Understanding the New Multi-Cloud Operating Model

Accelerate multi-cloud success by unifying operations across cloud silos
UNDERSTANDING THE NEW MULTI-CLOUD OPERATING MODEL

Cloud operating model at a glance

What is a cloud operating model and how is different from any other operating model that IT has delivered in the past? Like a traditional IT operating model, a cloud operating model addresses three core competency areas associated with the delivery of IT services:

- **Cloud Service Delivery**
  - Unlock app innovation
  - Optimize speed and agility
  - Deliver a modern developer platform

- **Cloud Operations**
  - Maximize efficiency
  - Optimize performance
  - Deliver end-to-end intelligent operations

- **Cloud Governance**
  - Lower risk exposure
  - Optimize costs
  - Deliver secure and compliant resources

But a cloud operating model does this in a way that specifically supports the *principles of cloud computing* that were first expressed by National Institute of Standards and Technology (NIST) and that are today embodied in the technology platforms of hyperscaler cloud providers such as Amazon, Microsoft, Google, IBM, Oracle and Alibaba. The result is a model that fully exploits the benefits of cloud computing while also addressing a new set of technical challenges that are specific to cloud computing.
Origins of the cloud operating model

NIST first published their definition of cloud computing in 2009. It laid out a set of attributes that when taken together delivered a cloud computing environment. Those initial attributes included:

- On-demand self-service
- Resource pooling
- Metered services
- Broad network access
- Rapid elasticity

These attributes implied a new operating model for IT. There is little sense in having cloud capabilities if those same capabilities aren’t fully expressed in an operating model that is used in practice. This in turn gives rise to the idea of a cloud operating model.

Cloud as a destination

In the early days of cloud computing, there was no need to explicitly think too much about a Cloud operating model. Organizations just picked a cloud provider and then built their service delivery, operations and governance processes around the capabilities that their chosen cloud provider’s platform unlocked for them.

This approach gave rise to the idea that cloud was a destination. Many organizations started to think that the way you “got cloud” was to simply pick a cloud provider to work with and then migrate apps to that provider’s cloud or build new apps on that provider’s platform. Until recently, for many organizations, this approach worked pretty well.
The changing nature of cloud use

Most teams using the cloud started out using a single cloud provider. However, over time many teams have come to realize that relying on a single provider is insufficient to support the diversity of their business strategies. Consequently, in recent years, there has been a strong trend towards teams using multiple clouds to support their application portfolios.

In the first quarter of 2021, VMware surveyed over 1,000 IT and App Dev leaders and practitioners around cloud use maturity and best practices. As part of that survey, VMware asked three bellwether questions that help frame where organizations and their teams are today as it relates to multi-cloud adoption and use:

1. Are there individuals on your teams who have "hands-on" responsibilities for more than one public cloud?
2. Are there teams in your organization that commonly use more than one cloud provider to support production apps?
3. Are there any production apps that span more than one environment (2+ public clouds or the DC and 1+ public clouds)?

The overwhelming number of respondents answering in the affirmative to these three questions suggests that not only are organizations multi-cloud but that their teams are now embracing multi-cloud operations. This level of multi-cloud use at the team level was unimaginable just a few years ago.

This new reality is forcing organizations to relook at what a cloud is and to distill cloud back to its essence. As part of this reinterpretation, organizations are asking themselves the question: “How do I maximize the benefits of cloud, across more than one cloud provider or environment?” In other words, how does an organization implement a multi-cloud operating model that has the simplicity of working like a single cloud but gives the organization access to all the services they need from multiple cloud providers?
From single cloud to multi-cloud operations

Hyperscale cloud providers deliver a cloud technology platform that supports a cloud operating model. They provide a comprehensive IaaS layer that can be fully accessed via a cloud API. They also deliver a set of management technologies that can be used to manage their cloud. These management capabilities can be extended using 3rd party ISV’s technologies. When these technologies are combined with people and processes, organizations can build out and instantiate a Cloud operating model.

However, each of the major hyperscale cloud providers only enables a Cloud operating model that is specific to their environment. In other words, AWS provides a cloud technology platform that supports a Cloud operating model on AWS only, Azure for Azure only, Google for Google only and so on. As VMware research shows, many teams are starting to run their applications across combinations of the public clouds they use plus one or more on-premises datacenters. Increasingly, edge environments are also in the mix of what must be managed. The same research also shows that organizations are beginning to architect some of their applications in a way that is dependent on more than one cloud or environment.

Having multiple Cloud operating models that can’t work together is not sustainable for the long term. What organizations need is a Cloud operating model that can work seamlessly across any combination of environments. A multi-cloud operating model allows organizations to abstract cloud silos in order to support a set of common operations across any combination of clouds that are important to the business.
Start with a multi-cloud technology platform

Enabling a multi-cloud operating model starts with a multi-cloud technology platform. A multi-cloud technology platform provides an abstraction layer capable of riding above any combination of public clouds, hosted clouds, private clouds and edge environments, along with a consistent underlying technology layer riding below this combination of environments.

These two elements work to together to support a multi-cloud IaaS that can be leveraged by a multi-cloud management layer. This multi-cloud management layer also supports and integrates with core DevOps processes and tools to deliver a set of higher-level services necessary to support cloud service delivery, cloud operations and cloud governance.

**FIGURE 2:** Consistent infrastructure and operations on every cloud
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Multi-cloud operating model competencies

Critically important to the concept of a multi-cloud operating model is the idea that the higher-level services associated with cloud delivery, cloud operations and cloud governance are designed to be cross-cloud capable. Examples of these higher-level services are shown below.

<table>
<thead>
<tr>
<th>Cloud Service Delivery</th>
<th>Cloud Operations</th>
<th>Cloud Governance</th>
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<tbody>
<tr>
<td>• Support developer agility with on-demand access to curated cloud services</td>
<td>• Automatically scale application resources based on real-time application performance needs</td>
<td>• Recognize that cloud instances differ in their underlying capabilities, with different generations of hardware, technologies and security features enabled</td>
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<tr>
<td>• Standardize app architectures with cloud-agnostic service templates</td>
<td>• Provide capacity and cost analytics that help drive continuous resource optimization</td>
<td>• Define performance, capacity and security requirements for each application</td>
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<tr>
<td>• Automate consistent service delivery across VMs, Kubernetes, and native cloud services</td>
<td>• Deliver app-aware visibility across cloud infrastructure and application components</td>
<td>• Empower developers to make informed app placement decisions across all environments</td>
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<tr>
<td>• Apply DevOps best practices to infrastructure management (e.g.: Infrastructure as Code, Continuous Integration/Continuous Delivery)</td>
<td>• Adopt cloud best practices for proactive and self-healing operations</td>
<td>• Provide non-intrusive guardrails to developers that protect the organization from security risks</td>
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<td>• Enable developers to easily integrate infrastructure components and take advantage of underlying hardware technologies in app dev CI/CD pipelines</td>
<td>• Empower developers with app context views across cloud resources</td>
<td>• Support the ability of platform teams to share the responsibility for cloud cost management with the consumers of cloud services</td>
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<td>• Enable platform teams to enforce security and compliance standards across cloud workloads</td>
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<td>• Automate operational best practices to help ensure that applications perform as required by the business</td>
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Separation of concerns still possible

Implementing a multi-cloud operating model doesn’t necessarily supersede all the functions of cloud specific operating models. But it does allow for global, or multi-cloud operations when and where those multi-cloud operations are needed.

For instance, a team working across two hyperscale clouds and an on-premises data center may need a common approach to provisioning resources across this multi-cloud landscape. But elsewhere in the organization there may still be teams who are entirely working on a single cloud. Assuming that skill leverage across the entire organization is not an enterprise level priority, it may be perfectly fine that some teams continue to operate in a model that only uses a single cloud.

However, even in this example, it is likely that a security team with enterprise-wide responsibilities would want a common set of security practices across all of the clouds that the enterprise is using. In this case, a multi-cloud operating model would support that need.

Having a multi-cloud operating model does not mandate that all cloud operations are common. But when global or cross-cloud services are needed, a multi-cloud operating model is the only vehicle that will provide the ability for the organization to have unified and common processes across all the clouds that matter to the organization.
The broadest support for app modernization

In 2020, the VMware team did a study that preceded the one already mentioned earlier in this eBook. That study included 1200 IT and business leaders and was focused on application development and cloud adoption trends. One of the questions asked of this group was: “How would you describe your ideal cloud environment?” The bullets below summarize what this group told us about their ideal cloud environment.

• All applications are managed consistently regardless of where they are deployed
• The freedom to move applications between environments without rewriting
• No matter where an application is run, it is secure and protected
• Developers and operations teams can collaborate easily

When this list of aspirations is combined with a recognition that more and more teams are expecting to use more than one environment to support their application portfolios, it is easy to understand why a multi-cloud operating model will emerge as a fundamental requirement for most organizations in the future.

The availability of a multi-cloud operating model provides the broadest degrees of freedom when it comes to making choices related to the implementation of the five application modernization strategies (Figure 3). Three of these strategies in particular: rehost, re-platform and refactor, are made much simpler to execute if the organization has a robust multi-cloud operating model in place.
Rehosting
Consider the rehosting of a traditional, monolithic application to the cloud. Leveraging a common virtual infrastructure allows an organization to continue to leverage the same operating model they are already using - no matter where the application is rehosted to. Teams can continue to use a familiar set of tools to manage both domain specific processes (compute, storage, security and networking) as well as interdomain processes for the major areas of service delivery, service operations and service governance. This provides the maximum amount of leverage for the skills and expertise that already exist within the organization.

In many cases the hardware underlying the cloud you are migrating to may be generationally more advanced than the hardware you were running that app on in your data center. As a result, the team may also experience improved performance running the app in the new environment even though they have not changed a single line of code associated with that app.

Conversely, recent on-premises infrastructure may be more advanced and higher performing than certain cloud instances. What's important is to understand the differences and ensure that the cloud can deliver the performance and security capabilities required for a given application to perform optimally.

According to IDC, organizations that have worked with VMware to leverage a common infrastructure across cloud environments have been able to achieve the following benefits:

- 46% Faster migration
- 57% Lower overall migration cost
- 59% Less staff time to migrate

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1. IDC Business Value Snapshot, 2021, Sponsored by VMware, IDC #US46862820
Re-platforming
The next area where the existence of a multi-cloud operating model will yield benefits is the area of **re-platforming** a traditional application to run on a Kubernetes based infrastructure. The goal of re-platforming in this context is to modernize the lifecycle management of a traditional application in such a way that wherever that app is deployed, the operational envelope around that app remains consistent. The existence of a multi-cloud operating model based on a common infrastructure will support this goal.

Refactoring
Lastly, in terms of **refactoring** an application or building a brand-new app, in a multi-cloud operating model, the tools and processes associated with building net new functionality that conforms to modern application principles are the same. This is true no matter where the app is built or run. As is the case with rehosting, the ability to use the same tools and processes across any environment provides tremendous skill leverage, not only for the application development teams building new apps but also for the operational teams responsible for running those apps.

Intel supports your multi-cloud strategy by providing a common underlying set of hardware technologies for use in your data center and on the leading cloud provider platforms including AWS, Azure and Google. Five generations of Intel® Virtualization Technology built into the Intel® Xeon® processors enables migration across generations and across environments. Still, understanding the capabilities of each environment or instance can help guide decisions to deliver resources optimized for each application from a feature, performance, and security perspective.

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1. Liftr Cloud Components Tracker April 2021
2. https://intel.com/cloudperformance

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![Figure 4: Intel is the foundation for all your clouds](image-url)
Take an agile approach to implementation

The answer to the question of “where to start an organization’s journey towards a multi-cloud operating model” will differ depending on the team driving the initiative and the scope of the need. However, for many teams, starting with their own data center will be a logical first step. In many organizations, there are critical applications running in the data center that need to be integrated with one or more applications running in a public cloud.

One of the largest challenges that these teams face is that their data center lacks the characteristics and capabilities of a cloud. As a result, operations in these data centers can’t support the velocity that is expected in an era of cloud. Providing users with a public cloud like experience in the data center will make it easier to integrate the data center and one or more public clouds into a single, unified multi-cloud operating model.

While starting with the data center as a focus is likely to be the best answer for many teams, it won’t be the right answer for all teams. If getting two different public clouds working in harmony is a bigger concern, then focusing first on building out a multi-cloud operating model to support cross public cloud operations would make sense.

In this circumstance, a robust IaaS layer with strong automation capabilities already exists in the public clouds. Given that, a logical approach would be to focus on processes and technologies that provide for a common approach to service delivery and the ability to unify governance practices across the two public clouds in scope for integrated operations.

The primary point here is that where you start your journey to a multi-cloud operating model can be different depending on your specific circumstance and business priorities. The second point is that no matter where you start, you will want to iterate in your approach to achieving a comprehensive multi-cloud operating model.
VMware and Intel can help

VMware pioneered compute virtualization. Providing a means of abstracting the resources of standards-based servers created a revolution in how the data center was run. VMware followed that by fully virtualizing the full infrastructure stack and adding a rich set of cloud management capabilities to that stack (VMware Cloud Foundation). VMware Cloud Foundation enables organizations to rapidly create a cloud like experience in their data centers.

In 2016, VMware announced a partnership with AWS and VMware Cloud on AWS was born. Today, VMware has partnerships with all of the hyperscaler cloud providers as well as with thousands of other cloud providers and managed service providers to provide a consistent cloud infrastructure as a service experience.

In 2019, VMware launched VMware Tanzu. The Tanzu portfolio brings together a rich set of capabilities for building, running and managing modern apps in containers with Kubernetes on any environment. Tanzu is integrated with VMware Cloud Foundation which supports the need of organizations to build, run and manage both traditional and modern apps on the same cloud platform.

Intel's decades of innovation and optimization with the world’s leading technology and service providers means that Intel not only has a deep understanding of enterprise use cases, but also a fine-tuned, globally deployed architecture you can count on. Intel is committed to deliver technology to our customers that enables them to master multi-cloud success and thrive in a transformed environment.

The ability of VMware and Intel to address and support the requirements of both traditional and modern apps provides the foundation for a multi-cloud operating model. A model that allows your team to leverage any combination of cloud environments to support the full scope of your application modernization strategies.

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