ESG WHITE PAPER

Creating a Future-ready Organization with an Effective Application Infrastructure Modernization Strategy

Fully Leverage Cloud Functionality Using Containerization of Applications Across the Entire Cloud Ecosystem

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Executive Summary

Heritage systems and applications are complicating how companies keep pace with evolving conditions in their markets. IT leaders recognize that their organizations need an effective, future-ready approach to digital transformation, starting with application infrastructure modernization. This requires an IT transformation strategy that enables companies to leverage the benefits of cloud services—stretching across public, hybrid, and multi-cloud. Modern, cloud-native applications can bring new capabilities, services, and insights, as well as greater agility and flexibility, to accelerate the attainment of business-critical objectives, driving growth and cost efficiencies. However, moving to a cloud environment can be complicated, involving considerations about how to ensure continuous business operations and unbroken customer service while delivering modernized applications. Other obstacles can include complex security and compliance issues. In addition, not all enterprise data is appropriate for cloud environments, and some will remain on premises. As a result, many companies can struggle with determining which data resides where and lack the expertise to design, implement, and execute an effective cloud strategy.

IT organizations need to avoid a "trial and error" approach and look at multiple considerations, including microservices and containerization of applications, which are essential to fully leveraging cloud functionality. Organizations need to take into account various considerations, including the right deployment location and the cost basis for application refactoring, to ensure that the ROI for moving to cloud is solid. Many organizations are looking not just at application modernization but also at approaches such as moving and then modernizing in place.

Container platforms, like Kubernetes, offer a cloud-like experience, whether they're deployed on a public or private cloud, on premises, or at edge locations. As a lightweight, standalone, and executable package of code, containers provide a streamlined way to build, test, deploy, and redeploy applications. They provide a standardized configuration across different environments supported by multiple cloud platforms. A well-designed containerization strategy has been shown to help organizations to modernize legacy applications across hybrid or multi-cloud environments; innovate and respond to rapid market demands through the creation of new, cloud-native applications; create applications that are both agile and scalable; provide a standard way to package and deploy applications while optimizing costs; and run applications in a consistent manner across the entire software development lifecycle. This paper examines the biggest challenges to a cloud-ready infrastructure and explores several approaches organizations can take to design and implement a containerization strategy to better manage modern cloud environments.

The Application Modernization Imperative

Companies recognize that, to remain competitive and relevant, they need to invest in digital transformation and face decisions about how best to continue to modernize their applications. A common theme in these efforts is the need for a robust, enterprise-wide strategy that provides greater flexibility around intelligent workload placement and costs while avoiding being tied to a single environment with no freedom of choice. Hybrid IT environments are becoming the new norm, with many enterprises managing workloads in data centers, the public cloud, and at the edge. A modernized environment enables organizations to achieve this hybrid approach. However, they must put in place an effective strategy to sustain and navigate complex multi-cloud environments so they can become digital with speed and scale and modernize with no disruption to day-to-day operations.

Three key principles should influence application modernization strategies in the next three years:

1. **Application modernization should align with the overall financial model for the business**. OpEx is not necessarily the right answer for all organizations or for all business applications. Understanding medium- to long-term costs and how they fit into the target financial model for the business needs to move to the front of the "funnel" and shape architecture and technology strategy.

2. **A target operating model will help sustain the transformation and future state.** Being thoughtful and deliberate in designing future-state people/process/technology operations will ensure that the change endures leadership changes, as well as talent and market disruptions.

3. **Modernization has to be secure but also compliant by design.** Avoid unwelcome surprises by carefully enabling risk and compliance from the outset. Security needs to be addressed from the start, all the way through to the establishment of the operating model. Building securely to exceed governance, risk, and compliance (GRC) requirements from the beginning means considering how Day 2 operations will be conducted post-deployment, not just securing the code.

For organizations already on the application modernization journey, public cloud adoption is indeed a key focus area. And according to ESG research, 88% of those organizations already using a public cloud service run their apps on microservices and containerized environments.[1]

Figure 1. Microservices and Cloud-native Architectures Are Increasingly Used to Deliver Production Apps

Is your organization currently developing cloud-native applications? (Percent of respondents, N=387)

- 73% — Yes, we build and deploy cloud-native applications based on a microservices architecture
- 22% — Yes, we build and deploy cloud-native applications using a traditional (i.e., monolithic) approach
- 6% — No, but we plan to build and deploy cloud-native applications within 12 months
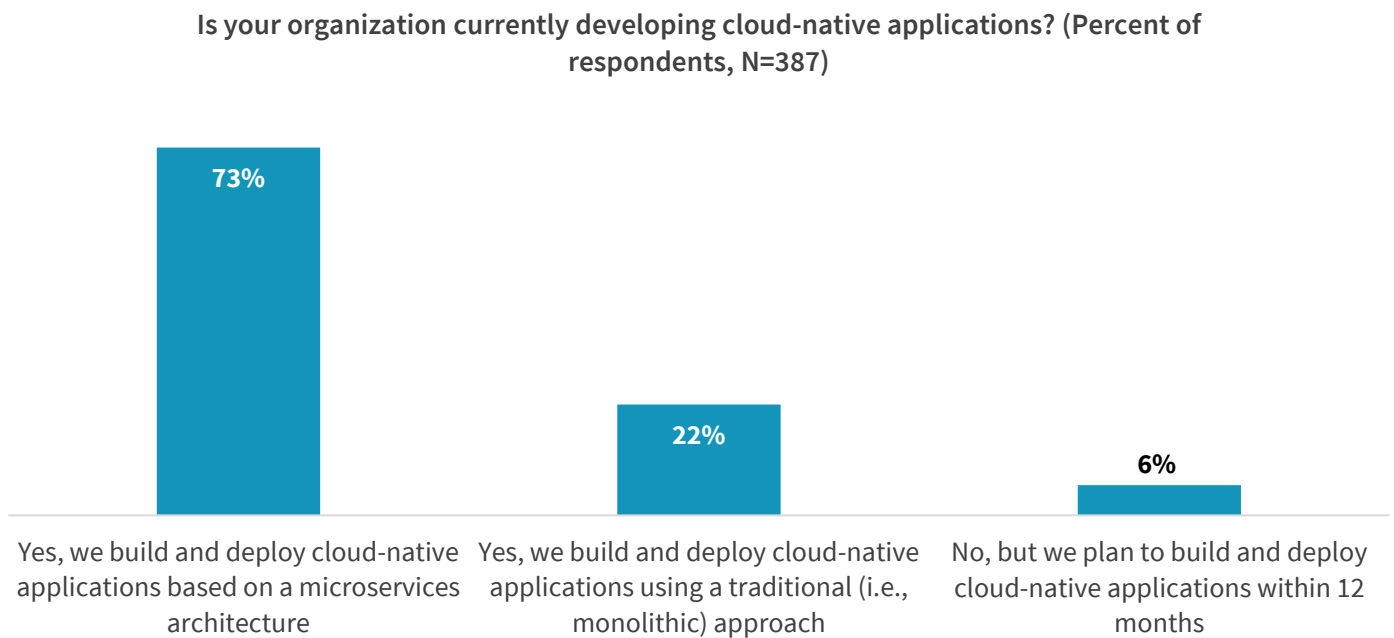
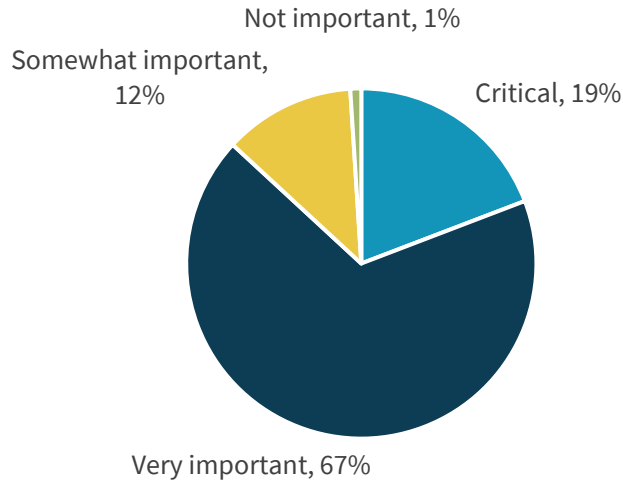*Source: ESG, a division of TechTarget, Inc.*

Another consideration is the rapid pace of digital technology evolution, which means that the cloud environment that works today may not be the right one for the same workload tomorrow. Interestingly, in the same ESG research study, 86% of respondents indicated that the portability of cloud-native applications was critical or very critical to their organizations (see Figure 2).[2]

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[1] Source: ESG Research Report, *Cloud-native Applications*, May 2022.
[2] Ibid.

Figure 2. Portability of Cloud-native Apps Is an Important Factor

How important is application portability (e.g., ability to move from data center to edge to cloud, cloud to cloud, etc.) to your organization? (Percent of respondents, N=387)

Not important, 1%

Somewhat important, 12%

Critical, 19%

Very important, 67%

Source: ESG, a division of TechTarget, Inc.

As indicated in Figure 3, 89% of organizations feel that it is critical or important for them to provide infrastructure that is "developer-ready."[3] Developer-ready infrastructure can be defined as being integrated with the organization's software supply pipelines, open, flexible, secure, and scalable. Whether it's deployed in the cloud, on premises, or at the edge, this kind of platform gives organizations a consistent experience and the ability to choose where to build, deploy, and run applications. Cloud-native apps are able to fully leverage cloud resources, enabling elasticity, observability, and management across the entire cloud ecosystem. The platform also enables application portability for greater mobility between the core, edge locations (smaller data centers), and the cloud—supporting the ebbs and flows of resources and providing the ability to easily add resource capacity as needed.

Figure 3. More than 1 in 5 Categorize 'Developer-ready' Infrastructure as Critical

How important is it for your organization to provide "developer-ready" infrastructure? (Percent of respondents, N=387)

Somewhat important, 10%

Critical, 22%

Very important, 67%
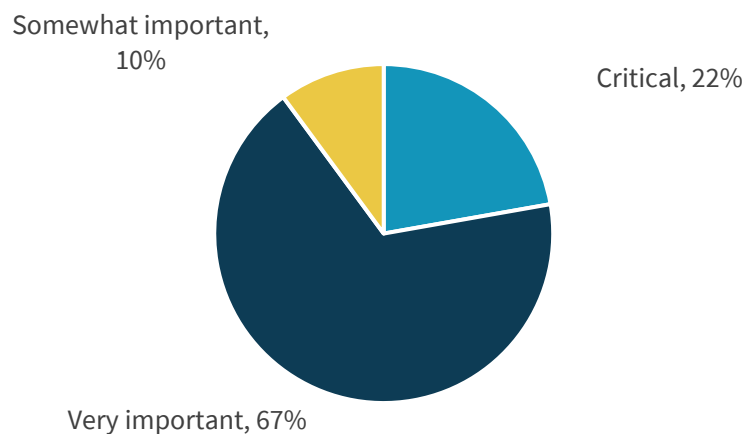
Source: ESG, a division of TechTarget, Inc.

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[3] Ibid.

Cloud Considerations

Moving applications to the cloud is not a one-size-fits-all proposition. Some may need to be completely rebuilt, others may need to be retired, and still others may be left on premises. However, regardless of where the business applications reside, organizations must have easy access to them and all relevant data. As such, business-critical data and applications need to be portable between public cloud service providers, on-premises private clouds, data centers or edge locations, and hybrid cloud layers. The use of containers and an orchestration layer provides a streamlined way to securely build and quickly test, deploy, and redeploy applications across multiple environments (including on-premises, hybrid, or multi-cloud models).
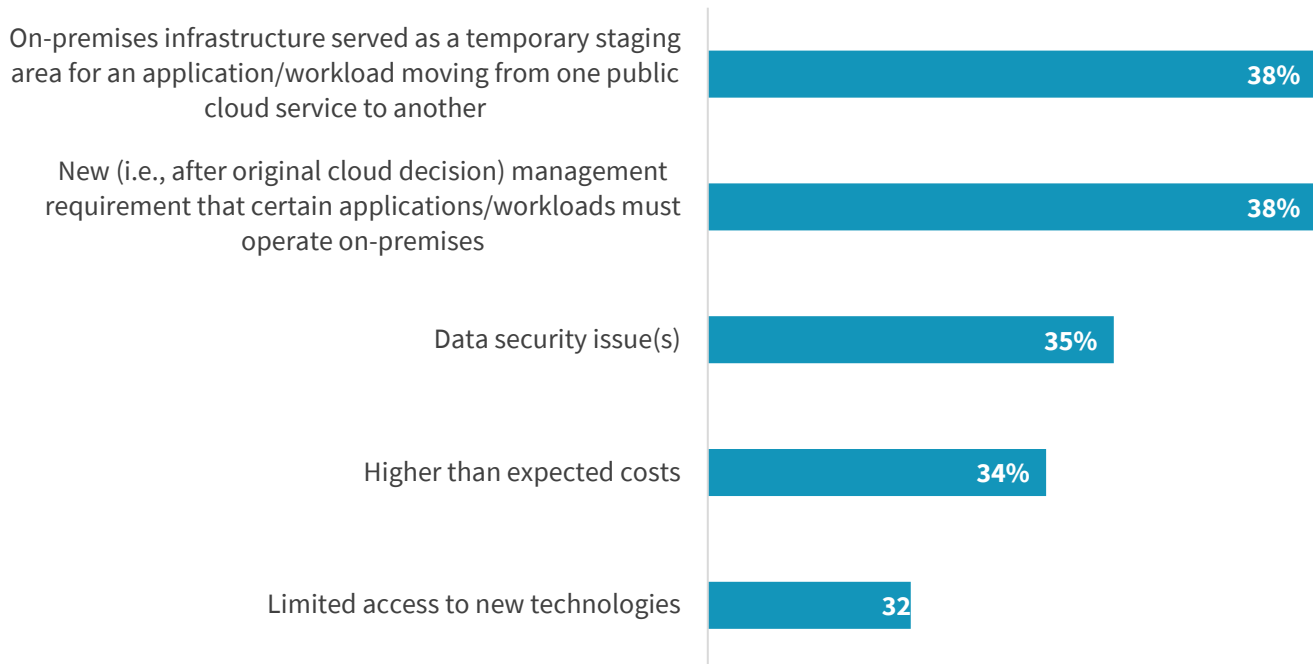
An enterprise open source container platform based on Kubernetes technology is the optimal way to run containers and maintain their operations for maximum efficiency. In our view, a container platform should have the ability to run on hybrid or multi-cloud environments, providing flexible options for organizations' current and future needs.

The Secret to a Successful Modernization Strategy

It is important to note that a successful modernization strategy demands more than just technology. It takes the right people and processes, as well as an open mindset—in addition to the right technology. In fact, ESG research shows that over a third (38%) of organizations have brought an application back from the cloud to rework it and take it to a different cloud (see Figure 4).[4]

Figure 4. Top 5 Reasons for Moving Applications/Workloads Back to On-premises Infrastructure

What were the reasons behind your organization's decision to move an application(s)/workload(s) back to on-premises infrastructure? (Percent of respondents, N=167, multiple responses accepted)

Reason	Percent
On-premises infrastructure served as a temporary staging area for an application/workload moving from one public cloud service to another	38%
New (i.e., after original cloud decision) management requirement that certain applications/workloads must operate on-premises	38%
Data security issue(s)	35%
Higher than expected costs	34%
Limited access to new technologies	32

Source: ESG, a division of TechTarget, Inc.

To avoid this type of costly rework, it is worth considering partnering with a solutions provider that has expertise in building and running cloud-native enterprise applications. Often, the complexity of managing the day-to-day operations of multiple cloud environments in-house can consume limited and inexperienced IT staff and be costly in terms of time, money, and innovation. An experienced, cloud-agnostic managed service provider (MSP) that understands the unique requirements and objectives of the business and keeps a strong focus on delivering strategic outcomes can help lower the total cost of ownership by building a roadmap to the cloud that is sustainable.

How Containers Can Help with Application Modernization

There are five critical reasons many organizations choose to use containers as a core component of their digital transformation journey:

1. As a platform for componentizing and modernizing heritage applications.

2. To quickly respond to rapidly changing market demands by using microservices in the creation of new, cloud-native applications.

3. To move to modern CI/CD pipelines to create applications that are both agile and scalable.

4. To provide a standardized way to package and deploy applications.

5. To run applications in a consistent manner across the entire software development lifecycle, resulting in reduced risk and cost for environmental triage.

What Are Containers?

A container is a lightweight, standalone, and executable package of code that includes all the dependencies that enable an application to run reliably in a cloud-native environment. Orchestrating containers on Kubernetes provides a cloud-agnostic framework to efficiently run distributed applications resiliently and securely.

Once the container platform has been selected and implemented, organizations have many decisions to consider. A "learn as you go" approach can be costly and time-consuming. A hybrid IT model presents a shift in culture and a new way of managing and operating the technology ecosystem that requires governance and control across the organization.

Establish a Center of Excellence for Containers

The Benefits of a Contanerization Hub

A center of excellence or containerization hub addresses application modernization challenges by enabling organizations to navigate through the complexities of containerization. It also breaks down silos between functions and empowers employees, allowing organizations to dynamically assemble talent and capabilities to establish highly responsive, flexible, scalable, and connected delivery competencies.
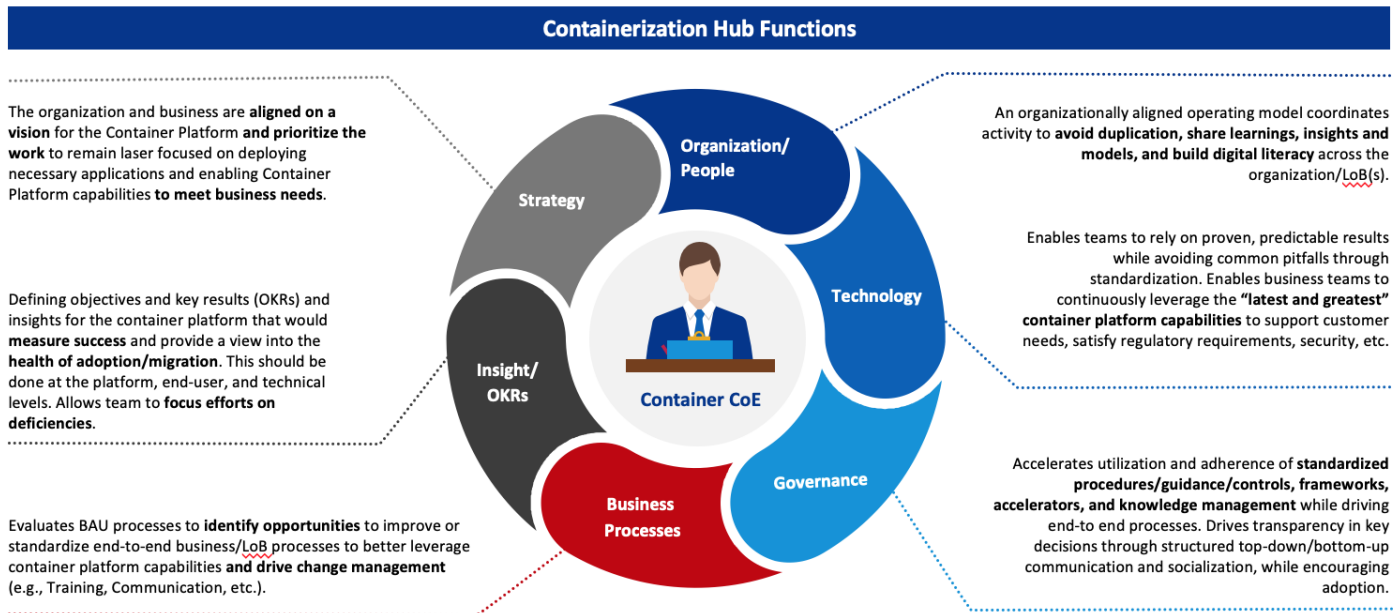
To realize the full potential of containers and Kubernetes, organizations need a containerization strategy and a centralized body to standardize the operating and governing framework for the hybrid cloud. A containerization hub or center of excellence (CoE) can enable companies to realize their application modernization objectives through an organized, logical model, and help navigate the complexities of containers to drive change and enable organizations to achieve their digital transformation goals.

A CoE for containers can help an organization optimize its deployment by centralizing SMEs, streamlining its contributions, and concentrating its expertise in one location—resulting in improved quality of service. This central point of contact and knowledge also reduces knowledge management risk. In an ever-changing environment of infrastructure and operations, the containers stay up to date and secure. In addition, delivery times and development and maintenance costs are reduced

through identification and development of reusable assets. Another important benefit is that a CoE drives compliance and consistency of approach and reduces duplication of efforts through standardization while also promoting cross-organizational collaboration. The functions in a containerization hub are detailed in Figure 5.

Figure 5. Containerization Hub Functions

Containerization Hub Functions

The organization and business are **aligned on a vision** for the Container Platform **and prioritize the work** to remain laser focused on deploying necessary applications and enabling Container Platform capabilities **to meet business needs**.

Defining objectives and key results (OKRs) and insights for the container platform that would **measure success** and provide a view into the **health of adoption/migration**. This should be done at the platform, end-user, and technical levels. Allows team to **focus efforts on deficiencies**.

Evaluates BAU processes to **identify opportunities** to improve or standardize end-to-end business/LoB processes to better leverage container platform capabilities **and drive change management** (e.g., Training, Communication, etc.).

Strategy · **Organization/People** · **Technology** · **Governance** · **Business Processes** · **Insight/OKRs** · **Container CoE**

An organizationally aligned operating model coordinates activity to **avoid duplication, share learnings, insights and models, and build digital literacy** across the organization/LoB(s).

Enables teams to rely on proven, predictable results while avoiding common pitfalls through standardization. Enables business teams to continuously leverage the **"latest and greatest"** container platform capabilities to support customer needs, satisfy regulatory requirements, security, etc.

Accelerates utilization and adherence of **standardized procedures/guidance/controls, frameworks, accelerators, and knowledge management** while driving end-to end processes. Drives transparency in key decisions through structured top-down/bottom-up communication and socialization, while encouraging adoption.

Source: KPMG

Adopt an End-to-end Approach for a CoE

Standing up a center of excellence is necessary and requires a comprehensive, end-to-end approach that includes a modern delivery enablement and program management, allowing organizations to align business strategy with technical/engineering delivery.

KPMG and Red Hat have partnered to help organizations become future-ready through agile, scalable industry solutions that can:

- Reduce application complexity using microservices that allow for more agile development.

- Enable more responsive and frequent application updates based on customer/marketplace demands.

- Provide greater flexibility to run anywhere, without cloud vendor lock-in.

- Enhance security throughout the entire application lifecycle.

Based on Red Hat OpenShift technology and leveraging its global consultative expertise, KPMG has designed a customized approach for a container hub tailored to the level of container maturity within an organization. The roadmap includes:

1. A current state assessment.

2. Design target state containerization hub.

3. Operational hub minimally viable product (MVP).

4. Hub enablement pilot.

5. Hub enablement execution.

The Bigger Truth

Organizations are all at different stages on their application modernization journeys. Since most of those organizations have hundreds of applications, there's a recognition that not all applications will get the same treatment in the application modernization journey. Many organizations spend a lot of time and money trying to evaluate how to best modernize the application stack, with countless of them selecting to use Kubernetes and containerized microservices to componentize their applications. This is not a simple task. Organizations must grapple with many unknowns if they are willing to implement application modernization correctly.

Organizations should not try a "big bang," all-at-once type of modernization. Instead, they should focus on their most significant revenue-generating application first. ESG recommends engaging with and building a containerization center of excellence. This will offer the organization the opportunity to optimize all that the cloud has to offer by building the "muscle memory" of running dev and test first, then moving to production with an appropriate migration plan.

Focusing on getting it right in the COE can speed innovation, accelerate the delivery of business solutions, lower operational and resourcing costs, enhance security and scalability, improve collaboration, and enable an organization to keep pace with rapidly changing customer and workforce demands.

It is important to focus on the following when building out a COE:

1. Get help selecting a platform that will allow for the flexibility you require and run in all of the locations where components of the application will need to live, such as cloud, on premises, and at the edge.

2. Focus on selecting an application to start with and determining how the architecture can be componentized into microservices.

3. Get comfortable with CI/CD pipelines, leveraging the knowledge from a service provider that has seen it work before.

4. Determine what your organization's standardized way to package and deploy applications will be going forward so that instrumentation and processes are the same organizationally.

5. Rely on the COE to build out the standardized production operating model, including the observability capabilities to measure success from a KPI perspective.

Ensuring your COE can provide these capabilities and guarantee a standard across the organization will help you deploy applications in a similar manner, even though they may use different components. It also ensures that if your developers move between parts of the organization, they will not be faced with additional learning curves as they come up to speed on different methods for application modernization and instead can focus on innovation within their component of the application.

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