

Break Down 3 Barriers to Cloud Migration

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Initiatives: [Data Center Infrastructure](#)

Cloud migration initiatives for enterprise applications are often thwarted by application size, high levels of customization and insufficient skills. Before migrating applications, I&O leaders must break down the barriers by modernizing infrastructure and applications into cloudlike configurations.

Additional Perspectives

- [Summary Translation: Break Down 3 Barriers to Cloud Migration](#)
(05 March 2021)

Overview

Key Findings

- While advancements in virtual machines (VMs) enable infrastructure and operations (I&O) leaders to migrate medium-sized applications (2TB to 6TB) to the cloud, they cannot yet migrate applications larger than 6TB on a single VM.
- I&O leaders are tasked with managing a broad portfolio of customized applications that are not designed to run in the cloud (or on cloudlike on-premises infrastructure).
- Cloud IaaS providers deliver the underlying infrastructure and excel at offering operational and implementation skills in SLAs. Although they offer professional services, cloud IaaS providers often rely on partners for specialized transitional and transformational skills – resulting in an I&O skills gap.

Recommendations

I&O leaders responsible for data center infrastructure must:

- Determine the best migration path for each existing application (i.e., cloud versus hosting) by classifying applications based on size.
- Collaborate with application teams to standardize legacy applications by reconfiguring heavily customized applications (for hosting) and replatforming lightly customized applications (for cloud).

- Drive modernization efforts by supplementing traditional I&O teams with transitional and transformational skills from strategic partners or system integrators (SIs).

Strategic Planning Assumptions

By 2024, 15% of all enterprise applications will run in a container environment, up from less than 5% in 2020.

By 2024, 30% of custom enterprise applications will run in a container environment, up from less than 10% in 2020.

Introduction

To deliver efficient infrastructure services while managing cost and risk, I&O leaders must deliver standardized, modernized and repeatable infrastructure (see [Move From Siloed Infrastructure-Led Disruption to Reusable Services](#)).

The emergence of hyperscale public cloud infrastructure has created new or improved methods for increasing the repeatability of infrastructure provisioning as IaaS. This improved infrastructure provisioning is also:

- **Immutable:** An approach to managing services and software deployments on IT resources, wherein components are replaced rather than changed. An application or service is effectively reprovisioned when a change occurs.
- **Ephemeral:** IT resources are unable to be changed – without exception.
- **Idempotent:** An ability to arbitrarily repeat an action without additive or detrimental effect.

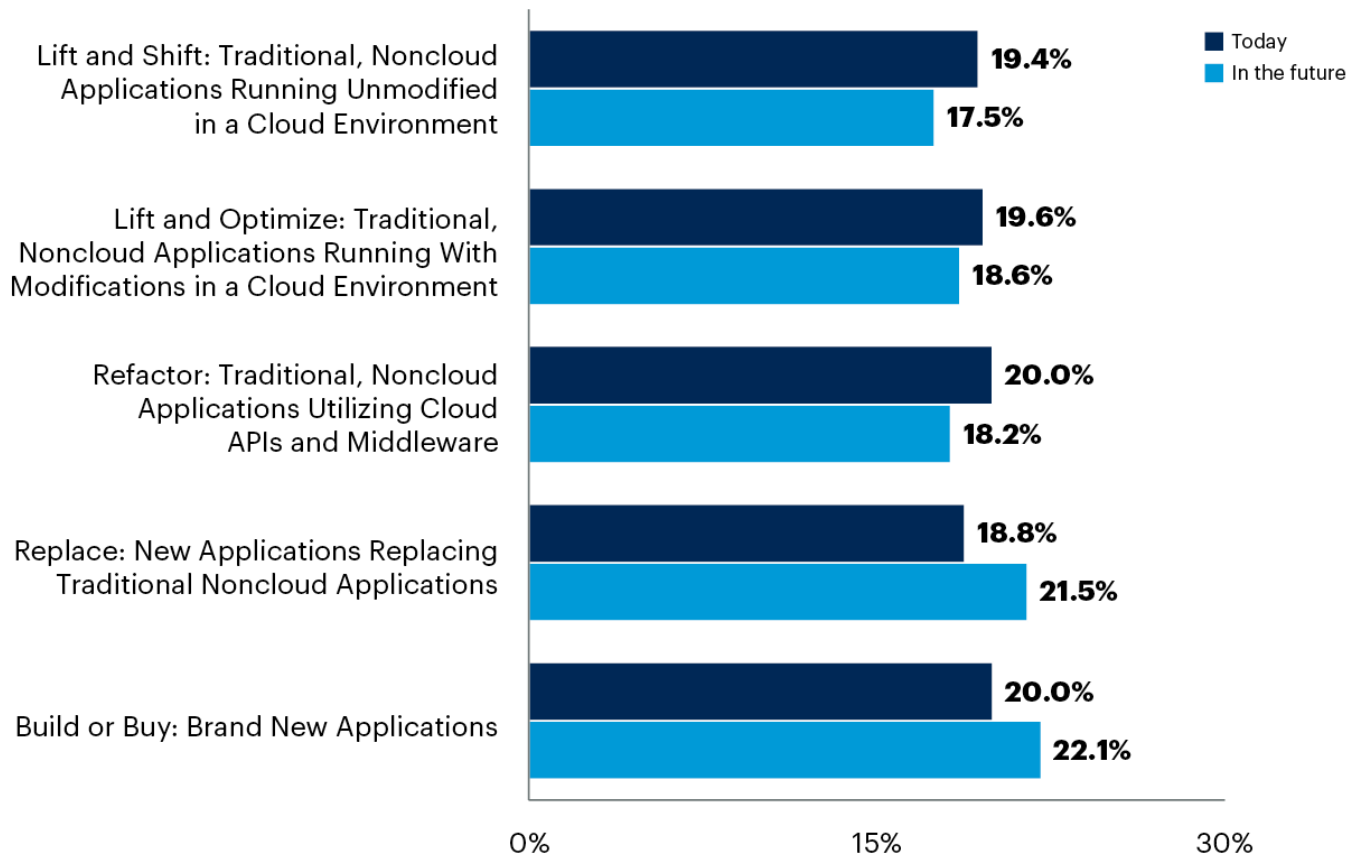
These attributes are necessary for creating the industrial levels of automation and repeatability that are required in hyperscale public clouds. They also help improve the agility of enterprise IT, but are best suited to modern, cloudlike applications and infrastructure.

Unlike new applications, the bulk of the enterprise application portfolio – about 85% of existing core IT applications – was not designed using the principles of cloud-native architecture. Examples include legacy mainframe and midrange applications, ERP applications, and proprietary UNIX-based applications. These applications are often highly customized and large in size, rendering them incompatible with most cloud platforms. A lift-and-shift approach for migrating legacy applications to the cloud is not an effective modernization strategy.

In our 2020 Cloud End-User Buying Behavior Survey, respondents indicated that their organizations are less likely to employ a lift-and-shift strategy by 2022 and will instead increase use of other modernization approaches, including replace and build/buy new applications (see Figure 1).¹

Figure 1: The Direction of Applications in the Cloud

The Direction of Applications in the Cloud Mean Calculation



n = 366 use public cloud infrastructure; excluding don't know/not sure
 D2. What is your organization's plan for public cloud application portfolio distribution today/in the next two years?
 Source: 2020 Gartner Cloud End-User Bxuying Behavior Survey
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I&O leaders must enable application migration by ensuring that on-premises IT infrastructure becomes cloudlike. To accomplish this, they must focus their resources on making infrastructure immutable, ephemeral and idempotent. I&O leaders must make investment decisions about workload placement to determine hosting options that are suitable for the application (ideally by using a workload placement policy; see [Designing a Cloud Workload Placement Policy Document](#)). This process enables them to break down barriers to cloud migration by modernizing infrastructure and applications into cloudlike configurations.

In all cases, I&O teams face three key barriers when migrating existing applications:

1. **Size.** Large applications are less portable.
2. **Customization.** Nonstandardized applications are not compatible with cloudlike infrastructure.

3. **Skills.** Cloud providers often lack the transitional and transformational skills to drive modernization initiatives.

To overcome these barriers, I&O leaders must first understand the limits of cloud, and then develop the strategy and skills to modernize their applications.

Analysis

Determine Application Migration Path Based on Size

Applications smaller than 2TB comprise the bulk of most IT portfolios. Gartner client inquiries indicate that about 95% of the cloud applications and 90% of the on-premises applications are below the 2TB threshold. Unless an application exceeds 2TB, I&O leaders should plan to virtualize it and migrate it to the cloud or cloudlike infrastructure.

The increased portability of VMs enables I&O leaders to achieve two main benefits, both on-premises and in the cloud:

- Improve SLAs via live VM migration (to address planned downtime).
- Increase resiliency via site-based recovery (to address unplanned downtime).

With the release of VMware 7.0, VM size is no longer strictly limited to 30 virtual CPUs (vCPUs). Thus, I&O leaders can now run applications that are larger than 2TB in the cloud. However, the upper memory limits of VMware 7.0 are still being tested. While some 5TB to 6TB applications are running on VMs, not all cloud providers can support these large applications in every region or every vertical. Similar enhancements to Red Hat KVM have also increased its VM capacity for on-premises and cloud providers. Thus, I&O leaders must get references from the infrastructure/cloud provider before migrating an application that is larger than 2TB. Do not move these medium-sized applications until the provider has proven they are able to offer support in your region or vertical.

Applications larger than 4TB to 6TB push the memory limits of VMs (both on-premises and in the cloud). For these applications, I&O leaders should evaluate bare-metal hosting options. Because these offerings use a dedicated server hardware, they are not an elastic cloud, but rather are considered cloudlike infrastructure. In many cases, I&O leaders may still need traditional high-availability (HA) solutions.

I&O leaders should classify their applications based on three sizing categories (see Table 1). Prioritize cloud migration of small applications in the short term (where risk is low and the benefits are proven) and then request proof of concept for medium-sized applications (as migration of 2TB to 6TB applications is more experimental).

Table 1: Migration Plan Based on Application Size

Application Size	Cloud Migration Path
Small Less than 2TB (less than 30 vCPUs or one socket)	<ul style="list-style-type: none"> ■ Place application in cloud IaaS on VMs ■ Use cloud and VM tools for import, portability and clustering ■ Check VM and infrastructure references
Medium 2TB to 6TB (less than 120 vCPUs or four sockets)	<ul style="list-style-type: none"> ■ Place application in VM or evaluate VM on provider/hosting in cloud ■ Use cloud migration tools for import, portability/migration and VM clustering/HA ■ Check with provider/vendor for references
Large More than 6TB (more than 240 vCPUs or eight sockets)	<ul style="list-style-type: none"> ■ Use bare-metal cloud/hosting option ■ Use clustering/HA (including live migration if/when available) ■ Check with provider/vendor for references

Source: Gartner (February 2021)

Standardize Custom Applications for Cloud Migration

After identifying which applications are suitable for cloud migration, I&O leaders face another challenge: Many of their existing applications are customized and are not designed to run in the cloud. IT organizations must standardize these applications before the migration can begin.

The path to standardization depends on the level of customization. Most legacy applications have three types of customizations:

1. Added or customized screens and reports
2. Added fields or indexes/totals
3. Added processes and custom scripts

The greater the level of customization, the more difficult and time-consuming it is for I&O leaders to migrate and modernize the application to the cloud. Thus, I&O leaders should start their migration efforts with high-value applications that have fewer customizations, as these applications require less time and effort to standardize. The goal is to transform a lightly customized application into a configured application that has:

1. Edited text fields within configuration
2. Hidden fields or indexes/totals
3. Standard processes and custom scripts

I&O leaders should then migrate the configured application to the cloud.

In contrast to applications with less than 100 customizations, highly customized applications are too complex to be converted to a configured, cloud-compatible format. As such, I&O leaders will not be able to move these applications to the cloud until at least one project cycle through 2025. Instead, they must reconfigure the application for bare-metal hosting delivery on IaaS.

Table 2 outlines each category of application based on customization level, along with its respective migration path.

Table 2: Migration Plan Based on Level of Application Customization

Level of Application Customization	Migration Plan
Low Less than 20% screen changes, reports and scripts are customized or typically less than 100 total customizations	Replatform to cloud PaaS or rearchitect to SaaS (standardize as configured application)
Medium 20% to 50% of screen changes, reports and scripts are customized or typically 100 to 500 total customizations	Replatform to cloud or bare-metal/hosting (standardize as configured application) Rationalize to reduce customizations to less than 100
High More than 50% of screen changes, reports and scripts are customized or typically more than 500 total customizations	Reconfigure to bare-metal/hosting (keep as customized application) Rationalize to reduce customizations to less than 500

Source: Gartner (February 2021)

Develop Transitional and Transformational Skills

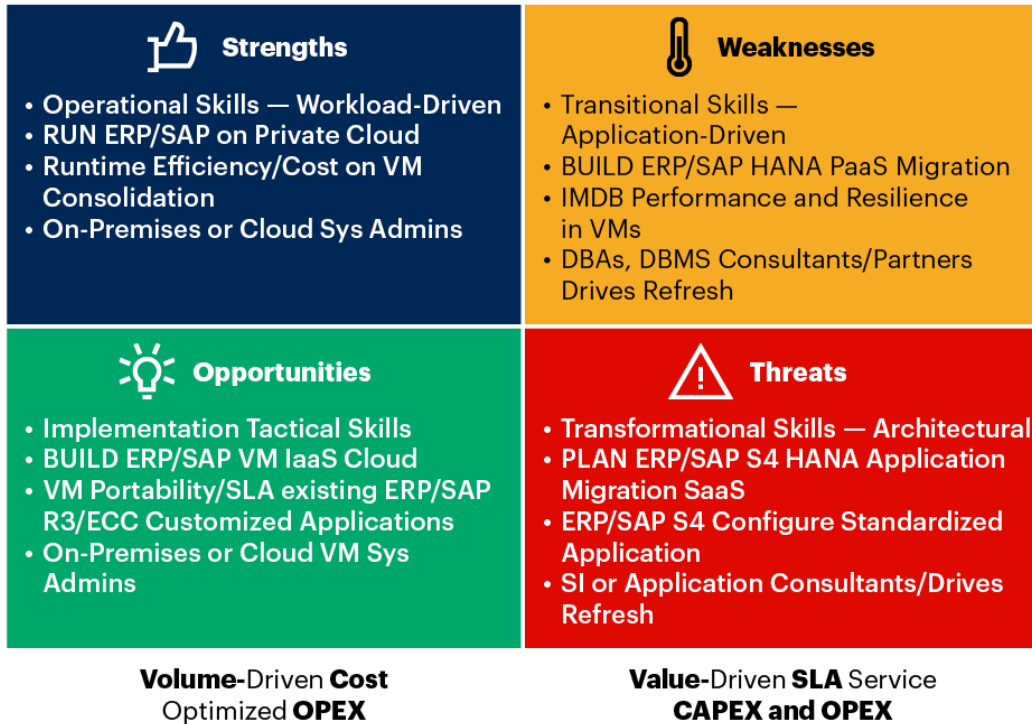
Cloud providers often focus on providing operational and implementation skills, rather than transitional and transformational skills. They provide efficient execution. In other words, the SLA from the provider includes “build” and “run” (the vehicle) but not “plan” (the journey). Transitional and transformational skills are beyond the scope of the contract.

To facilitate a smooth migration journey to cloud, I&O leaders need four skills to support three different migration paths, as well as cloud operations (see Figure 2):

- **Operational skills.** The ability to run standardized applications in the cloud at a lower cost than on-premises infrastructure. Cloud IaaS providers excel at providing infrastructure skills. The providers’ subscription-based consumption model can often be cheaper than on-premises, project-based alternatives (at least for the first three years of the contract).
- **Implementation skills.** The ability to directly move standardized applications to the cloud. Cloud providers have this capability for configured applications. However, highly customized and complex applications will not necessarily be less expensive when moved to the cloud (especially in the longer term).
- **Transitional skills.** The ability to move a customized application from on-premises to PaaS. Without specialized skills related to the systems, these transitions cannot occur. Cloud providers typically lack these skills and partner with a system integrator (SI) to provide this capability.
- **Transformational skills.** The ability to move a customized application from on-premises to a new packaged application or SaaS. To complete this migration, the application must be standardized, modernized and configured, which requires mission-critical, specialized skills that come at a premium and are only available from SIs and third parties.

Figure 2: Cloud Provider Skills SWOT Analysis

Cloud Provider Skills SWOT Analysis



Source: Gartner
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Cloud providers use additional partners and SIs to provide application-based transitional and transformational skills, so those providers have great strategic value to the project. Without these advanced skills, I&O leaders will deliver little cost savings (if any) when migrating and running customized applications in the cloud. Skills-intensive migrations that require SI involvement can end up being more expensive than capital expenditure (capex) infrastructure purchases. I&O leaders must understand and bridge the skills gaps by priming the project and contract, and owning the relationship with the SI (to modernize applications and thus improve SLAs).

Evidence

¹ Gartner’s 2020 Cloud End-User Buying Behavior Survey was conducted to understand how technology leaders approach buying, renewing and using cloud technology. The research was conducted online from July through August 2020 among 850 respondents from midsize and large (\$100 million plus in revenue) organizations in the U.S., Canada, the U.K., Germany, Australia and India. Industries surveyed include energy, financial services, government, healthcare, insurance, manufacturing, retail and utilities. All organizations were required to currently have cloud deployed.

Respondents are involved, either as a decision maker or decision advisor, in new purchases, contract renewals or contract reviews for one of the following cloud types in the past three years: public cloud

infrastructure (IaaS), public cloud platform (PaaS), public cloud software (SaaS), private cloud infrastructure, hybrid cloud infrastructure or multicloud infrastructure. Respondents were also required to work in IT-focused roles, with a small subset of procurement respondents.

The study was developed collaboratively by Gartner analysts and the Research Data and Analytics team. Results of this study do not represent global findings or the market as a whole, but reflect sentiment of the respondents and companies surveyed.

Recommended by the Author

[Move From Siloed Infrastructure-Led Disruption to Reusable Services](#)

[Drive Administration, Application and Automation Capabilities of Infrastructure-Led Disruption](#)

[Hype Cycle for Infrastructure Strategies, 2020](#)

[Rethink Your Internal Private Cloud](#)

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Cloud computing represents one of the most valuable innovations in current IT and business strategies but continues to be misunderstood and underutilized. IT leaders should familiarize themselves with the benefits of cloud computing, learn about cloud security and understand what type of talent is necessary for successful cloud implementation.

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