

How to build a comprehensive cloud migration strategy with VMware HCX

INTRODUCTION

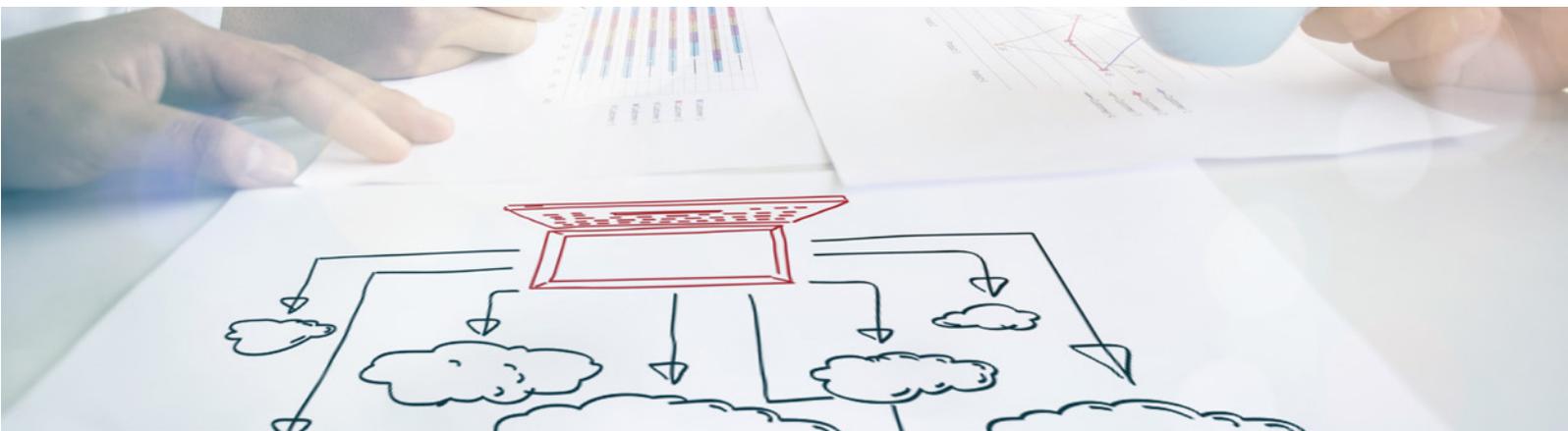
Over the past few years, the hype surrounding cloud services has prompted many organisations to consider a transition from on-premises datacentres to cloud-based infrastructures. The main reasons for such transitions are to boost IT agility, speed up time to market, avoid capital investments, lower TCO, and increase redundancy and disaster recovery capabilities.

There is much to gain, but at the same time, migrating to a cloud environment can be a highly complex project, with many pitfalls and hurdles to overcome. Enterprises must face the challenges of zero-downtime migration for business-critical applications, possible performance degradation during the transition period, bandwidth hiccups while pushing petabytes of data to the cloud, and advanced network issues, including the need to re-IP workloads.

This is why a migration process requires a lot of thought and in-depth planning, to ensure effective use of resources, risk management, and the available budget.

First, build your business case

Moving an on-premises infrastructure to the cloud is one of the most critical business decisions a company will ever make, and there is no single path to success. To build an effective migration strategy, you need to define your business case and clearly specify the goals. This is the time to ask yourself what a cloud migration will bring to your company. It could be cost-efficiency, productivity improvements, or fostering better collaboration between remote teams. How will you measure the migration's success? And most of all, what valid reasons are there for the transition? These are the first questions you need to answer before even starting to look for a cloud provider.



Use your expertise

Cloud transition is not just about technology, but also about the people. Consider your IT team for a moment. What are their assets? Do they have the necessary expertise for the task ahead? Do they know the technology you plan to incorporate? And if not, is hiring or training your only option?

There might be a simpler solution.

You can choose to use the same framework – a “cloud operating system” – to manage workloads on-premises and in the cloud. This approach helps you build a more functional and mature cloud environment, as well as simplifying the migration processes. If you are using OpenStack as your on-premises technology, search for a cloud service provider with compatible services. Similarly, if your environment (like 91%¹ of on-premises virtualisation infrastructures) is VMware-based, choose a vendor with a VMware hosted cloud in their portfolio. It’s as simple as that.

Utilising a “one framework” approach also allows you to build on the existing skillset of your IT team, saving you the hassle of recruitment and/or retraining. As the current demand for cloud skills is greater than the supply, finding people with the right competencies to conduct a cloud transition is a challenge many businesses are facing.

Infrastructure assessment

An essential part of the planning process is an IT infrastructure assessment. You need to know exactly the true state of your IT landscape and what you are struggling with, as depending on your systems’ architecture, the migration strategy will require different steps.

The assessment should start with gathering information about your infrastructure, network design, environments, applications, and data. The goal here is also to discover all the hard dependencies with any physical equipment you might have, and establish how well you really know your infrastructure.

¹ Source: Gartner Market Share Analysis: Virtualization Infrastructure Software, Worldwide 2017.

Data transmission

For most of the companies, the sheer number of applications and volumes of data can be a challenge. However, collecting, organising, and validating your data can be even a bigger one. As with every step of the migration process, without careful planning, you won't go far.

In a perfect world, your data migration would take place over a secure, high-speed, dedicated uplink. In reality, you need to keep your business running as usual, in parallel with securely pushing your data to the cloud. The main challenge here is to make the migration fast and invisible to end-users. Wide Area Network (WAN) acceleration can be the answer. If you are using an on-premises VMware stack, you can take advantage of VMware's latest solution, HCX (Hybrid Cloud Extension), which is equipped with WAN optimisation techniques, like de-duplication and compression. This will improve the network performance during migration or data transmission to and from the site.

"In OVH, we have more than three years' experience in secure workload migration. During this period, we have migrated exabytes of data all over the world. Until a year ago, when VMware introduced HCX, transferring data and workloads between datacentres was a highly complex and challenging task. Now, we can help our customers to move hundreds of terabytes of VMs and reach speeds up to 1TB per hour, thanks to our global backbone network of 15Tbps."

Francois Loiseau, Head of Private Cloud and VDI at OVH



Workload migration methods

Before moving your applications to the cloud, you need to establish their status: are they cloud-ready, are there any dependencies to consider, and what's their environment? At this stage, enterprises often discover all types of applications in their portfolio, from cloud-native, through to those that need refactoring, and siloed legacy ones. An early effort to create a complete and exhaustive application inventory will pay off during migration planning.

As there is no one-size-fits-all model for moving application to the cloud, you might want to look deeper into the available options, and whether they are going to suit your workloads...

Moving workloads as they are

"Lift-and-shift" (also known as **rehosting**) is a quick and non-resource-intensive migration. In the majority of cases, organisations rehost their applications when the main advantage of the cloud is simply the cost and new, more powerful architecture. The sooner an application is in the cloud, the better. With a lift-and-shift approach, applications are moved as they are, without any changes in the code. Rehosting can be done in several ways: as hot migration, cold migration or in a massive way – as bulk migration.

Hot migration

For the sake of business continuity, critical applications may require **live migration** – something that was impossible just a few years ago, but is now within reach. Just like with vMotion in a cluster, HCX allows you to move a virtual machine from its source to a new datacentre, without losing its state, connectivity (including IP address), and context. There are, however, some limitations. If you have an application distributed on multiple VMs, it won't be possible to move them simultaneously. HCX sequences VMs for live migration, and the latency between migrated VMs and those still in the source site can be substantial.

Cold migration

Backups, archives and templates that you need to move to a new datacentre won't require near-zero downtime. They can therefore be migrated **cold**. Virtual machines are switched off, synchronised and powered on when all data arrives in the destination site. This method is the most disruptive, and therefore not recommended for production machines.

Bulk migration

Bulk migration – a replication-based method, available with HCX – better assists you while migrating multi-VM applications, or during mass datacentre evacuations. In this process, replicas of VMs are created in the destination datacentre. Once synchronised, you can choose to switch over immediately, or factor in a pre-determined maintenance window.

Re-platforming and refactoring applications

Re-platforming is another migration model. Here, you might make a few optimisations and allow workloads to gain flexibility and scalability, but you won't be changing the application's core architecture when doing so.

In some cases, you might consider completely re-designing your application's architecture. This approach, also known as **refactoring**, can include rewriting the source code, APIs, and interfaces, as well as coupling or de-coupling data, making the migration process more time-consuming. However, it allows workloads to take advantage of cloud-native frameworks and functionalities, and may offer the best long-term results.

It's important to remember that while striving to get the maximum value from the cloud, you and your IT team might go one step too far. Although refactoring can be very beneficial, it can also lead to architectures that are only deployable on one platform. While it may be tempting to use ready-to-use, provider-specific solutions, especially in terms of networking, you can unintentionally create vendor lock-in by doing so, which will be a blocking point in the future.

Establish performance baselines

Once you know what workloads you have and how you're going to move them, you can start setting performance baselines. To establish acceptable performance levels in the cloud, and thus validate the migration as successful, you need to measure the pre-migration performance of your applications, then compare it with the post-migration cloud performance. After all, one of the main drivers for a cloud transition is to boost performance!

Gathering performance data is crucial for establishing baselines. When collected for each Key Performance Indicator (KPI) over a given period, this data will allow you to determine the baselines. The longer the period, the more accurate and representative the baseline data will be.

"Detailed test scenarios will help you to build a solid performance baseline. It is a key factor to make sure your workloads running in the Cloud are meeting stakeholders expectations."

Pierre-Yves Bandet, Solution Architect at OVH

Ensure security and retain control

For a long time, security concerns were holding enterprises back from the cloud. It was believed that it's impossible to retain the same level of control and security in the cloud that an on-premises infrastructure can offer. Some legacy systems are still kept out of the cloud for those reasons, but times have changed, and the latest technologies now allow you to maintain a hardened perimeter in the cloud.

As more businesses move data to the cloud, the responsibility for security shifts from companies to cloud providers. The latter are security-conscious, and often provide sets of security features, either by default, or as an option. But this does not mean you can blindly rely on your cloud provider. On the contrary, it's still your job to put those security measures to work and – most of all – beef up cloud security in those areas that lie outside your provider's scope.

Interoperability, reversibility and mobility

Being in control of your data and workloads means you decide when to move in or out of the cloud. Interoperability and reversibility are primary factors to consider when developing a cloud strategy. Even though you are planning to move your workloads onto a cloud platform, you shouldn't neglect the possibility of vendor lock-in. Make sure you always have the option of moving away.

No matter which cloud computing model (public cloud, hosted private cloud, or a hybrid of the two) you consider, to make the cloud strategy successful, your deployments should be designed with portability in mind from the start.

Data residency

Finally, while planning your move, it's important to not only consider the storage size and performance, but also legal constraints. Make sure all your application data can be moved to the cloud. Otherwise, your choice of cloud providers will be limited to those who offer you the desired geographical location.



Select the right cloud platform

When it comes to choosing a cloud provider, the requirements and evaluation criteria should be unique to your business. Nonetheless, there are some common areas that you mustn't neglect during the assesment of possible cloud service providers...

Technology

Using one framework simplifies your choice of technology. You have interoperability built into your project, and will not be concerned with vendor lock-in. On the other hand, you should ask your future provider about their service roadmap. Does it fit your long-term goals? Is your provider innovative, and keeping pace with the market leaders and the latest technology? If you're not planning to use the same framework in your target platform, you need to make sure the provider's architecture, standards, and services are compatible with your current environment.

Data security and certifications

Cloud providers that comply with recognised quality frameworks and certificates demonstrate adherence to industry best practice. If security is a top priority for you, look for providers with ISO 27001 and PCI DSS.

Assess each provider's security level. Ensure you know how and where data is handled, and what security measures are in place by default. Take an interest in any additional security features, if your provider offers them.

Contracts and SLAs

Cloud providers' terms and conditions can be complex, especially in terms of billing. Important factors you should investigate before signing the contracts are service delivery, additional fees, policies on contract renewals, and exit notice periods.

Service Level Agreements (SLAs) should clearly define service level objectives (e.g. uptime, accessibility, service capacity, all limitations), compensations related to those objectives, and exclusions.

Reliability and performance

For any large cloud provider, downtime is inevitable. It's how the provider copes with that downtime that counts. Ensure your cloud provider has processes for planned and unplanned downtime. Check if the monitoring and reporting tools delivered with the cloud service are enough.

Also, ask your provider about their disaster recovery solutions, if you don't have one in place already.

Migration tools and processes

When moving datacentres, we keep using the same processes and technologies we were using 15 years ago. We use disaster recovery and backup products to shift data from one site to another. But modern business requires modern business continuity, even during a migration process. It needs to be seamless and non-disruptive for all BAU activities.

From a technical point of view, the network is the biggest challenge. Moving virtual machines from one location to another usually requires changing the IP address, re-routing the network, and re-configuring the firewalls. If you are moving several VMs, it's possible to handle the necessary re-configuration, but what if you have thousands of VM to migrate? Let's take a look at a real-world example of how this can be achieved...

How to migrate 6,441 VMs and 1.9 petabytes of data

In 2017 OVH, a hyper-scale cloud service provider, acquired vCloud Air by VMware, with an intent to migrate the customers into their own water-cooled datacentres. This was a huge cloud-to-cloud migration programme, led by an international team of architects, engineers, managers, and migration consultants.

“Each customer’s migration was an individual project per se, although each migration followed a secure structure and always with the customer’s business foremost in our minds. ‘Migrate safely and securely and in a timely fashion’ has been our team motto.”

Ian O’Connor, Director of Enterprise Technical Support at OVH

Without the right tools, this massive migration from vCloud Air datacentres to OVH wouldn't be possible. To this end, OVH teams utilised HCX as their primary migration software. This allows customers to use several methods of migration, including hot or live migration without service interruptions, low-downtime migration involving replication, and cold migration. HCX also provides features to extend or stretch existing networks – a technological breakthrough that supports continuity, and avoids the need to re-IP workloads.

Using all available migration methods within HCX, OVH built a migration schedule for each customer, in line with their business needs. The programme was successfully completed in early 2019.

Communication is the key

For any organisation, reshaping the IT ecosystem and shifting to the cloud may have broad implications on various levels, from the application architecture, through essential business processes to end-users' cloud adoption. A cloud transition should therefore be managed at all these levels.

People tend to resist the unfamiliar, even those who say they are in favour of change. Replacing a well-known system with a cloud solution can cause uncertainty and confusion, which can, in turn, impact productivity. Coupled with poor communication and a lack of change management processes, this can quickly lead to the premature end of a cloud strategy.

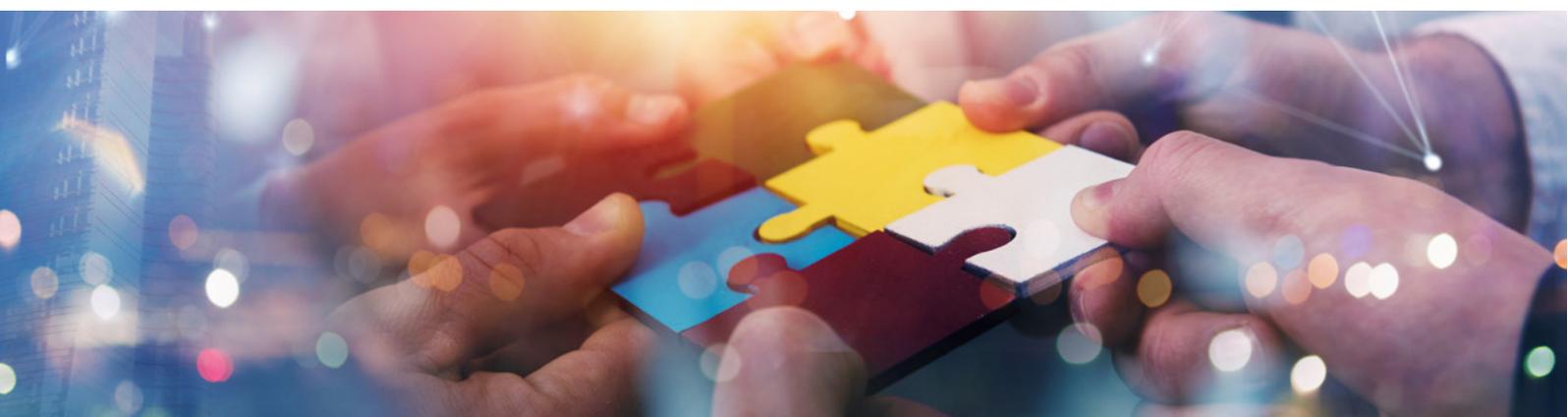
“One company” vision

In 2017 Arcade Beauty, a worldwide production company in the beauty sector, migrated their legacy systems from multiple on-premises locations and providers to OVH, a European cloud provider.

“One of the goals of Arcade Beauty’s digital transformation was to enable global collaboration and teamwork, to fulfil the “one company” vision. With the Private Cloud at the heart of the enterprise, we have increased our efficiency by connecting all European production sites. The company is now better equipped to deliver innovative sampling solutions to its world-class customers.”

Patrick Zawadzki, CIO for Europe at Arcade Beauty

With well-designed change management in place, Arcade Beauty engaged, educated and supported their employees throughout the transition. And what’s more, their cloud solution improved employees’ productivity and minimised the cost of in-house technical support.



Finally, calculate the overall savings and migration costs

When it comes to costs, one of the first considerations is the existing datacentre investment. To estimate the savings that can be achieved through migrating to the cloud, you need to know the Total Cost of Ownership (TCO) of your on-premises infrastructure. Just comparing the up-front investment in your local datacentre with the recurring cost of a chosen cloud IaaS is not enough. An exhaustive TCO calculation should include the ongoing cost to run, maintain, and upgrade an environment throughout its entire life cycle.

When budgeting for the migration process, you need to consider several main factors, some of which we have already mentioned:

- **Timeframes for data migration** can range from several weeks to several months, depending on volumes. Local and migrated applications will have to co-exist during that time, so if you are migrating out of a datacentre, it may mean that your costs will double for that period.
- **Re-platforming and refactoring.** These migration approaches are resource- and time-consuming. Your budget will need to include the labour costs as well.
- **Data transfer and traffic consumption.** Moving data in or out of the cloud can result in a substantial consumption of traffic. It's quite common to overlook that cost when migrating away from a local datacentre.
- **The cost of migration automation software.** The right tools can be game changers. Like HCX in VMware stack, they can help you to overcome the hurdles and make your migration processes a lot easier to implement.

SUMMARY

In the old days, transition challenges like moving apps without downtime, avoiding performance degradation, and re-IPing VMs gave IT managers many sleepless nights. Now, technology offers us advanced solutions that help jumpstart migrations, so cloud transformation becomes more about processes than data. Just as every person is unique, so is every architecture and deployment. Careful planning and anticipation of difficulties are key factors in ensuring the resulting infrastructure matches the business case. Sharing OVH's experience and best practices, the goal of this paper is to provide a starting point for organisations to plan their own tailored migration processes.



OVH is a global, hyper-scale cloud provider that offers businesses industry-leading performance and value. Founded in 1999, the group manages and maintains 28 datacentres across four continents, deploys their own fibre-optic global network and controls the entire hosting chain. Relying on their own infrastructures, OVH offers simple and powerful solutions and tools that put technology at the service of business, and revolutionise the way that our more than one million customers around the world work. Respect for individuals, freedom and equal opportunities for access to new technology have always been firmly rooted principles of the company. *"Innovation for Freedom"*.