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Why Organisations
need VMware Cloud

Enabling and driving the adoption of the multi-cloud era.

Whitepaper
↳ VMware Cloud (VMC)

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Introduction

In this first paper of the series, focussing on the cloud and in particular multi cloud environments, we are going to start by discussing what the cloud means and the benefits of each of the cloud models and architectures.

The objective then is to take this information and translate it into how VMware are embracing and delivering multi cloud environments using its knowledge and expertise in delivering the software defined datacenter.

Before we get into the details of discussing the VMware approach to the cloud and their solutions for delivering multi cloud environments, I thought it important to first set the scene and take a more holistic view of the current cloud trends and why they, especially multi cloud, hold the key for organisations to build the right cloud strategy.

Given the drive to migrate to the cloud, organisations have already ended up with a multi cloud environment by default as part of their migration projects. A recent IDC survey suggested that 97% of enterprise organisations have both a public and private cloud environment.

However, some have found that not every cloud had a silver lining! By that I mean they ended up having multi cloud deployment based on necessity rather than design.

Referring to the same IDC report, 92% of enterprise organisations have cloud environments deployed with two or more cloud providers. The reason being is that organisations soon realise that different characteristics, and costs of the available platforms has meant that some cloud platforms were better suited to some workloads than others.

For example, one might be more suited to running database type application as the CPU price/performance is more favourable, or another provider is better suited to running desktop workloads in the form of a DaaS solution.

The key takeaway here is that organisations should plan their environments for multi cloud by design rather than by accident, selecting the most appropriate provider. It is akin to deploying storage solutions whereby you would tier the storage with expensive fast disk used for performance and cheaper storage used for backup and archive.

Taking this "multi cloud by design" approach will remove the complexity of managing multi cloud deployments and enable them to very quickly access the apps and data that they need to run their business. Particularly for those organisations that already have mandates a cloud first strategy.

Given all this talk of clouds, do not forget that most organisations will still most likely have a significant amount of on premises infrastructure.
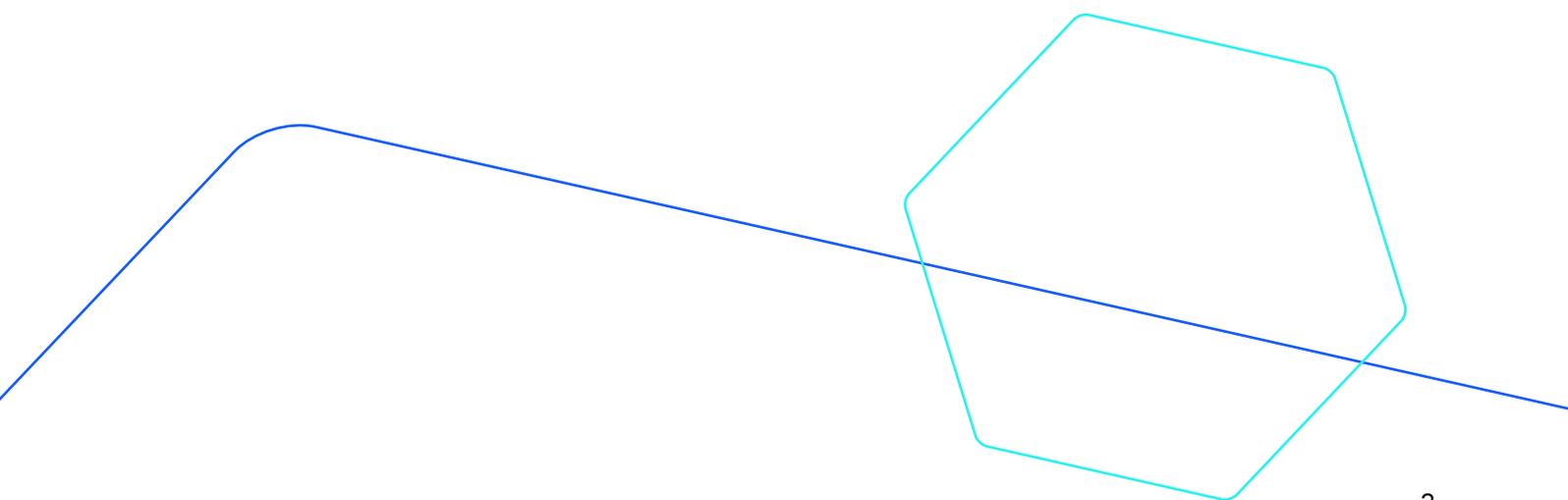
This on premises presence is still particularly important and in fact should be considered as just another type of cloud platform. It just so happens that you own it and manage it and therefore it should be considered as a private cloud. There is also the matter of the existing investment in the infrastructure that you should still be able to take advantage of.

A recent 451 Research survey showed that 46% of enterprises were already taking advantage of combining on premises with muti cloud and a further 32% of enterprises were in the process of implementing a hybrid solution. This is shown in the diagram:
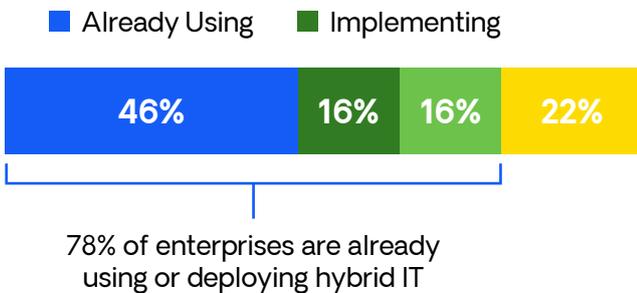
Often when we talk about a cloud migration strategy, or that cliched "journey to the cloud" statement, the first consideration is where to start. The reality of it is, as we have just discussed with the on premises private cloud, you will already have started this journey just by having infrastructure in your datacentres.

The question is how do you expand and embrace other cloud platforms, what types of cloud platform are available, and why you should consider one over the other?

This paper is going to discuss the types of cloud platforms that exist today and take a closer look under the hood as to what engine drives these platforms before focusing on one particular engine:
The VMware Cloud.

■ Already Using   ■ Implementing

| 46% | 16% | 16% | 22% |

78% of enterprises are already
using or deploying hybrid IT

Figure 1: *The percentage of organisations already using hybrid environments.*

The Anatomy of the Cloud

First, it is important to understand the cloud in more detail by defining both the architectures and the infrastructure technologies that drive these platforms.

Put simply the architecture defines they type of cloud whereas the infrastructure relates to the resources to deliver that cloud platform.

Defining Cloud Architecture

While you may already be very familiar and experience with cloud technologies, it's useful to just step back and look at the definitions of the various different types of cloud architectures so as to establish a baseline that will assist with identifying and evaluating the various cloud strategies that are available today. This ensures that you take in the complete picture when designing your cloud environments.

Public Cloud

A public cloud environment is defined as a set of infrastructure resources such as compute, networking, and storage that are hosted by and delivered, via the public Internet to an enterprise customer as a service by an external provider such as AWS, Azure, or Google.
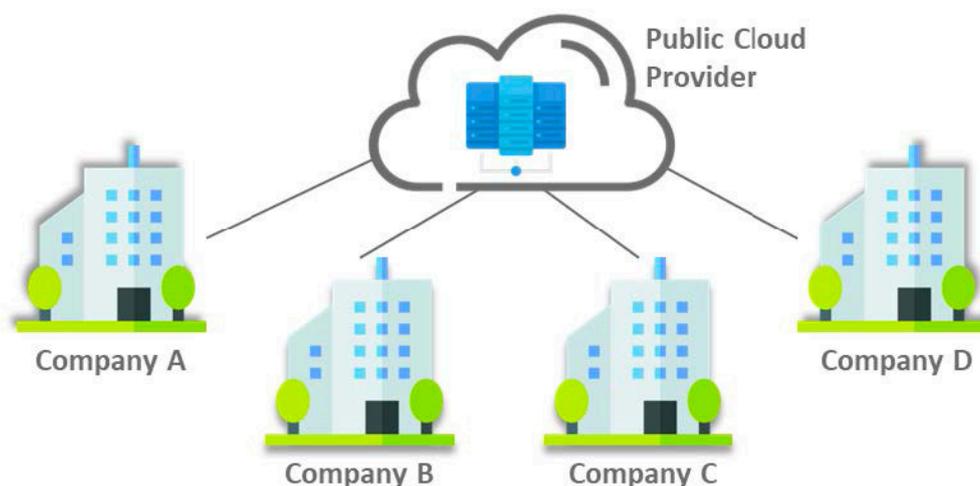
Figure 2: The Public Cloud Model

The benefits of Public Cloud deployment include:

↳ Minimal setup time and maintenance costs
↳ Launch apps globally within minutes
↳ On demand access to compute & storage
↳ Virtually unlimited scalability
↳ Choice of operating systems
↳ Optimised software stack
↳ Lower staffing requirements

One consideration for public cloud solutions is the fact that the infrastructure is shared across a number of organisations or tenants.

Although not a problem in itself given the economies of scale this delivers when it comes to costs, often enterprises could see this shared infrastructure approach as somewhat of a security risk. This can easily be mitigated against by ensuring they implement a robust, cloud focussed security solution to protect their data and their employees.

Private Cloud

In contrast to public cloud environments, private clouds offer organisations a set of infrastructure resources such as compute, networking, and storage that are hosted by and delivered via the public Internet as a service by an external provider such as AWS, Azure, or Google.

However, the key difference is that these resources are now exclusively reserved for each organisation and are not shared with anyone else. Not forgetting as well

that any on premises infrastructure in an enterprises own datacentre is also classed as a private cloud.

Another key benefit of deploying a private cloud environment is that as an individual customer you are the only organisation to have access to the platform, as well as full management. You will have full control over the configuration in terms of the hardware vendor, operating systems, and other third party solutions.
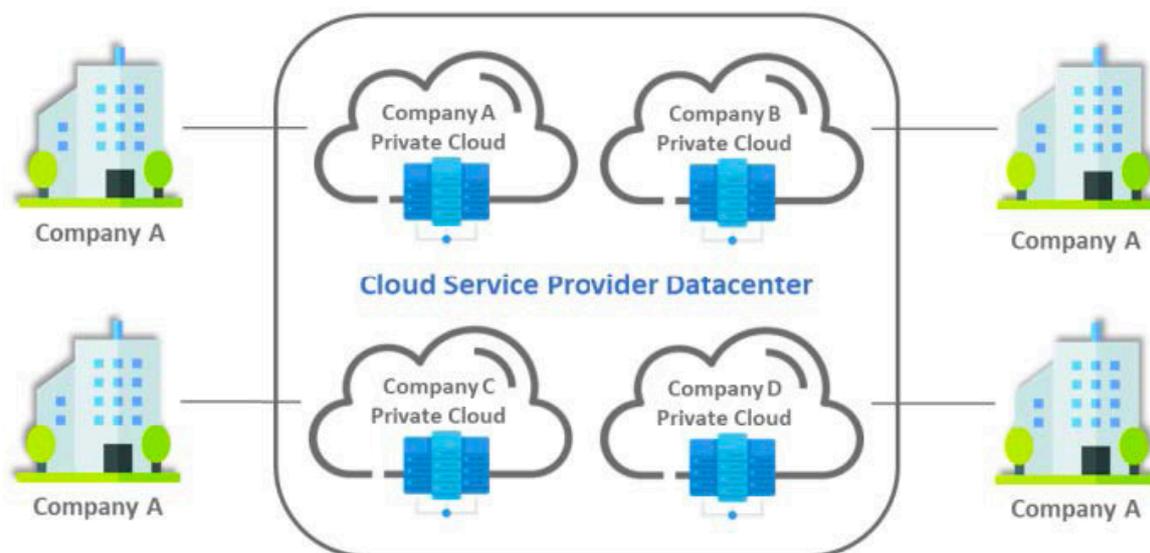
Figure 3: *The Private Cloud Model*

The benefits of Private Cloud solution include:

↳ Compliance and data privacy regulations prevent an app from running in the public cloud
↳ Your organisation has applications that don't run in the public cloud
↳ Flexibility choosing infrastructure technologies   ↳ High performance is a priority
↳ Organisations have a growing infrastructure   ↳ Data transfer costs are a concern

With a private cloud, whereby the enterprise effectively owns the infrastructure rather than share it, in some cases the scalability is not as straightforward as it would be with a public cloud. Public clouds are built to easily add resources, often simply by using a credit card. Adding addition resources to a private cloud environment will need you to purchase new hardware, install the new hardware, and then configure and manage it.

These steps will all take time and money.

The last point to be aware of when considering a private cloud is around management. Although management can be a benefit in that an organisation can have full control over the infrastructure, doing so in a private cloud environment could result in additional tasks such as having to manage the cloud based elements as well as the infrastructure and applications.

Managed Cloud

Taking advantage of a managed cloud environment basically means that the cloud provider adds a management layer to the cloud platform regardless of whether it is a private, public or hybrid cloud environment.

Depending on the point at which the management layer is deployed in the stack dictates the type of managed cloud environment you have access to.

You will have seen this written and appended by the term "as a service". This means that the as a service element is managed by the cloud provider.

Figure 4 below shows the different as a service models for a managed cloud and what the customers manages versus what the Cloud Service Provider (CSP) manages:
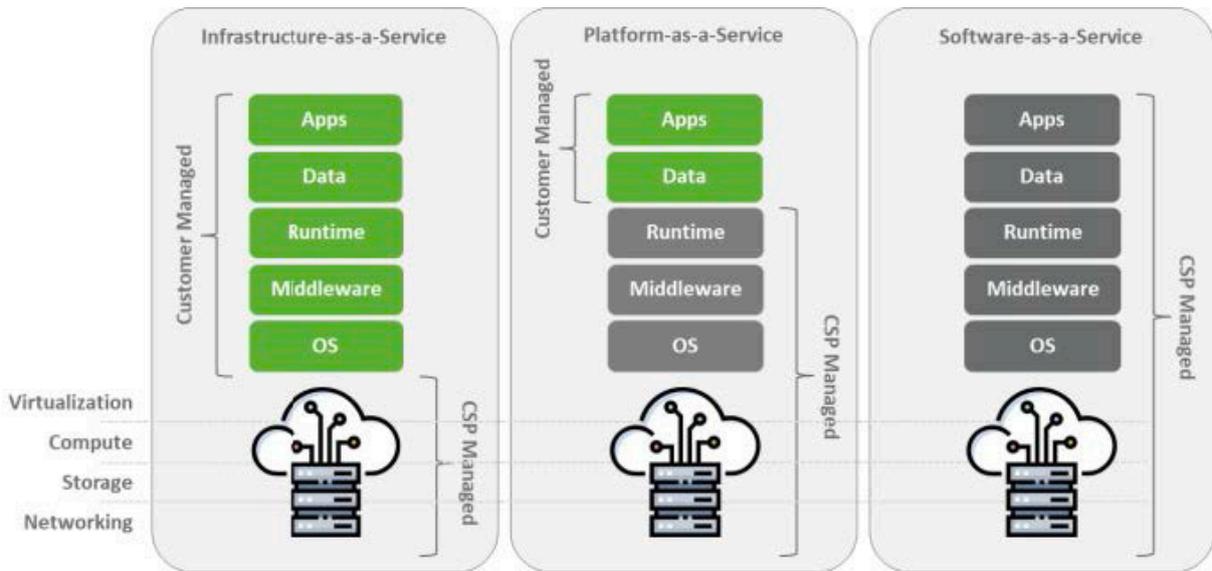

Figure 4: *The Managed Cloud Model*

The benefits of deploying a Managed Cloud Environment include:

↳ Low "time to cloud"   ↳ No staffing costs

↳ Easy access to expertise   ↳ Choice of managed services

However, you should be aware that this level of service does come at a price in the form of the additional management fees, but this is often negated by the fact that the overall total cost of ownership is reduced given you will not need as many administrators performing functions that the cloud provider is now delivering.

Hybrid Cloud

The hybrid cloud model is seen as the first step towards a true multi cloud environment.

As the name suggests, a hybrid cloud architecture combines and orchestrates a number of public and private cloud environments.

This is why the hybrid cloud is seen as the first step towards a true multi cloud environment as workloads will span both a public cloud and private cloud.

Either of these can be managed either independently or managed as if they were one cloud as shown in figure 5.

So, what are the advantages in customers deploying a hybrid cloud model?

First of all, it allows you to deploy different workloads between a public cloud and a private cloud. Taking that to the next level of detail that could mean that an organisation could deploy the end user facing web front end elements of an application on a public cloud where they could quickly and easily scale the number of end users that require access to that application.

However, when it comes to the actual data used by the app then due to regulatory compliance, that data may need to reside in an on premises private cloud to ensure it is secure.

In this example the hybrid element of the solution brings both the private and public cloud environments together presenting a unified and seamless end user experience. The end user just accesses the apps and data from what appears to them to be a single location.
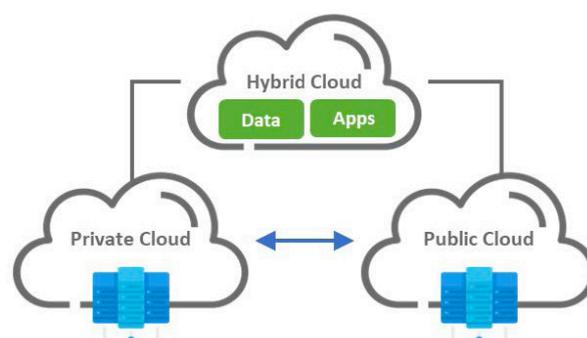
The benefits of deploying a Hybrid Cloud Environment include the following:

↳ Take advantage of vendor specific capabilities

↳ Meet high service and seasonal working demands with the ability to burst into the cloud

↳ Enable apps and data delivery for remote working　　↳ Enable scalability

↳ Comply with data privacy and enhance data security

↳ Deliver business continuity and disaster recovery effectively

↳ Lower the cost of capital (capex) and operational (opex) expenditure

↳ Easy access to cutting edge technology to drive innovation and deliver advantage

Multi-Cloud

Multi cloud deployments are the next step along from the hybrid cloud in that rather than simply having a private cloud and a public cloud, an organisation is consuming cloud services from multiple cloud providers.

This cloud model continues to grow exponentially, with a large number of organisations already having deployed a multi cloud strategy, whether by design or by chance.

This is evidenced in a recent 451 Research survey, where it was recorded that the majority, around 76% to be more precise, of organisations are already using two or more public clouds as well as their own private clouds.

If you average that out, then each enterprise uses approximately 2.3 clouds.

If you go on to look at the large corporate enterprise type organisations, those that typically have revenue figures in excess of $1 Billion, then these figures rise even further. In these cases, then the use of three or even four different clouds is not unusual.
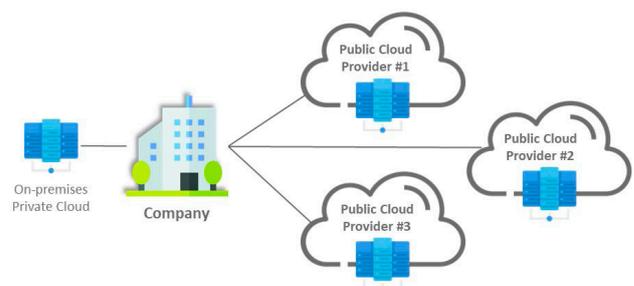

Figure 6: *The Multi Cloud Model*

So, the question is why is this the case? Why are organisations looking at consuming services from multiple clouds?

The answer has already been touched on earlier in this paper, and it comes down to the different abilities, technologies, and costs that each of the individual cloud platforms provide.

These different capabilities mean that organisations, as part of their overall cloud strategy and design, should choose the most appropriate cloud platform to suit the type of workload that they are going to run on it.

For example, a customer provides high resolution mapping solutions. They might look to one cloud provider as they deliver a better price/performance storage service for storing large images, and then another cloud provider that delivers advanced features for running a virtual desktop infrastructure such has hardware accelerated graphics. Therefore, they would potentially choose at least these two different platforms as essentially, they are the best in breed at the service they deliver, and meet you use case.

But what you need to be aware of is the glue that brings all these clouds together and how you manage multiple cloud environments.

A key point to note is in how the cloud platforms deliver commonality across them to make it easy to move workloads ensuring that they run in the best place possible.

By doing this you remove any form of vendor lock in or any cloud platforms that use some form of proprietary technology that means it is difficult to move off.

This harks back to the days of old where hardware vendors avoided using different architectures within their devices that drove high costs.

However, having said that, virtualization went a long way in fixing this as the type of hardware became less relevant.

Cloud Infrastructure Technologies
↳ The driving force behind delivery cloud platforms

So far in this whitepaper we have discussed the various type of cloud, from private to public, and on premises to multi cloud. But what makes up cloud computing and a cloud platform?

Simply put, the core elements of any cloud solution are exactly the same regardless of whether it is an on premises private cloud, or a cloud managed and delivered by one of the cloud providers.

You could even go as far as to say that cloud is just the collective term for a set of infrastructure or infrastructures with the purpose of delivering applications and data to end users regardless of their location and the location of the applications and data and whether you manage it yourself, or somebody else manages it and lets you use it.

So, what are the cloud infrastructure components?

Hardware

Let's start with hardware. You would most likely think that a cloud is based on virtualization, and on the whole, you would be correct in thinking that. Virtualization has most definitely enabled the cloud allowing resources to be shared effectively between different organizations, however you can still consume physical resources in a cloud.

But regardless of this, the virtualization software still needs to run on some form of physical hardware infrastructure such as servers, networking equipment, storage arrays, and backup devices as well as more specialist hardware such as high end graphic cards for VDI environments. Quite often we hear the term serverless used when talking about the cloud. Clearly you need some form of physical hardware platform to run these services somewhere so what does this term mean exactly?

Serverless architecture allows an organisation to build and run applications and services without having to manage any of the infrastructure. The management aspects are taken care of the cloud provider so serverless basically means an organisation doesn't care about the servers and infrastructure. All they need to care about are the apps and data.

Virtualization

The virtualization layer, or more specifically the hypervisor software, runs on the physical server hardware hosted by the cloud provider. Its role is to abstract or virtualize the servers compute resources, such as process (CPU), memory, storage, and networking.

This virtualized pool of resource makes up the cloud platform, coupled with benefits such as self service and automation that allows an organisation to scale their cloud resources to meet the demands of the business much quicker than deploying physical hardware.

As this paper is focussing on the multi cloud environments, and VMware specifically, then we will discuss how the VMware vSphere hypervisor provides that level of consistency and commonality that enables organisations to reap the rewards of a true multi cloud environment.

Storage

Data is another key infrastructure element and one on the most valuable assets to any organisation. Data needs to be stored, protected, and delivered to end users, the three most important elements within any organisation no matter how large or small.

As with the compute elements, virtualization is used to abstract storage resources from physical hardware systems enabling data to be easily accessed by end users.

This approach, referred to as software defined storage (SDS), pools together physical storage resources within the cloud providers environments as one entity and then allows organisations to access their own secure storage areas.

This approach enables organisations to very quickly add or remove storage resources from their environments or to take advantage of managed storage cloud environment such as backup as a service where data is securely backed up in the cloud making it easily available to restore.

In the multi cloud world, cloud storage could be delivered by a different cloud provider than the hardware. The choice based on the provider who delivers the best price/performance to meet the storage demands of the customer.

For example, you have most probably heard the term "bucket" used in this context, which in this case refers to an Amazon cloud storage service.

Networking

The final infrastructure component is the network. Again, with the advent of the software defined network (SDN) once the cloud provider has deployed their physical infrastructure and cabled all the switches, routers, and firewalls etc. then the configurations and connections can simply be managed in software.

However, networking for the multi cloud era delivers much more. It provides the connectivity between the different cloud environments as well.

Without this moving between the different cloud platforms would be much harder given that each one would deploy its own network configurations, policies, and rules.

As with the virtualization layer, for this to work then there needs to be commonality between the cloud platforms. That is a common network.

The final piece of networking to consider, now that apps and data are potentially more remote from the end users, is wide area networking (WAN), and given we are talking cloud and virtualization, software defined wide area networking (SDWAN).

Now that we have defined the different cloud architectures and the infrastructure that drives them, next we are going to focus our attention to the VMware solutions for delivering cloud environments and how it provides all the features and capabilities required.

Introducing the VMware Cloud (VMC)
↳ The VMware based engine room supporting the multi cloud era

Let's start by defining what the VMware Cloud is. The name suggests that this is VMware's own cloud solution, and that VMware are the cloud service provider, like Google, Amazon, or Microsoft for example, and that you consume services directly from VMware.

However, this is more of a headline and the reality is that there is much more to the VMware Cloud than this. It's about enabling the foundation of the cloud, and not just a VMware cloud but enabling VMware infrastructure, namely the software defined datacenter components (SDDC) to run on whoever the cloud provider is. Or there is the option for reseller and systems integrator partners to deliver their own cloud service via the VMware Cloud Provider Program.

As VMware were and still are the pioneers of virtualization in the world of commodity x86 server infrastructure, and pioneers of the software defined datacenter, then VMware has both the experience and capability to deliver the foundation for the VMware Cloud.

In today's terms this is the VMware Cloud Foundation (VCF) solution, the foundation for delivering the VMware vision of any cloud, any application, and any device. This means that when we are talking about the cloud, as we have already discussed, we are not just talking about a VMware owned cloud.

What we are talking about is providing the foundation services for any cloud provider to deliver their cloud service that is underpinned by VMware technology solutions. Put in basic terms this means VMware software defined datacenter solutions and other associated software solutions such as management, automation, and security solutions running on each of the different providers infrastructure, regardless of whether that is Google, Microsoft, AWS, Oracle, or any other cloud providers infrastructure.

We will outline the different cloud platforms and cloud service providers, or hyperscalers as they are more commonly known as, later in this paper and in more detail throughout the series. The VMware cloud becomes the enabler for delivering a common unified platform across clouds and therefore driving digital business for the multi cloud era.
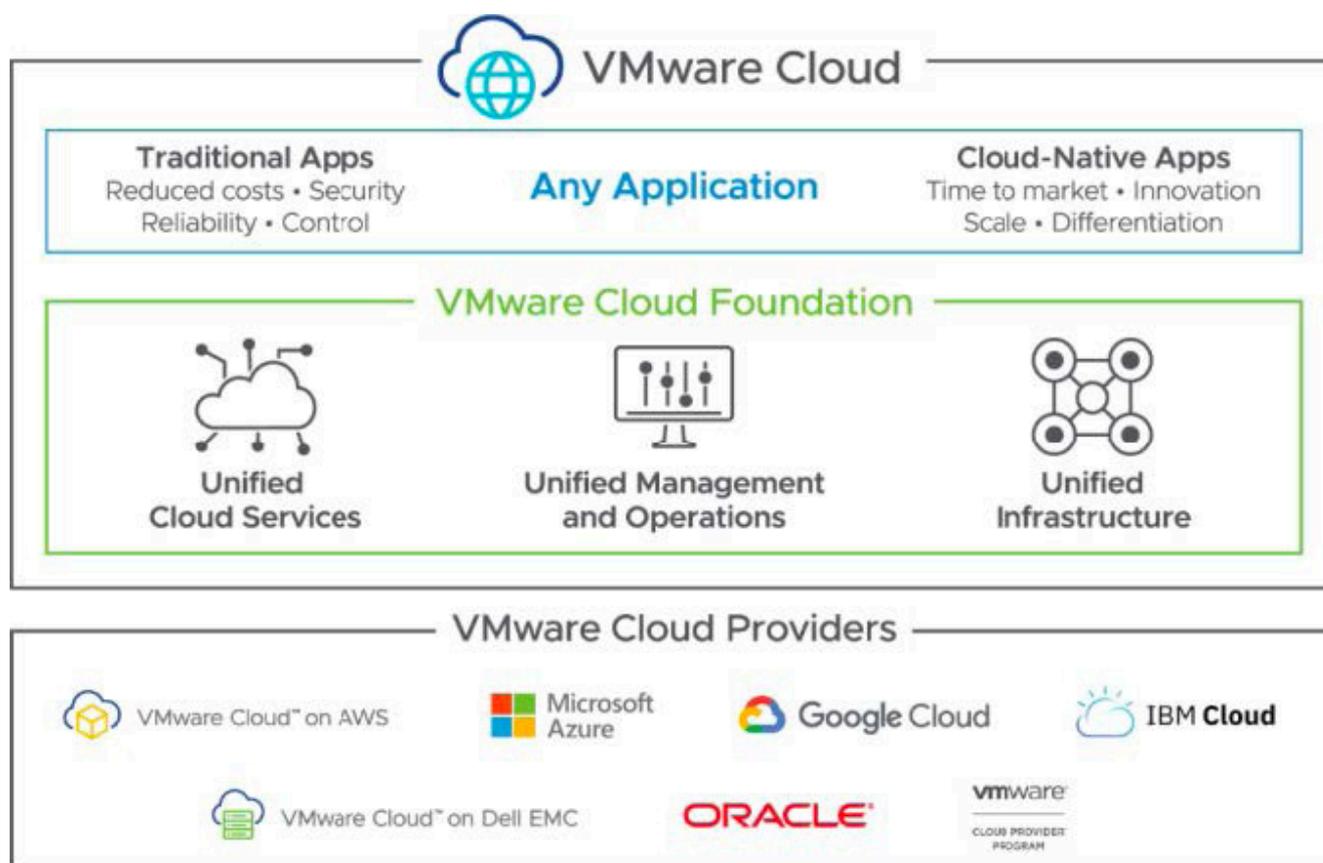
Figure 7: The VMware Cloud

The future is Multi Cloud

↳ Building a multi cloud strategy with VMware Cloud

Single platform, multiple clouds

One of the key success factors to a multi cloud strategy is the ability to easily move workloads between the providers.

For this to work then the cloud platforms need to have an element of commonality on which the cloud infrastructure that runs your workloads. This not only allows for these workloads to be easy to manage but means that you are not locked in to a single hyperscale platform provider.

After all, many cloud migrations take time to complete, you want to avoid having to waste more time if you need to migrate workloads.

In the case of VMware, this common cloud platform is called the VMware Cloud Foundation or VCF.

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VMware Cloud Foundation (VCF)

VMware Cloud Foundation provides an integrated, software defined infrastructure stack made up from the core VMware solutions:

↳ Hypervisor: VMware vSphere
↳ Storage Virtualization with VMware vSAN
↳ Network Virtualization with VMware NSX
↳ Cloud Management and Monitoring tools with VMware vRealize Suite

Combined into a single platform, VMware VCF can be deployed on premises or can run on the infrastructure of one of the cloud service providers. This delivers the level of commonality and portability across clouds that enables workloads to be managed centrally and migrated to other platforms as required.

VMware VCF will be discussed in more detail in the next whitepaper of this series, Building the multi cloud platform with VMware solutions.

The next piece of the multi cloud jigsaw is how these cloud platforms are joined.

Virtual Cloud Network

The Virtual Cloud Network is made up from a comprehensive set of enterprise class networking and security features including VMware NSX and VMware SDWAN that allow an organisation to connect and protect workloads across your on premises datacentres, hybrid cloud, and multi cloud environments.

Not only that, by automating the network ensures that security policies are mirrored across cloud environments meaning that scalability and portability of workloads is vastly simplified and reduces time to deploy.

If you use the cloud journey analogy, then the Virtual Cloud Network provides the motorway structure between clouds.

The Virtual Cloud Network will be discussed in more detail in the next whitepaper of this series, Building the multi cloud platform with VMware.

Combining the VCF platform for cloud infrastructure and the VMware Cloud Network enables organisations to take advantage of the various support hyperscale platforms.
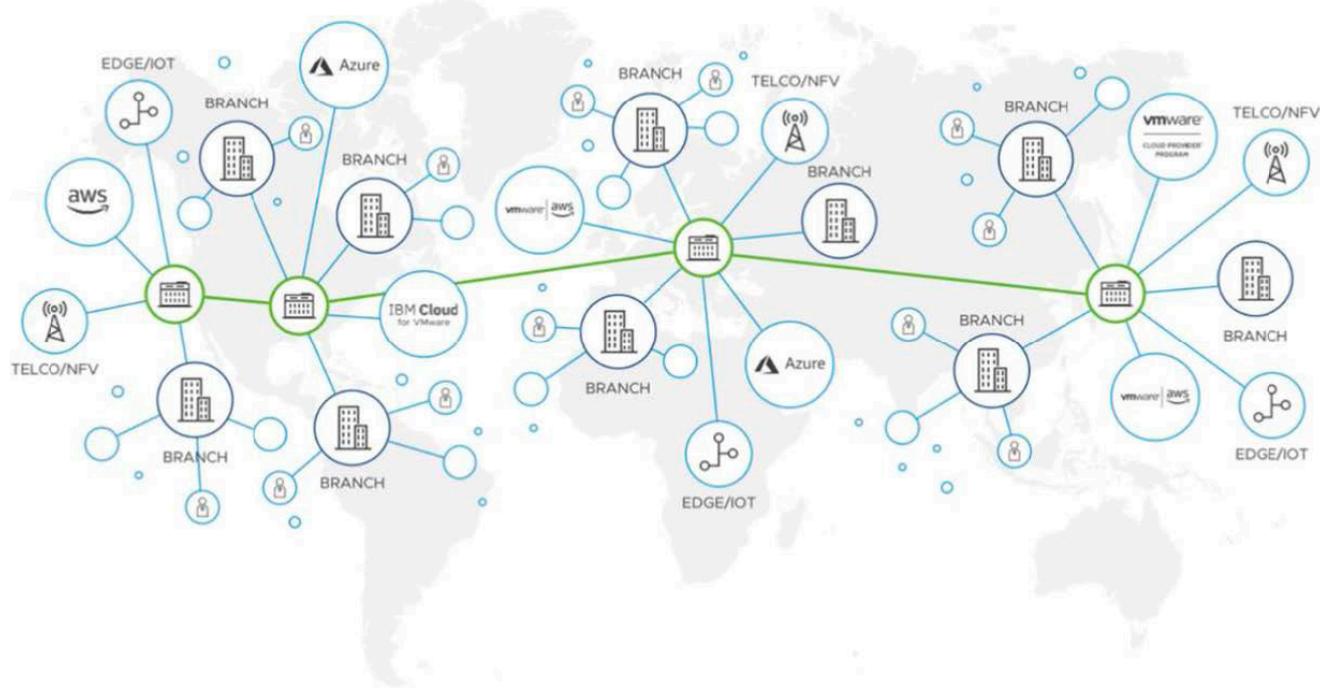
VMC Hyperscale Platforms
↳ Todays platforms that support running the VMware Cloud

🅰 VMC on Amazon AWS

VMware Cloud on AWS brings VMware's enterprise class Software Defined Data Center software solution to the Amazon AWS Cloud platform.

This solution enables customers to run their production applications across private, public, and hybrid cloud environments.

Applications run on the VMware vSphere software defined datacenter solutions and in turn this is hosted on AWS infrastructure that has also been optimised to also take advantage of other additional AWS services.

The VMC AWS solution, including architecture and licensing will be discussed in more detail in the third paper in this whitepaper series.

Figure 8: *The VMware Virtual Cloud Network*   19

VMC on Microsoft Azure

With the Microsoft Azure cloud solution, VMware vSphere runs natively on Azure Bare Metal server infrastructure, located on the Azure cloud locations.

The service includes all the features that are required to run your applications on the VMware software defined platform efficiently and securely.

The solution is delivered by Microsoft, verified by VMware, and runs on the Azure infrastructure.

The VMC on Microsoft Azure solution, including architecture and licensing will be discussed in more detail in the fourth paper in this whitepaper series.

VMC on Oracle Cloud

This solution enables the VMware vSphere SDDC to run on the Oracle cloud infrastructure.

However, one of the key differences is that it is customer managed meaning that customers manage their own VMware environment.

That means that it offers complete control of the VMware SDDC solutions to enable organisations to move or extend their VMware virtual machine workloads to the Oracle cloud without needing to rearchitect their applications.

The VMC on Oracle Cloud solution, including architecture and licensing will be discussed in more detail in the fifth paper in this whitepaper series.

VMC on Google Cloud Platform

The Google Cloud VMware Engine, or GCVE, is a fully managed VMware as a Service solution that is delivered and managed by Google, or a VMware Cloud Provider.

In terms of cloud infrastructure, the VMware Engine referred to is running the VMware Cloud Foundation solution on bare metal servers in the Google Cloud environment. One of the key advantages of this solution is the integration with Google's other cloud service offerings such as big data and machine learning services.

The Google Cloud solution, including architecture and licensing will be discussed in more detail in the sixth paper in this whitepaper series.

VMC on IBM

The IBM Cloud solution for VMware Cloud enables organisations to take advantage of the IBM Cloud platform running VMware's SDDC software. This enables you to easily migrate your VMware based virtual machine workloads to the IBM Cloud using existing tools, technologies, and expertise, protecting investment.

With the IBM Cloud, organisations can take advantage of some of the integrated technologies such as Red Hat OpenShift to drive innovation with AI and analytics services. The VMware IBM Cloud solution, including architecture and licensing will be discussed in more detail in the seventh paper in this whitepaper series.

VMware Cloud Provider Programs

The final option we are going to look at is the VMware Cloud Service Provider (CSP) and the Managed Service Provider (MSP)programs.

The MSP Program enables partners to leverage software as a service offerings to deliver VMware solutions to customers without the need to build and manage your own data center hardware. Instead you can leverage VMware datacentres.

VMware Validated Designs for Cloud Providers are blueprints for building and operating cloud infrastructure for a wide range of cloud provider use cases that you can build in your own datacentres.

Next Steps...

Digital Transformation and migrating to a cloud based environment is a journey, and the question our clients ask is "how do I get started on that journey to the cloud?"

Organizations on the cloud adoption path must create a cloud strategy for flexibility, agility, speed, and cost reduction. However, even a lift and shift approach to migration brings challenges such as data security, compliance, and cost control.

Digital transformation goes beyond building a cloud and requires a plan for people, processes, and technology to deliver applications and data. LUNIQ offers assistance regardless of your cloud project's progress.
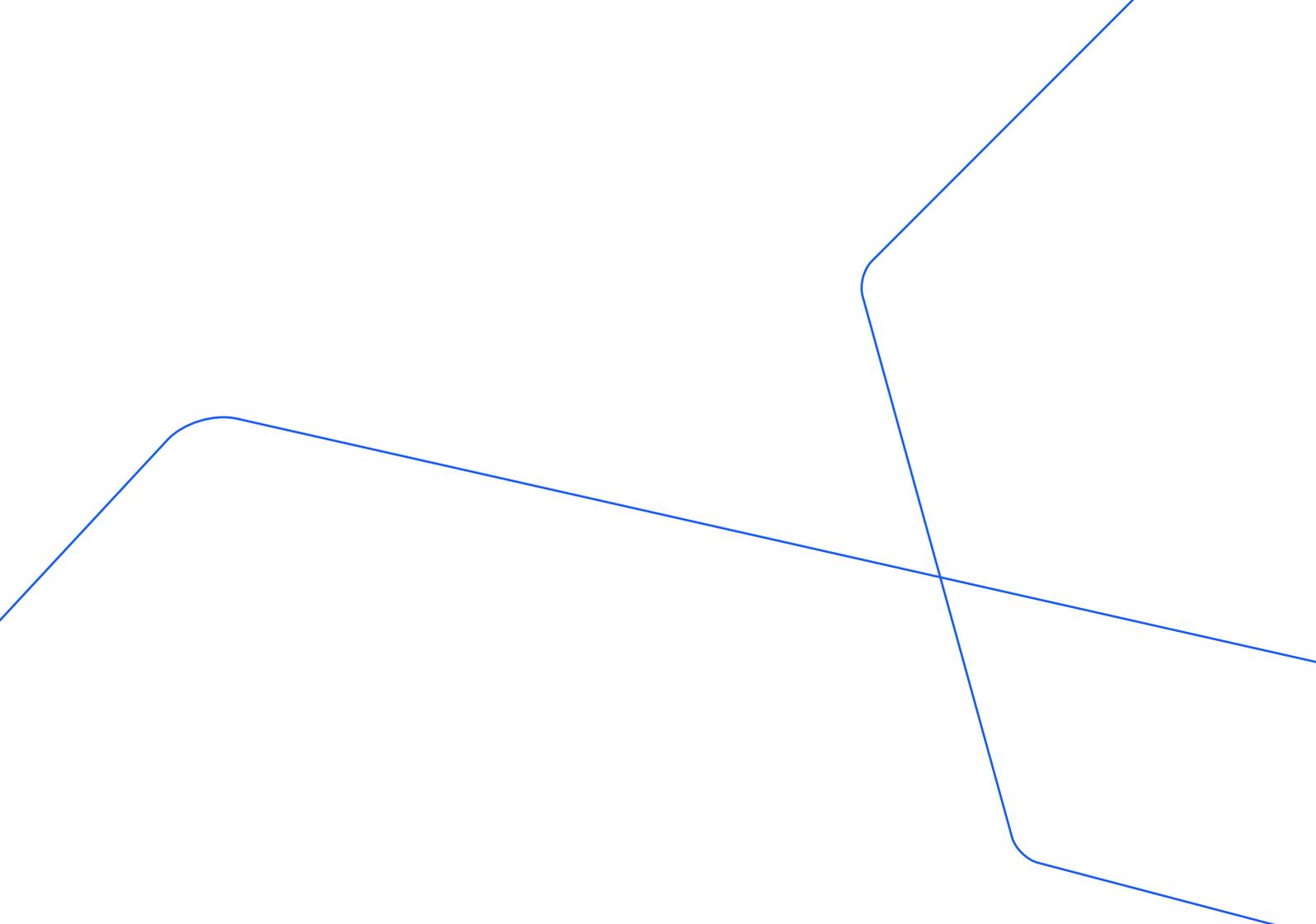
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About

↳ Tech solutions for digital
  success, backed by experts.

LUNIQ prides itself on providing a best-in-class experience for our clients. Some of our consultants have literally written the book when it comes to their particular area of technical expertise.

LUNIQ can solve the most demanding challenges our clients face today on their Digital Transformation journeys.