VMware Cloud vs. Traditional Public Cloud

Total cost of ownership

Introduction

The fundamental notion behind the VMware Cloud™ approach is that the software, which makes up our offering in VMware Cloud, gives customers more capabilities, for lower total cost, over the life of a cloud project, when compared to traditional cloud environments.

When weighing a move to the cloud, there's a lot to consider. In general, cloud providers offer a great degree of similar capabilities implemented in proprietary ways, while trying to add their own unique value. But we took a different approach. VMware Cloud was built specifically for multi-cloud, providing a compatible platform that offers a broad set of integrated infrastructure capabilities to support the requirements of any enterprise workload that accelerates application modernization in the data center and cloud. Our approach enables rapid migration to any cloud and unifies all new and old environments with consistent operations and security. And when comparisons are done, not just for compute costs, but for the entire cloud project, then VMware Cloud is the customer's choice.

This summary paper provides an overview of comparisons between VMware Cloud and traditional public cloud offerings, removing misconceptions on VMware Cloud being more expensive, as well as elaborating on the extended functionality of VMware Cloud when compared to other cloud environments. For the sake of comparison, we focus on Amazon Web Services (AWS) to demonstrate that VMware Cloud costs less in total than any functionally equivalent traditional public cloud.

This paper is a synopsis of a more comprehensive report created by the VMware Economics Team titled, "Comparing VMware Cloud to Traditional Public Cloud by Total Cost of Ownership."

It is important to be specific when discussing the costs associated in a move to the cloud. We need to quantify all aspects of the purchase, installation and operation of a set of workloads (commonly thought of as virtual machines, or VMs), which are migrated onto either VMware Cloud or to a traditional public cloud. The bottom line also must include acquisition costs of the compute, storage and network resources, as well as significant cost avoidance opportunities.

VMware Cloud economics model

The VMware Cloud Economics Team's methodology was designed to compare VMware Cloud on AWS and public cloud traditional implementations on as close to a level playing field as possible. While the two environments appear to be similar on the surface, evaluating the functionality and services of each will help you make a better-informed value decision regarding your specific cloud implementation or migration.

Cloud platform comparison

To fairly compare two platforms, the platforms must be functionally equivalent. The VMware Cloud platform is designed to be a complete customer solution that contains a wide array of essential technologies for building, running and maintaining enterprise-grade applications. Creating the same operational functionality on the public cloud, however, requires the subscription of additional services over and above the published compute and storage costs needed to deliver the same, and in some cases, less enterprise-ready services.

Basic assumptions for both environments

- Three-year prepaid reserved instance pricing
- 1,000 VMs running on twenty-eight (28) i3 nodes, with about 300TB of NVMe block storage
- Average VM utilizing 4 vCPUs with 16 GB vRAM
- AWS m5.xlarge EC2 instance-type
- Elastic Block Storage (EBS)
- No discounting for either solution

A base of one thousand VM instances was used as a default workload for the model to reflect an average enterprise workload comprised of multiple production applications. In addition, the model was based on data derived from the VMware Cloud on AWS full workload set. Elastic Block Storage (EBS) was the AWS storage service that matched the performant NVMe block storage used on the VMware Cloud on AWS hosts.

Baseline architecture used for each solution

- VMware Cloud Console
- VMware Software-Defined Data Center (SDDC)
  - VMware vSphere®
  - VMware vSAN™
  - VMware NSX®
  - VMware vCenter Server®
- VMware HCX®

Total cost of ownership (TCO) includes:

- Direct costs
- Migration
- Network services
- Security
- Observability and management

- VMware Tanzu™ services
  - VMware Tanzu® Kubernetes Grid™
  - VMware Tanzu® Mission Control™
- Dedicated Amazon EC2 Bare Metal Instances (i3– 36 Cores/512GB RAM/~10.7TB RAW)
- VMware Global Support
- VMware vCenter® Lifecycle Manager™
- Support for High Availability (HA) and Stretched Clusters

The inclusion of the NSX software suite is notable, as it provides a centralized network configuration and management across all clusters, along with a scale-out architecture for network elasticity with absolute security coverage. NSX is also application-aware and provides granular analytics and firewall policy formulation.

A medium enterprise application workload was selected to represent the baseline assumption for the comparison, reflecting a realistic starting point for analysis that may represent the entire production stack or subset for a larger enterprise. While there are several variables that affect the cost for egress/ingress network traffic, we have assumed a percentage of the EBS storage costs as an anchor for data transfer. The default percentages were chosen based on the AWS position within the flow of data, which allows the costs to scale accordingly, and also can be changed easily.

VMware Cloud is not the same as traditional public cloud

One of the most frequent misconceptions we hear from customers is that VMware Cloud must be more expensive. Some customers assume that VMware must be deploying VMware Cloud on top of the full software stack of the public cloud in question, most frequently Amazon Web Services (AWS). But actually, VMware deploys the full Software-Defined Data Center (SDDC) stack, VMware Cloud Foundation, on bare-metal hosts. VMware Cloud produces verifiable savings for any cloud implementation or migration project. We can show you how. Email us at cloud-economics@vmware.com and our Cloud Economists can explain.

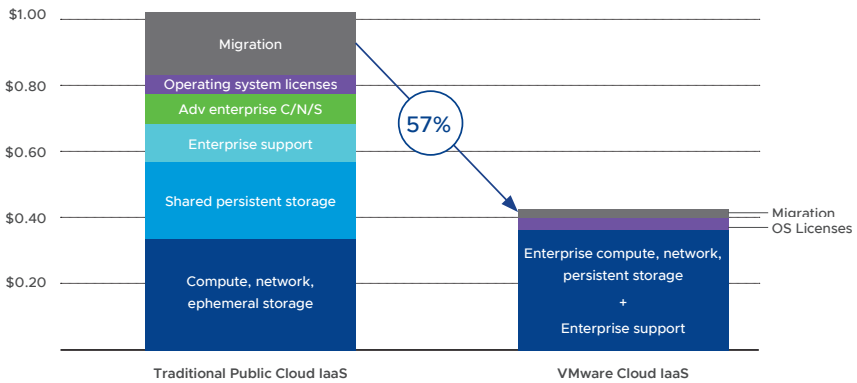

Figure 1: Real world example: 3-Year TCO comparison (cost per VM-hour)[1]

Understanding where savings come from

Customers frequently make the mistake of focusing on acquisition of compute resources alone. By this measure, traditional public cloud IaaS is, indeed, less expensive. However, this is not a proper comparison because it is starting from the wrong baseline. To compare accurately, we must look at the total cost of ownership, including advanced networking for things such as micro-segmentation, shared storage, support and switching costs in the form of cloud migration.

Direct costs

Direct costs refer to the additional native cloud services that need to be added to have feature parity with the out-of-the box features of VMware Cloud on AWS. VMware Cloud on AWS has been jointly engineered to be complimentary to the adjacent services offered natively by AWS. However, for this study, we are comparing features as if one of the solutions was being leveraged over another. This highlights the embedded enterprise features and capabilities that comprise the VMware Cloud on AWS solution.

Migration

As statistics show, migrating to a cloud is a substantial part of any cloud project in terms of both time and money (up to 30% of project costs). The core VMware Cloud Economics models 11 hours of staff time to migrate a VM from vSphere to a hyperscaler platform. Experience has shown that the average time to move a vSphere VM to VMware Cloud is about 15-20 minutes, due to the VMware vSphere® vMotion® feature and the HCX software package that comes with VMware Cloud at no cost.

Because migrating to the cloud can't be done all at once, a migration must have both current and future platforms running at the same time, with two sets of storage costs, two sets of management costs, and so on, leading to a cost bubble during the process. The longer the migration, the more you pay.

Network services

There's a huge breadth of services offered via VMware Cloud Foundation™ and NSX, which provides strong, multi-cloud, easy-to-operationalize network defenses that secure application traffic within and across clouds. NSX goes a step further in making it easy to enable Zero Trust application access, which secures traffic across applications and individual workloads. Additionally, VMware Cloud provides the following features:

- **SDDC network** has two notional tiers: Tier 0 handles north-south traffic (traffic leaving or entering the SDDC, or between the management and compute gateways). Tier 1 handles east-west traffic (traffic between routed network segments within the SDDC).
- The default **NSX Edge Appliance** is implemented as a pair of VMs that run in active/standby mode. This appliance provides the platform on which the default Tier 0 and Tier 1 routers run, along with IPsec VPN connections and their BGP routing machinery.

Intrinsic VMware technology value (cost avoidance)

There are several areas where the VMware Cloud platform avoids costs through efficient use of resources, obviating the need for additional computing/network/storage purchases. Cost avoidance, which we are calling intrinsic VMware technology value, includes:

- Compute savings (CPU oversubscription)
- Storage savings (compression)
- Memory savings (RAM overcommit, deduplication)
- Availability savings (automated host remediation)
- Application mobility savings (moving workloads without interruption)

- The **Management Gateway (MGW)** is a Tier 1 router that handles routing and firewalling for the vCenter Server and other management appliances running in the SDDC.
- The **Compute Gateway (CGW)** is a Tier 1 router that handles network traffic for workload VMs connected to routed compute network segments.

Upgrading the native AWS networking

Having established the included VMware Cloud network services, we can look at the functionality needed to build something comparable in the public cloud. An additional five native services would need to be added to equal the default services in the VMware Cloud on AWS SDDC:

- Site-to-Site VPN
- Network Address Translation (NAT) Gateway
- Elastic Load Balancer
- Network Firewall
- AWS Transit Gateway

Security

Security is a fundamental element for VMware Cloud, with NSX and the concept of micro-segmentation taking center stage. Here are some of the advanced security components of NSX:

- **Reachability analysis**—Traceflow technology allows you to inject a packet into the network and monitor its flow across the network, identifying issues such as bottlenecks or disruptions.
- **Traffic mirroring**—NSX Port mirroring can send mirrored traffic from a source to a destination appliance in the SDDC or to an on-premises network.
- **Micro-segmentation**—This is a native capability of NSX. Edge firewalls run on the management and compute gateways, examining all traffic into and out of the SDDC. In addition, these distributed firewalls allow fine-grained control over traffic between workloads.

Upgrading native AWS security architecture

Native AWS security services would need to be added to equal features and functionality provided by NSX.

Observability and management

Observability and management are key to understanding the full cost of moving to the cloud, since the largest portion of time in the lifecycle of an application is spent in running production.

- **VMware vRealize® Operations Cloud™** delivers a unified management platform to optimize, plan and scale hybrid cloud deployments from applications to infrastructure as a service. It provides continuous performance optimization, efficient capacity and cost management, proactive planning, intelligent remediation, and integrated compliance as a VMware Cloud service.

Further resources

For far more granular details, as well as for specific dollar savings relating to cloud choice, we refer you to the extended paper, "**Comparing VMware Cloud to Traditional Public Cloud by Total Cost of Ownership.**"

- **VMware vRealize® Log Insight Cloud™** is a VMware Cloud service that collects and analyzes log data generated by all resources in your VMware Cloud on AWS environment to centralize log management, accelerate IT troubleshooting, and provide deep, operational visibility across VMware Cloud on AWS and private cloud environments. In our model, the full subscription cost has been added for feature parity with native cloud.

Upgrading native management and observability

To provide feature parity that aligns to the VMware Cloud architecture, using Amazon Web Services as our default public cloud, both Amazon CloudWatch and AWS CloudTrail would be required.

Indirect costs: VMware technology value

As we have shown, there are direct costs associated with public cloud beyond what VMware Cloud offers out-of-the-box at no extra charge. In addition, there are several areas where the VMware Cloud platform avoids costs by efficient use of resources, which obviate the need for additional computing/network/storage purchases. These features are called CPU oversubscription, storage compression, storage deduplication, and RAM overcommit.

CPU oversubscription is the ability to oversubscribe CPUs on VMC hosts, which increases the number of workloads that can be sustained effectively on the physical hosts. In essence, while there may only be 2 Hardware CPUs, any number of actual CPUs can be defined, to take advantage of unused CPU cycles. Just as a juggler can keep multiple balls in the air while using only two hands, oversubscription accomplishes the same thing for virtualized workloads with many workloads in the air (running) on just a few hands (CPUs).

The value of storage compression is relatively straight forward. With VMware Cloud, we can average a 1.25 data compression rate, which means 500GB of information could be stored in 400GB of storage space, for example. This would occur by using stand data compression algorithms. This capability can reduce the amount of storage you would need to purchase to retain the same information in public cloud storage, resulting in higher monthly operational costs for the public cloud.

With VMware Cloud's storage deduplication feature, we can average a 1.5 data deduplication rate, which means 500GB of information could be stored in 333GB of storage space, for example. It does this by only storage each unique file once. This is especially useful when you have may copies of the same file, as you would have with multiple instances of an operating systems. This capability can reduce the amount of storage you would need to purchase to retain the same information in public cloud storage resulting in higher operational costs monthly for public cloud.

The value of memory overcommit is based on the ability to overcommit RAM on VMC hosts, which increases the number of workloads that can be effectively sustained on the physical hosts. In essence, more virtual memory can be assigned than there exists on the hardware. With RAM overcommitment, fewer physical hosts are required on VMC to support the same workloads as compared with hosts that are not configured for memory overcommit. In order to value this ability, we estimate the number of VMC hosts that would be required to support the same number of VMs based on the RAM allocation to each VM. For simplicity, we use the average vRAM per VM.

For more information on this topic, see the full whitepaper, "Comparing VMware Cloud to Traditional Public Cloud by Total Cost of Ownership."

Conclusion

Cloud implementation and/or migration projects can be confusing and expensive. But they really don't have to be. By understanding all the aspects of the project, as well as how companies and their products compare and deliver, the true costs of the undertaking come into sharper focus.

We show, through real-life scenarios, comparisons that indicate that public cloud imposes many costs on the user beyond the costs of the compute portion of a project. They add up. Consequently, a cloud offering that provides a bundle of services in a manner that provides a consistent platform, like VMware Cloud, clearly shows long-term benefits in both functionality and bottom-line project costs.

If you have any questions about the math behind our model, or if you would like to see what the model looks like with different assumptions, contact us and talk to a VMware Account Manager about a Cloud Economics analysis.

1. N=74. Based on 74 most recent Economic Analyses with reliable Public Cloud data. Pulled 06-16-2022, VMware Cloud Economics database.