Applications are the lifeblood of successful enterprises; modernizing existing apps through a transformation into a cloud-native format is key to long-term success.

Transforming Workloads Through Application Modernization

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Introduction

IDC estimates there are 500 million legacy applications in use around the world. The vast majority are found on x86 servers, with most running on virtual machines (VMs). There is investment taking place today focused on bringing these applications onto a more modern deployment platform by leveraging technologies such as containers and cloud services. This approach enables organizations to follow one of several known, viable paths designed to improve the operations, maintenance, and functionality of these critical workloads.

There is no one-size-fits-all solution to application modernization and transformation. Most organizations will choose from a spectrum of solutions applied on an application-by-application basis. Considerations include the criticality of the application, the future needs that it must meet, and its role in the context of new cloud-native applications, as well as other factors that are unique to industry verticals and individual companies' installed portfolio of applications.

This IDC Spotlight considers the options available to achieve application modernization — and the ways those applications can be replatformed and transformed.

Planning for the Next Generation of Application Deployments

Most organizations have a mix of new and legacy applications, with the latter being expensive to maintain and frequently hosted on aging infrastructure. Virtual machines host most of these today. This situation provides a suitable — and often a desirable — starting point for the beginnings of an application modernization strategy.

IDC defines cloud-native development as a process that leverages the conjunction of microservices, containers, Kubernetes orchestration frameworks, and DevOps. Often referred to as modern application development, cloud-native development features a specialized set of tools optimized for the cloud and distributed infrastructures, which are often referred to as modern platforms. Legacy applications need to live in a world that is increasingly cloud native first.

AT A GLANCE

KEY TAKEAWAYS

» There are many dimensions to application modernization that must be considered, along with a robust set of activities such as rehosting, replatforming, and re-architecting.

» Most developers are familiar with cloud-native development and the tooling that enables it. Developers are anxious to put those skills to work today.

» A variety of solutions are on the market today to address these challenges and opportunities.

However, there will be a lengthy period in which unchanged legacy applications, legacy applications in the process of modernization, and brand-new cloud-native applications will coexist. When it becomes possible for these legacy applications to coexist on the same infrastructure as cloud-native applications, organizations will be able to benefit either by streamlining their internal infrastructure needs or by consolidating both classes of applications on the same modern cloud platforms in a private or a public setting.

While discussion in the developer world is focused on the benefits associated with modern cloud-native applications, many existing workloads are candidates for a less extreme makeover. Existing applications can go through a set of incremental steps that move them to platforms that set the stage for further modernization. Modern cloud-native development techniques often can be used for modernization of discrete portions of legacy applications, but for many businesses, successfully colocating a legacy application on a modern platform is considered a win.

There are a series of options that organizations have for existing applications, including the following:

» **Retire/replace:** Applications that have lived out their expected life cycle, are no longer viable on their current platform, and are not modernization candidates face either retirement (if not heavily used) or replacement with a commercially available software-as-a-service offering.

» **Retain:** Applications that serve a continued need, but may not be candidates to move to a new platform, may be retained for the immediate future, either on premises or in a private colocation environment. Given the overlapping length of time between each technology wave and its successor, this is a viable strategy for as much as a decade to come, assuming that there is still support available for that application either internally or through the ISV that created it

» **Rehosting/replatforming:** The separate but similar notions of rehosting and replatforming offer a way to bring an existing application onto a more modern platform from its current location. In the case of rehosting, this would mean moving an application from its current platform — most often an in-datacenter virtualized server — to a cloud platform in a similar virtualized deployment environment. Replatforming goes one step further. It may involve making minor changes to the application to allow it to take advantage of the cloud platform where it is deployed, such as letting the application utilize some cloud services such as a local cloud database or data streaming services.

» **Refactoring/re-architecting:** These two actions also have similarities. Refactoring involves modifying the application to take advantage of the new platform on which it is running. This may involve a virtual machine-to-container migration, or it might involve some disaggregation of the application to move certain functionality out of the core application and into a function service, for example. By comparison, a re-architecting is a far more aggressive reworking (rewriting) of the application, and it may involve disaggregation of the application into smaller components. An extreme case would be rebuilding of the application's functionality into discrete microservices.

Getting Started

There is no singular approach to application modernization. For most companies, the first step is to inventory the application portfolio and triage that list into subsets of applications that are candidates for the form of modernization that may best apply to them. Most organizations running a virtualized infrastructure on premises or in a colocation facility are often in a position to consider a rehosting move as a first step into a new deployment model. The risks associated

with rehosting are low. By rehosting onto modern cloud infrastructure, organizations can move away from legacy datacenters, and applications can be colocated with new modern cloud-native applications, reducing latency for the two environments to work together. While some organizations are satisfied with a rehosting action and don't immediately look to further modernize, other organizations see a rehosting action as an enabler for future optimization.

Once an application has been rehosted, replatforming is logical next step, with virtual machine-to-container packaging as a safe and practical way to take an incremental step toward a modern architecture. In addition, some organizations will include a replacement of formerly on-premises resources in their replatforming activity. It is common for organizations that replatform applications to consider and embrace multiple cloud-based resources such as identity services and database services as part of a larger modernization activity.

For some organizations, rehosting, replatforming, and initial steps into refactoring will be consolidated into a single step. They will migrate virtual machines on premises directly to a containerized deployment on a cloud platform — and in the process, leverage other cloud services. This type of replatforming movement is common, with numerous vendors offering tools that can repackage a virtual machine into a container for deployment natively onto Kubernetes orchestration systems.

Benefits

There are long-term benefits associated with moving applications via rehosting.

Once a company has decided to update installed applications – regardless of whether this is a short-, medium-, or long-term commitment – it is a natural next step to think about subsequent plans for replatforming, refactoring, or re-architecting.

Rehosting has the immediate benefit of allowing an organization to shift capital expenses associated with datacenter construction and provisioning over to an operational expense model through the placement of applications in a cloud provider's infrastructure. This is a well-known path for organizations to follow, with low associated risk.

After a rehosting shift is complete, it becomes practical to begin the process of replatforming applications by leveraging commonly used services such as identity and access management, databases, and data streaming from applications supported by the organization itself. Organizations can also turn to services offered by the cloud provider. Replatforming often has no impact on the application logic itself, only the external services used by the application.

Those that opt to go a step further and begin the process of refactoring and re-architecting have the opportunity to move their applications from a legacy format to a modern deployment scenario. One common form of refactoring is the movement of an application packaged in a virtual machine to a container package, allowing that application to run directly on a Kubernetes orchestration environment. It should be noted that not every application will be a candidate for a full re-architecting.

Trends

Most developers view emerging trends in a favorable manner, recognizing that technology is evolving quickly and failure to move ahead with the industry has costs, both professionally and for their organization. Failure to embrace new technologies can put the organization at risk of being outflanked by competitors. It also carries the risk of retaining higher-cost models associated with aging development techniques, deployment models, tools, and resources. But the

cost for developers is also personal, with an individual's professional value tied to the development skills and knowledge they possess. IDC finds that the majority of developers are highly focused on moving forward with the industry.

IDC survey research finds that 31% of developers worldwide say they are extremely familiar with Kubernetes orchestration systems, which would typically host and manage modern applications in a containerized deployment. Another 40% say they are very familiar with Kubernetes. Less than one-third say they are moderately or less familiar with Kubernetes orchestration systems.

As noted in Figure 1, over 23% of IDC survey respondents use containers regularly today, while 27% use microservices regularly today. Further, 39% are piloting the use of containers and 36% are piloting the use of microservices. Microservices are the way modern applications are architected, and containers are the preferred way of packaging these applications. Both containers and microservices are aligned very closely with a Kubernetes orchestration environment when it comes to deployment. IDC expects Kubernetes orchestration platforms to be the most common deployment environment as organizations quickly shift away from an operating system–centric deployment model.

FIGURE 1: *Adoption of Refactoring Technologies*

Q *Describe your organization's degree of adoption of the following technologies.*

■ Using regularly
■ Piloting
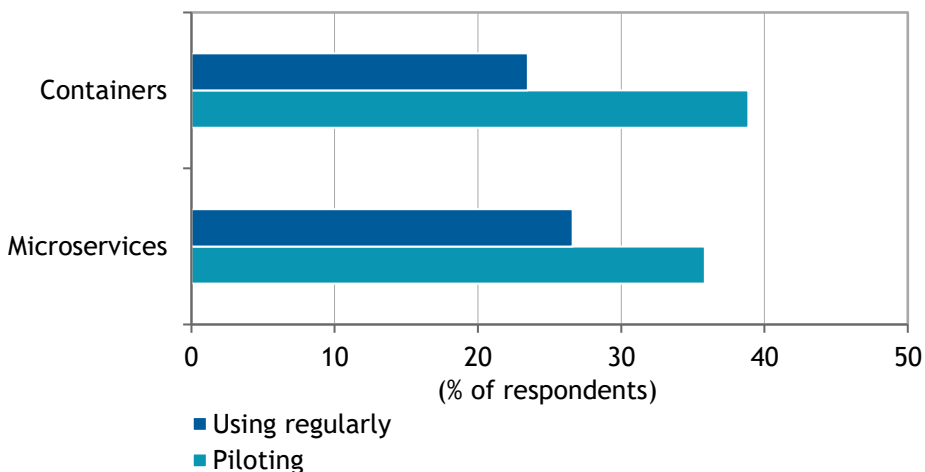
n = 2,454 worldwide

Source: IDC's PaaSView and the Developer, 2021

IDC research finds that most organizations are already moving forward in modernizing their applications, as indicated in Figure 2. For this survey question, IDC grouped together a collection of modernization technologies, including the introduction of modern application development architectures, the use of practices such as packaging of applications using containers, construction of new applications and components using microservices, use of DevOps, cloud-based IDEs, use of APIs for services, use of containers, and cloud deployment.

Using this broad definition of application modernization, survey data shows that all organizations surveyed are moving toward modernizing their applications. In fact, 98% of respondents are embracing one or more of these modern application development and deployment techniques within their organization, with two-thirds saying that over 60% of their applications have benefitted in some way from the activities associated with application modernization.

FIGURE 2: *Modernization Efforts on Legacy Applications*

Q   *What proportion of your legacy applications have been modernized?*
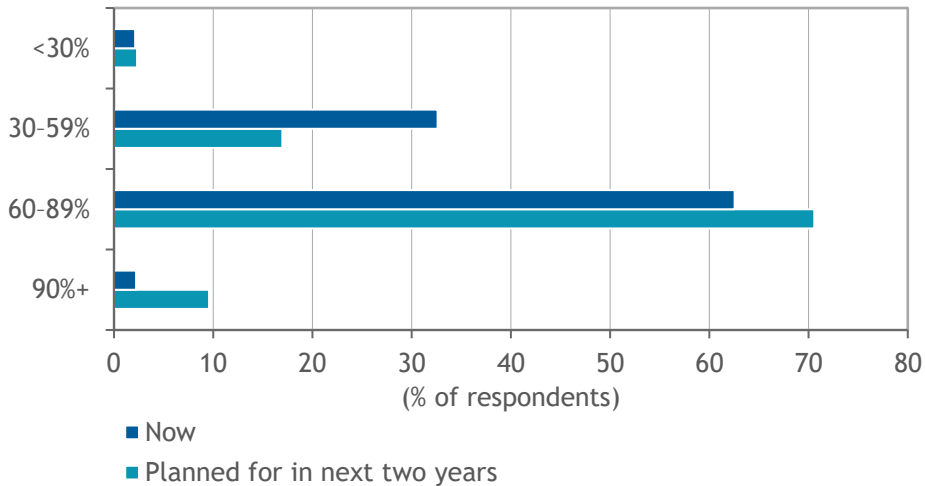
n = 2,335 worldwide

Source: IDC's PaaSView and the Developer, 2021

The takeaway from this data is that most organizations recognize the need to modernize their applications and have already begun to embrace technologies that enable them to make progress on modernizing their application portfolio. In parallel, most of these same organizations are using cloud-native technologies as the underpinnings of new applications being developed from the ground up.

Considering VMware

Application Transformer for VMware Tanzu is a tool that the company created to aid customers as they develop a plan to modernize existing applications, particularly those living in a VMware virtualized environment. Application Transformer for Tanzu provides discovery, analysis, and tooling that helps modernize applications, particularly through replatforming in its first release.

VMware announced the tech preview of the product in 2021, and it became generally available in February 2022. The company anticipates that this product will initially be used as a first step of a modernization process and not primarily as a vehicle to drive rehosting and replatforming activities. VMware expects that Application Transformer for Tanzu will first be used for the purpose of moving existing VMs into containers, with customers eventually deploying those containers on a VMware Tanzu platform.

VMware is focused on developers along with infrastructure management professionals. The company realizes its traditional customer base — VM administrators or people on the operations side of the business — are not necessarily the individuals who will be converting VMs into containers.

Application Transformer for Tanzu is most likely to deliver immediate benefits for customers that are ready to perform a VM-to-container migration. The conversion process creates a containerized application that can deploy on any Cloud Native Computing Foundation–compliant Kubernetes cluster.

That VM-to-container conversion provides an immediate benefit to the customer, consolidating and containerizing existing applications together with brand-new cloud-native applications on the same deployment platform, typically VMware Tanzu Kubernetes Platform. After that consolidation is complete, organizations that want to do more in the future can leverage Tanzu Application Platform (TAP) to create brand-new cloud-native applications.

Application Transformer for Tanzu is a web-based technology, delivered as an entitlement associated with Tanzu platform in the Standard edition or the Advanced edition, VMware Tanzu for Kubernetes Operations, and VMware Cloud on AWS.

Challenges

Protecting legacy applications from any disruption, even as modernization is embraced and a process is put into motion, is a key concern for customers. This risk-averse perspective leads to some having concerns about many modernization technologies. Such concern can result in a slower uptake of modernization solutions. Differentiation is a key challenge for VMware and all vendors, particularly in the highly competitive Kubernetes platform market. Multiple large vendors have staked out positions with products offering application modernization on top of a Kubernetes platform.

Specific customer challenges that exist include:

» **Doing nothing.** The enemy of progress is the status quo, since the short-term risk associated with doing nothing is considerably lower than the risk of starting a migration and modernization effort, which is guaranteed to have some unanticipated surprises.

» **Establishing unrealistic goals.** Organizations should recognize that application modernization is a journey that will extend over the course of multiple years. It is key to fully understand the minimal, optimal, and most robust outcomes that can be experienced and set expectations accordingly for where in that spectrum an organization's modernization effort is likely to land in both the short term and the long term.

» **Choosing between competing solutions.** Customers have an embarrassment of riches and options when it comes to application modernization, particularly for VM-to-container migrations. It becomes important to choose between using a best-of-breed approach (and dealing with integrations and technology gaps) or embracing an integrated portfolio that offers customers a variety of solutions for different modernization challenges.

Conclusion

Application modernization is a journey, not a destination. For most enterprises, a modernization journey will include the use of a wide variety of technologies and approaches applied using a surgical approach on an application-by-application basis. There is no one size fits all, and having a robust set of choices is particularly valuable to many organizations.

> Application modernization is a journey, not a destination.

For most companies, the right approach will be to use a multitude of solutions tailored to the mix of applications they use today, along with a multicloud approach to the deployment of modernized applications.

Disruptive events may occur along the road that cause a shift in priorities (e.g., supply chain disruptions, customer behavioral changes, external events such as a pandemic or economic pressure), but the right solution will lead to a more flexible and adaptive organization. The key is establishing a realistic road map for the journey at which organizations can chip away.

About the Analysts

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Dr. Lara Greden is Research Director for IDC's Platform as a Service practice. Dr. Greden's research focuses on platforms for application development on private, public, and hybrid clouds and on edge deployments. Dr. Greden directs research into the competitive markets of cloud platforms and application development and deployment services that are enabling digital transformation, including integration, containers, serverless computing, big data, AI, ML, predictive analytics, IoT, and other emerging technologies.

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Al Gillen oversees IDC's software development research portfolio. Research disciplines in this group include developer research, platform as a service and cloud application services for developers, and developer life-cycle and quality assurance products. In addition, Mr. Gillen jointly oversees IDC's DevOps research program and runs a program focused on the ecosystem of open source software pan-industry.

MESSAGE FROM THE SPONSOR

Application Transformer for VMware Tanzu is a tool that aids organizations to discover, analyze, and transform legacy applications to containers, delivering enhanced business outcomes.

Built to simplify and accelerate the application modernization journey, Application Transformer for Tanzu enables organizations to:

» Discover a wide range of application types, across Linux- and Windows-based OSs

» Visualize current application topology

» Gain end-to-end view automatically by leveraging VMware vRealize Network Insight flows

» Choose a modernization approach and to containerize suitable legacy applications based on business values and priorities

» Create artifacts such as docker files, OCI-compliant container images, and Kubernetes manifest YAML files

» Deploy containerized applications to Tanzu Kubernetes-based platform

Application Transformer for Tanzu allows organizations to customize their modernization journey. With Application Transformer, organizations can benefit from the holistic view of their entire application environment, improved efficiency through automation, increased speed to market for software and services.

IDC Custom Solutions

The content in this paper was adapted from existing IDC research published on www.idc.com.