure experts rather than being experts in their vertical application environment. In the end, a company is best served by building applications that help the company compete in its primary line of work compared with getting mired in the business of running infrastructure – particularly because cloud solution providers can do a far better job of running that infrastructure at a lower cost.

Container Use Explodes

With growing business pressures to accelerate development, deployment, and agility, CIOs and their teams should consider using emerging application packaging and orchestration technologies (containers) in conjunction with best practices (DevOps) to drive faster time to market and cost optimize development and deployment resources. Container technology can help application development teams increase the frequency of their code releases and improve code quality while decreasing the frequency of code being released with bugs.

Container adoption and purchasing plans are often linked to DevOps, hybrid or multicloud initiatives, and adoption of new cloud-native application architectures. By 2019, at least one-third of all public cloud IaaS capacity will be consumed by container workloads. IDC believes that adoption of containers on-premises is in early stages but is growing at a fast pace similar to that of enterprise container deployments on public clouds.

By providing abstraction from the underlying infrastructure, containers enable consistent, efficient deployment and updating of applications across public and private, virtualized, and physical infrastructure. As a first step, many organizations gain first experiences by packaging existing monolithic applications in a container.

But new innovation is the longer-term benefit because organizations drive innovation by building new applications based on containers and a distributed microservice architecture. The top enterprise drivers for adoption of containers are business agility, application performance, and software development life-cycle acceleration. These drivers align with the top drivers for adoption of multicloud and hybrid strategies.

IDC has observed that many organizations are likely to prefer container management solutions that are embedded as part of broader application or infrastructure management solutions or part of cloud IaaS or PaaS. IDC believes that interest in point solution container management offerings is likely to be limited over time as solutions become more bundled and integrated. Container orchestration is progressing, with Kubernetes becoming the de facto standard; almost every major software and public cloud vendor has delivered technical integration with Kubernetes in the past 18 months.

However, CIOs and CTOs often report that adoption of containers, Kubernetes, and microservices can be challenging, especially when an organization is expanding its multicloud and hybrid cloud investments. Because of this complexity, customers are looking to their platform providers to help them use containers and Kubernetes to build new applications as well as migrate and refactor existing (legacy) production applications.

Ease of Service Integration in a Multicloud World

Although CIOs and CTOs are concerned with technology lock-in, they also want to empower their IT organizations to use the best technologies as needed and to realize the benefits of a hybrid cloud implementation. As evidenced by the rapid revenue growth associated with AWS and Microsoft Azure's storage and database services and the cost savings for enterprises relative to on-premises storage and database services, enterprises will continue to use native public cloud services – providing it makes economic or technical sense.

IDC expects enterprises to leverage a mix of native cloud managed services and privately managed services for years to come. For instance, an enterprise may choose to deploy its privately managed application development tool chain and container-as-a-service or PaaS solutions on a public cloud such as AWS or Microsoft Azure. The enterprise may then choose to also use the public cloud provider's native storage or database service such as AWS S3, AWS Relational Database Service, Azure Storage, or Azure Cosmos Database.

Even after implementing only a few incubation microservices projects that leverage both a privately managed service and a public cloud-native service, enterprises quickly realize that ease of service integration is a key requirement and value-add that differentiates vendors. It is impractical for even the most advanced enterprises to devote significant resources to architect, implement, and maintain integrations with public cloud providers' native managed services. Enterprises are looking for open service broker standards and preconfigured integration templates so that they can focus on the development and maintenance of applications that provide innovation and differentiation and revenue for the business. Ease of service integration is a critical aspect of achieving a hybrid and multicloud strategy.

Key Public Cloud Advantages

DevOps, Innovation, and Automation

IDC defines DevOps as a methodology, a set of practices, and a set of enabling technologies that unify a highly collaborative team (consisting of business leadership, design, development, testing, process and portfolio management, deployment, and operations) to be responsible for the creation and delivery of business capabilities. DevOps methodology encourages integrated service delivery across development, operations, and security teams rather than siloed teams.

To varying degrees, DevOps plays a part in most large companies' digital transformation, enabling organizations to build applications faster, encourage innovation and risk taking, and align the organization on common business and customers goals. Business stakeholder accountability and influence increase because of the tighter integration of business outcomes with IT application development and operations.

IDC has identified automation and shared tooling across development and infrastructure teams as the two essential ingredients for successful DevOps adoption. In addition, IDC believes that a consistent infrastructure platform across multiple clouds is a key ingredient that allows organizations to more quickly scale DevOps across multiple teams and to train and retain key talent. Enterprises have demonstrated that DevOps practices provide value to both new and existing (legacy) application development and management. If a company is focused on driving differentiation and innovation based on software, adoption of DevOps practices is essential for success.

BEST PRACTICES IN CLOUD MIGRATION AND APPLICATION MODERNIZATION

Cloud Migration

Nearly all organizations are undergoing some form of digital transformation. IDC believes that most, if not all, DX initiatives require a cloud transition strategy as the underlying premise for success.

While most organizations approaching new IT investments do so with a cloud-first stance, there's less clarity on how to use cloud solutions for the migration of existing workloads. Not all workloads should migrate to the cloud, but for workloads that are identified as good candidates, standardizing on a PaaS platform will drive speed and quality for the transition.

As previously stated, security is both an inhibitor and a driver for cloud migration. With more and more mission-critical data and applications moving to public and private cloud environments, and even though internet-enabled threats are constantly changing and growing in sophistication, customers are realizing that improved security can be an important benefit of cloud adoption.

Leaders in this transformation have the future of computing in their crosshairs: hybrid cloud environments, microservices, containers enabling scale, continuous delivery, and API-driven workload management. Leaders are developing plans to embrace cloud infrastructure as a natural extension of existing infrastructure and planning for portability across multiple clouds, from on-premises and public sources. It is essential that security be built in throughout the integration portfolio to ensure that developers are at ease in delivering compliant solutions.

Application Modernization

The notion of application modernization correctly implies that an application exists that must be updated, potentially refactored, and deployed in modern infrastructure. For applications targeted to migrate to a cloud environment, organizations will adopt one of the modernization approaches discussed in the sections that follow.

Lift, Encapsulate, and Shift

Existing workloads that simply need to move to the cloud to take advantage of IaaS (public or private) can leverage either a virtual machine packaging or container packaging approach, which offers the most cost-effective solution. For many organizations, the first container experiences are more likely to be associated with a so-called lift-and-shift action on existing monolithic applications from a dedicated virtualized environment into a similar virtualized environment, but with the application and its key dependencies logically grouped together by the container packaging.

Lift, Shift, and Extend

Assuming an application is expected to continue to need investment and expansion, a simple encapsulation may not be sufficient. In this case, customers may encapsulate large portions of a given application in a container, easing the deployment of that application in a cloud environment. However, the application is likely to be extended with APIs that allow external (potentially new) processes to interact with the legacy application. In this scenario, the extensions are written using cloud-native, microservices, or function environments and tap the core legacy application for data, business logic, or other features.

Refactoring

In business-justified cases, full refactoring of existing applications into a microservices or function architecture may be justified. However, this can be a time-consuming and costly approach, without a well-defined return on investment. Many enterprises are most likely to use either the lift-and-shift or lift-and-shift-and-extend approach. In comparison, ISVs more frequently must rebuild their legacy applications if they wish to be competitive long term.

Determining the Right Path

The reality is that most organizations will use a mix of all three previously mentioned approaches to application modernization, with the mix of scenarios dependent upon the vertical industry and the aggressiveness of other players that an organization competes with, the sophistication and willingness of an organization to truly innovate, and the ability of the IT staff to successfully modernize applications. Common mistakes include organizations that bite off too much at once and, at the other extreme, organizations that fail to be aggressive enough in modernizing.

Investment Considerations

Avoiding Multiple-Year Licensing Agreements and Public Cloud Vendor Lock-In

With the adoption of public cloud as part of the digital transformation strategy, CIOs and CTOs frequently report that an accompanying goal is to avoid 10-, 5-, or even 3-year licensing or subscription agreements – especially agreements requiring a traditional up-front payment model. The pace of innovation and the changing developer and business needs make long duration licensing agreements an impediment to a successful digital transformation, unless the benefits (such as significant discounts and improved support) outweigh the risk.

Most native cloud managed services are often highly opinionated in terms of architectural design, best practices, and management tool support. Even when a cloud managed service is based on open source software, the implementation by the public cloud provider is often highly opinionated and essentially a form of lock-in. Although the ability to migrate from one public cloud provider to another is possible – and a key concern addressed up front by every cloud provider as part of its sales process – the reality is that most apps and most organizations will rarely migrate from a native service of one cloud provider to another cloud provider because of the limited upside relative to the technical complexity and risk.

Rare exceptions include situations where an organization encounters severe technical limitations with a native public cloud service or reaches such a scale of implementation that cost savings and management overhead warrant a migration (and often a complete rearchitecture of the service).

CIOs and CTOs want to be sure that they are not locked into a cloud vendor or platform simply by adopting a vendor's proprietary managed service, especially for rapidly evolving database, container, and functions/event-driven technologies. Concerns around scale and technical limitations, as well as the rejection of long-term SLAs, are driving CIOs and CTOs to embrace broad vendor support for open source initiatives such as the Open Container Initiative, the Open Service Broker API project, and the Open Security Initiative of the Linux Foundation and various other initiatives driven by foundations such as the Cloud Foundry Foundation, Linux Foundation, Mozilla Foundation, and Cloud Native Computing Foundation.

RED HAT OPENSIFT

Red Hat's OpenShift portfolio consists of three container-centric platform offerings, leveraging the full stack of Red Hat technologies. OpenShift Container Platform is a subscription software product, and OpenShift Online is a multitenant container-based public cloud application development and management platform. Available as a freemium solution since 2011, the OpenShift Online Pro paid service was released in July 2017. OpenShift Dedicated is a single-tenant platform on public cloud, fully managed by Red Hat administrators, and runs on Microsoft Azure, Google, or AWS infrastructure.

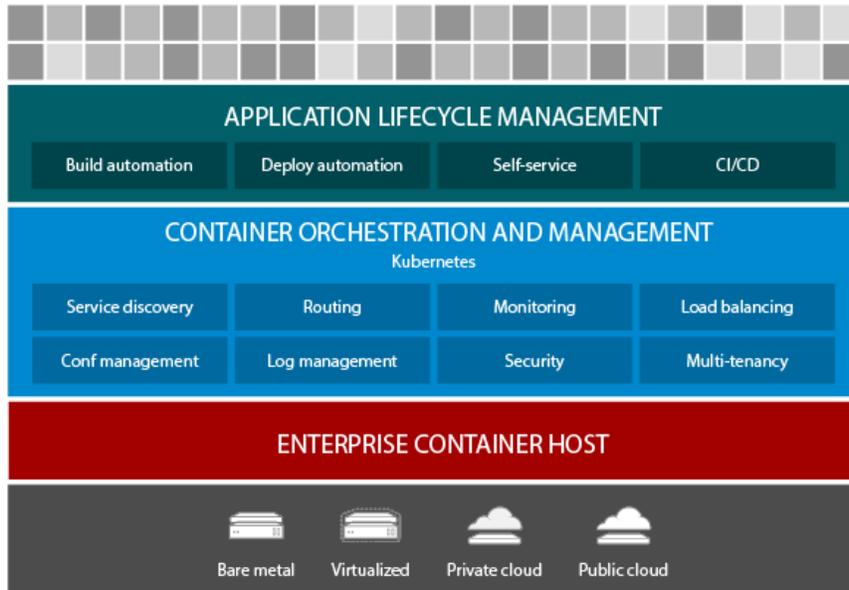
OpenShift's value proposition is presented by Red Hat as "any app on any cloud," with multiple pricing models and operational models for customer flexibility and optimization. OpenShift provides a consistent operational model for both developers and operations professionals across any cloud platform, which eases a major pain point associated with many hybrid cloud environments.

To truly provide a modern cloud development and deployment environment in today's open source-first world means embracing open source software from end to end. There may be room for proprietary extensions and additions alongside open source software, especially where open source alternatives are immature. However, any vendor that fully substitutes a proprietary component where there is an open source alternative risks an outright rejection by cloud-native developers.

Red Hat has been one of the most successful open source technology companies and has a 20+-year history as an enterprise solution provider. The company's deep engineering DNA and commitment to open source communities – often betting on thriving communities, not just on technology – have enabled Red Hat to build a portfolio of modern solutions and capabilities that can withstand the test of time with agility and cost-effectiveness (see Figure 2).

FIGURE 2

Red Hat OpenShift for Open Hybrid Cloud Deployments



Source: Red Hat, 2018

Technical Advantages

Red Hat's investments and product development strategy revolve around what the company calls "open hybrid cloud" (public and private cloud based on open source technology) to provide application portability. Accordingly, Red Hat has built a formidable infrastructure stack around Linux, JBoss, Ansible, and a variety of runtime-enabling solutions and offers a product portfolio that makes application development, data storage, security, and management a seamless experience for customers.

OpenShift is a portfolio of solutions that enables developers to build applications inside of a container and run, orchestrate, manage, and "life cycle" that application code. Developers can use the OpenShift platform with local or remote installations, and their applications can easily be packaged in Linux containers by default. The platform integrates all Red Hat services, and users can easily access third-party development tools.

Of particular interest, in a partnership agreement announced earlier this year, Red Hat will provide access to AWS services in the OpenShift service catalog, making those services accessible to applications running on OpenShift regardless of where applications are physically deployed. As part of the agreement, Amazon will provide and support the service broker for its services in a service catalog provided by Red Hat.

While AWS services are consumable using APIs through any application, Amazon leaves the responsibility of end-to-end integration to the developer. Red Hat now builds the capability to consume those APIs into the OpenShift console and gives access to a variety of AWS services to developers through a few clicks. With AWS constantly adding to its portfolio of services, this opens evolving AWS services to enterprises as they become available. IDC suspects this nonexclusive relationship is just

the first of what will eventually become many. We can see Red Hat potentially adding Azure services, Google services, IBM's Watson Developer Cloud, and other services, building a true ecosystem of openness and freedom of choice for customers.

Another common thread that Red Hat has been weaving across its infrastructure portfolio is Ansible for automation and CloudForms for management. Acquired in October 2015, Red Hat has integrated Ansible across its management portfolio (consisting of Ansible Tower, CloudForms 4.5, Insights, and Satellite) to enable full-fledged IT automation and cloud management across virtualization platforms, such as Red Hat Virtualization, VMware vRealize, and Microsoft Hyper-V. There are also plans to extend Ansible-powered automation across more areas of the company's infrastructure and DevOps portfolio to realize Red Hat's vision of an automated enterprise.

Business Advantages

Consistency reduces complexity, which in turn reduces risk and cost and increases agility. An enterprise can have a consistent development and deployment environment with known tools that remain version consistent and up to date thanks to the services being delivered by Red Hat.

Because different development groups inside of enterprises have different needs, OpenShift offers flexibility. Users can run cloud-native apps or perform "lift and shift" of legacy applications. Developers can push code and leave the container building to the platform, or they can build their own containers and use Kubernetes to manifest and run them.

Red Hat's R&D, rapid application development, and next-generation architecture enable developers to build cloud-native apps that can be easily and seamlessly containerized, deployed, integrated, and managed on OpenShift. Red Hat argues that this should lead businesses to better decision making through machine-learned recommendations, minimize risk, and increase code quality. IDC believes this is in line with market expectations around speed and agility of digital transformation platforms.

The benefits of OpenShift for organizations may include many of the following points:

- **Reduced risk**
 - By owning the container platform, customers own the life cycle of the platform as well as the contents of the container. Consuming a vendor container platform helps eliminate that risk.
 - OpenShift essentially layers a consistent container environment across each deployment cloud, eliminating unique lock-in for any individual cloud.
 - A single vendor supports the full stack of OpenShift, from the container image to the container host.
 - Red Hat security value-add includes OpenSCAP, Network Isolation, and Red Hat's Security Response Team.
- **Reduced cost**
 - A common deployment environment means greater scale with less unique learnings for each deployment environment. This also means less training for engineering, operations, and development teams across each deployment environment.
 - OpenShift enables companies to solve and manage enterprise integrations consistently.
 - Fewer people are required for operating disparate environments.

- **Increased agility**
 - Applications can be easily redeployed from one cloud environment to another across both hybrid and multicloud environments.
 - Applications can be easily repatriated to on-premises, if needed.

OpenShift Customer Profile: The Royal Bank of Scotland

The Royal Bank of Scotland is a large international banking and financial services company with nearly 80,000 employees globally and over 24 million customers, operating in a heavily regulated industry. A global bank with 200 brands, RBS has jurisdictional requirements on IT infrastructure and data, such as geographic location, that vary. The company is in the process of complying with new banking regulations for maintaining capital structure in the United Kingdom, required by January 2019. IT transformations have included combining formerly siloed organizations, technology, and processes under a single structure and CIO.

RBS' technology strategy focuses on agility and innovation through the use of microservices, eliminating vendor lock-in or long-term enterprise license agreements; implementing service integration across technology and native cloud managed services, multicloud, or hybrid cloud; and empowering developers with commodity services (as in the open service broker API), thereby reducing customized or operations-based solutions.

Cost reduction is a prime focus for RBS, and the company has a mandate to avoid being "locked in" to any single vendor or infrastructure. Rather, the company has prioritized a multipartner and multitechnology approach. Platforms must work on any cloud and integrate with native public cloud services via service broker (private cloud, AWS, IBM, Microsoft Azure, or Oracle or other foundations such as the Cloud Foundry Foundation).

RBS chose OpenShift Online and OpenShift Dedicated (Red Hat managed), giving the company an agnostic platform offering with a combination of native public cloud services (e.g., AWS AI service and Azure Machine Learning service).

Rather than building out its own infrastructure, RBS did not have to worry about the hosting environment (Microsoft Azure, AWS, or any future cloud). For example, if a business unit wants to use Oracle Cloud (and OpenShift was to be offered there), that is acceptable based on IT policy. The IT team's main focus is on integrating pipelines and tool building (not on infrastructure or initial deployment). RBS views this as the primary benefit.

The implementation of OpenShift platform was fast, according to RBS. The company cited a low-friction deployment experience to get an OpenShift reference platform running on AWS. The company's developers had more agility. RBS has been able to launch multiple products demonstrating business value quickly given its customer-based evaluations.

RBS describes the 18 months since partnering with Red Hat for deploying Red Hat OpenShift as a journey. With global regulations and the company's many brands and business units, RBS still doesn't know where the majority of apps will run, and no single provider or solution is dominant yet. But RBS says that OpenShift is a key enabler of its "Open Banking" initiative where heritage (legacy) systems and data interact with new services and applications and drive new sources of revenue.

CHALLENGES/OPPORTUNITIES

Challenges and opportunities that customers face in adopting a deployment environment spanning multiple clouds include the following:

- **Stakeholder involvement.** Organizations experience a natural hesitancy to embrace change, possibly fueled by perceived concerns that may be outdated (such as career risks or being displaced by outside vendors or services). In addition, executive stakeholder involvement is key. Opportunities for career growth and learning new skills counterbalance concerns.
- **Developer shortages.** Skilled developers are a precious commodity, and the best developers will be difficult to retain, given the urgency for organizations to move quickly on DX initiatives. Opportunities exist for companies with existing work to bring strong talent aboard to help other staff up their game. In addition, this shortage of developers has led to growth of no-code/low-code approaches to application development.
- **Security.** Security has long been the number 1 concern about moving to public cloud infrastructure because of the shared resource model. Security concerns span data sovereignty, data privacy, and regulatory or compliance issues of cloud services. An often overlooked opportunity is to improve security because most cloud service providers can (and do) offer better security than an organization's own IT department.
- **Life-cycle management.** Application life cycles are changing, with modern cloud-native applications likely to see a fast-evolving development process. This is a challenge for most organizations to embrace, especially if their experience is largely limited to waterfall development processes. This also provides an opportunity to improve the agility and speed of response at organizations that learn how to develop with a modern DevOps practice model.

CONCLUSION

A substantial change in cloud adoption, deployment simplification, and application portability is taking place in the industry. The demand for cloud continues to grow, and enterprises now anticipate that a cloud architecture will dominate their spending for the next several years.

With the growing sophistication of cloud-native applications, microservices, and containers, customers are looking to their application platform providers to help them use containers to transition and extend existing production applications to be useful in public or private cloud. All this technology sophistication is exciting, is readily accessible, and can be freely had as open source, community-supported software.

However, companies should maintain a focus on what their core mission is: being a bank, a retailer, or a manufacturer and not an infrastructure software company. As such, they should focus on building applications that help them compete in their primary line of work.

Companies that are in the business of helping abstract the underlying, enabling technologies that make public cloud infrastructure cost effective should be seen as partners for organizations driving their DX. In addition to cloud providers, vendors such as Red Hat remain instrumental partners for many companies today. Having already pivoted into a new market position where it can meet the needs emerging from the developer community, Red Hat is bringing its strengths and its extensive experience commercializing Linux and related open source technologies to its PaaS and container platforms.

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