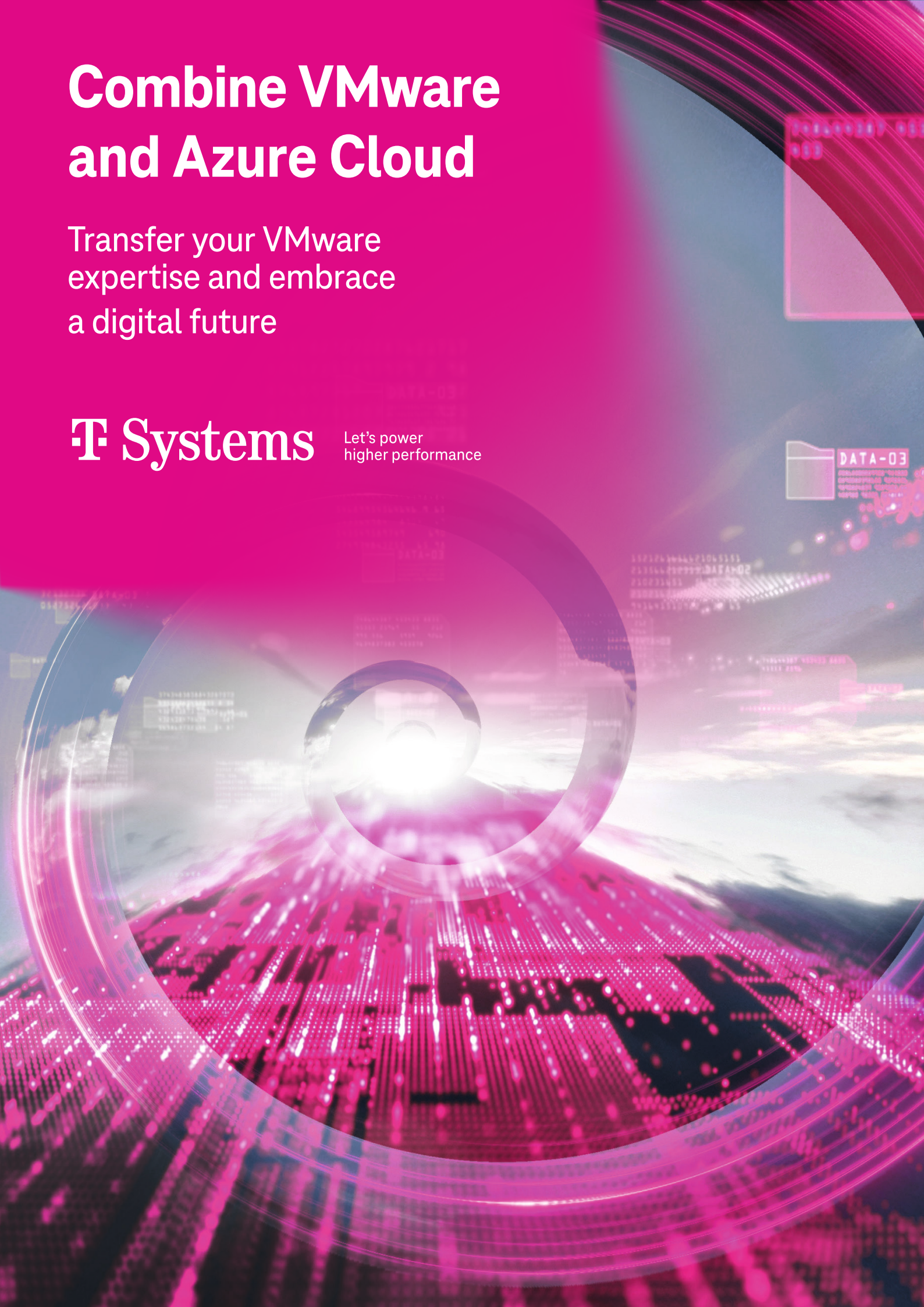
Combine VMware and Azure Cloud

Transfer your VMware expertise and embrace a digital future

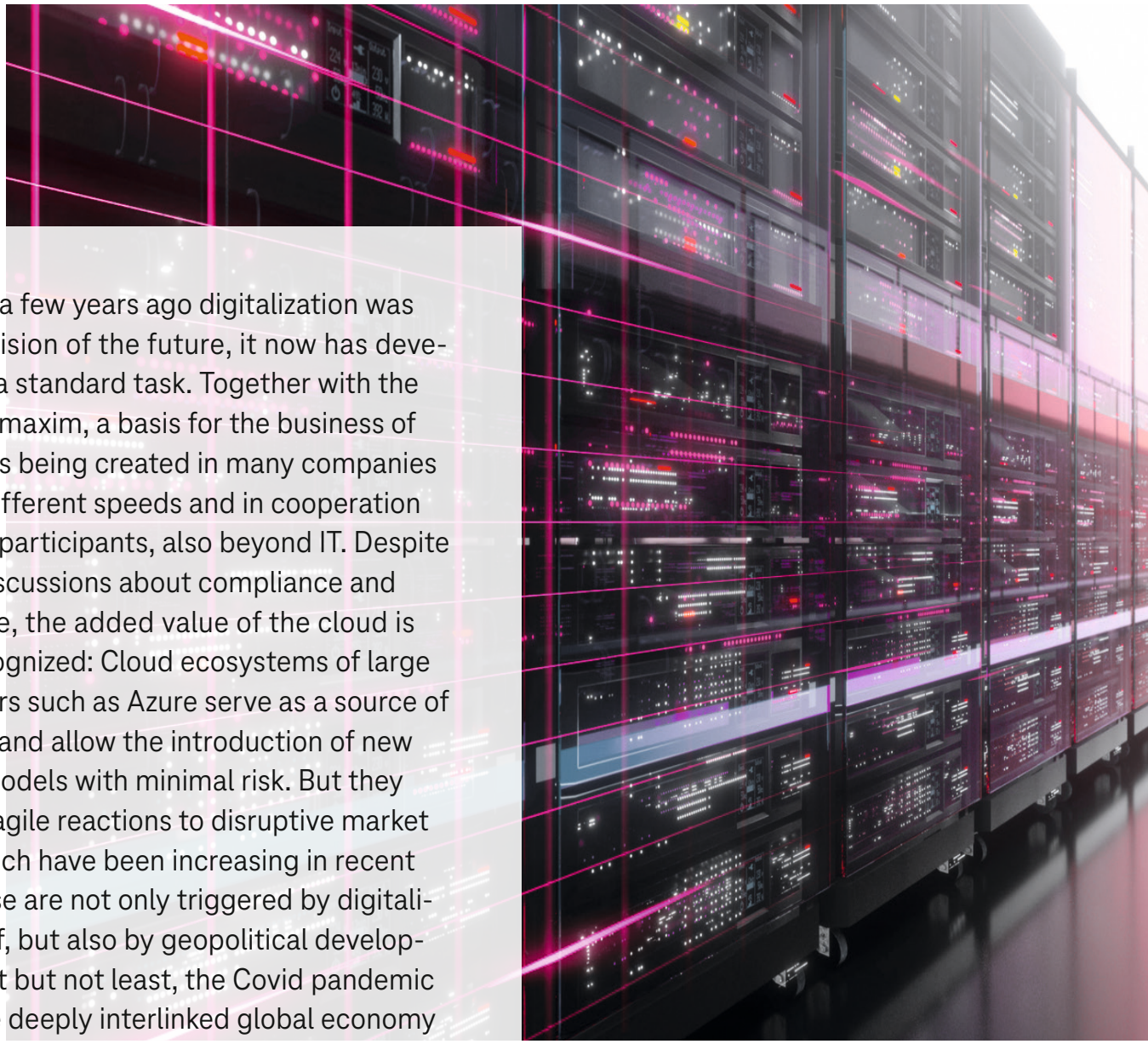
T Systems

Let's power higher performance



Content

Digitalization is reality



While only a few years ago digitalization was seen as a vision of the future, it now has developed into a standard task. Together with the cloud-first maxim, a basis for the business of the future is being created in many companies – at very different speeds and in cooperation with many participants, also beyond IT. Despite ongoing discussions about compliance and governance, the added value of the cloud is widely recognized: Cloud ecosystems of large hyperscalers such as Azure serve as a source of innovation and allow the introduction of new business models with minimal risk. But they also allow agile reactions to disruptive market events, which have been increasing in recent years. These are not only triggered by digitalization itself, but also by geopolitical developments. Last but not least, the Covid pandemic has put the deeply interlinked global economy and its supply chains to the test. Companies with flexible processes and dynamic cloud IT are better prepared for such challenges.

The cloud is the vehicle of digitalization

With the advantages and options of the cloud, business decision-makers have an effective tool to shape the future. But cloud also requires a cultural change within companies.

This includes, for example, an agile business view with new decision-making, innovation and development processes such as those brought by DevOps. The increased experimentation with new business ideas and the procedural basis for this must be implemented.

However, the upheaval also means putting existing IT to the test. To what extent are on-premises systems and owned data centers future-proof? Which know-how and skills do IT and business departments need to acquire to effectively use the cloud? In which situations is investment protection crucial?

All in all: Which implementation strategy for the cloud fits best to the specific situation of the company?

Cloudification needs the application view

The cloud – and with it the hyperscalers – is often classified as a pure infrastructure focus. But that's not correct. The path to the cloud must be considered from the point of view of services and business processes. The applications that support these processes therefore play an important role. They are also the starting point for cloud transformation. In addition, hyperscalers such as Microsoft Azure offer rich ecosystems with out-of-the-box solutions for, e.g., artificial intelligence, big data/data analysis, high-performance computing or the Internet of Things. Thus, the hyperscalers are also becoming innovation drivers, for example, by adding additional functionalities to existing applications with cloud services.

Example: Custom Cloud Migration Path

Historically grown SAP systems are an essential part of many companies worldwide. The SAP R/3 systems operated by their own team in their own data center are of essential importance for a large number of central company processes at a European manufacturer. The core system for Enterprise Resource Planning (ERP), its peripheral systems and the business warehouses keep the company running.

Two key elements prompted the IT team to put the existing SAP landscape to the test: On the one hand, the company wants to advance the necessary digitalization to increase its ability to innovate, for agility and efficiency – crucial skills in order to remain relevant in its market in the long term. On the other hand, the company's own data center, in which, among other things, the SAP systems are operated on on-premises hardware, is showing its age. It no longer meets the current standards of technology, security and sustainability. The mechanical engineering supplier has therefore decided to dissolve the data center in the medium term – with the consequence that other operating platforms have to be found for the workloads operated there.

Since the company has been working closely with Microsoft for many years, the application owners decided to migrate their SAP workloads to Microsoft Azure. Regarding the type of migration, the company wanted to keep all options open.

The art of cloud migration

Based on an original concept by Gartner, the 6R methodology for developing a cloud migration strategy has now established itself on the market. In general, there are six options for dealing with applications on the way to the cloud, which generate different efforts. Depending on the application landscape and the importance of the applications within a company, a specific cloud (migration) strategy is created on this basis with an individual mix of the six paths.

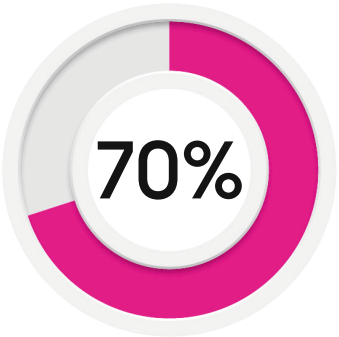
6R

The 6Rs for application migration

- **Retain** – the application is kept unchanged. This creates hybrid solutions in which the classic IT world and the cloud world are operated alongside or with one another.
- **Retire** – the application is switched off because it provides minimal business benefits.
- **Repurchasing** – an application is replaced by a standard (cloud) product, e.g. a SaaS.
- **Rehosting** – "lift and shift", the application is elevated from an on-premises infrastructure to a cloud infrastructure, while remaining largely unchanged.
- **Replatforming** – the application's core architecture remains unchanged, while a few minor adjustments are made, for example, the transfer of data-bases to open source such as PostgreSQL.
- **Rearchitecture/Refactor** – cloud-native redesign of the application.

Virtualization is not just virtualization

In reality, many companies with historical business activities run legacy systems that have shaped and reliably supported business processes for decades. Transferring these systems to the cloud is not always easy. They typically run on mature virtualization technologies such as VMware's vSphere. VMware is the undisputed leader in data center virtualization[1,2,3].



It is estimated that up to 70 percent of enterprise workloads run on VMware.

Almost every IT team that operates applications in corporate environments is familiar with the tools and mechanisms of the VMware suite.

Enterprises often take a (low-risk and inexpensive) lift-and-shift approach to the cloud for such systems. It is very well suited to detach old infrastructures and hardware; it also achieves scaling options for the application. But in the past, the virtualization technologies used in the cloud and in enterprise data centers were not always compatible. Technical challenges arose during the transfer, which hindered migration to the cloud.

The owned data center – a discontinued model?

There are many reasons for moving to the cloud. Some of these are driven by economic or financial factors, others will be technical. In many cases, the two components can hardly be distinguished – the digital world requires an integrated view of both anyway.

Typical business reasons that favor the pro-cloud decision are the exploitation of innovation potential, cost flexibility (moving away from CapEx) and (international or short-term) business expansion opportunities that on-premises installations do not offer to the same extent.

The entry into DevOps, new disaster recovery concepts or making operations more flexible (workload shift or burst capacities) are typical reasons resulting from a technology strategy. Aspects that affect the company's own data center are often – rightly so – also included in the consideration of the cloud. Can current security aspects, service levels, operational and sustainability requirements still be guaranteed? Can internal operations ensure business continuity, does the company have efficient disaster recovery concepts? Which added value is generated by purchasing and continuously managing hardware on its own terms?

According to the Bitkom study *"Data Centers in Germany - Current Market Developments"*, dated February 2022, only 54 percent of German companies are sure they will still have their own data centers in three years.

Number of data centers in companies

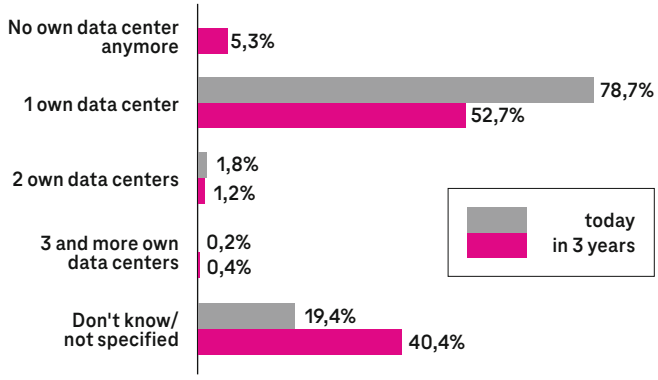


Fig.1: Company survey: How many own data centers does your company operate in Germany today or in 3 years? [4]

Five percent of those surveyed clearly state in the study that they will no longer have their own data center, while around 40 percent admit they cannot or do not want to make any statements about the future of their data centers (!). In the study, 3,000 locations that operate at least ten racks or require at least 40 kilowatt hours (kWh) of IT connecting power were considered data centers. This means that the future of around 1,500 of these locations is unclear. Another result of the study confirms the move away from the company-owned data centers: In an expert survey, the topic of on-premises data centers was classified as the only topic with decreasing importance, while all cloud-related topics, especially the hybrid cloud, are increasing in importance for companies.

Importance of data center concepts and deployment models

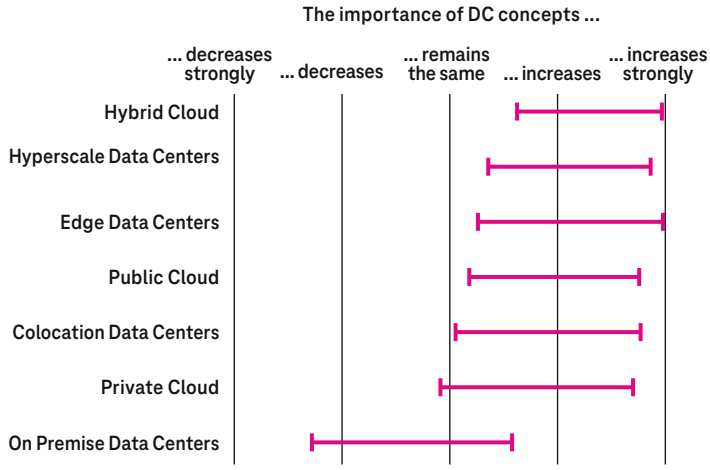


Fig.2: Expert survey: How will the importance of the above DC concepts/deployment models develop in Germany until 2025? [4]

With business and technology requirements driving cloud adoption on one side, and the demands for significant re-skilling on the other, a challenging area of conflict arises for companies. As a further barrier to cloud entry, investment protection also plays an important role in this tradeoff. How can entry into the cloud be successful, even if the company does not yet have extensive cloud expertise? How long does it make sense to exploit the investments already made?

Introducing Azure VMware Solution (AVS)

Solutions that combine VMware virtualization with hyperscaler infrastructures open up cloud entry opportunities for organizations with a strong VMware focus. With the Azure VMware Solution (AVS), Microsoft is making it easy to take those first steps into the Cloud.

Because it has the native VMware vSphere components (ESXi, vCenter, vSAN, NSX-T, and HCX) but on Azure infrastructure, it is perfect for organizations that may not have time initially to spend re-factoring their existing VMware-based applications but need to have a presence in the cloud fast. As these components will all integrate with the infrastructure deployed on premises, the approach is suitable for organizations that want to continue using VMware (also in the cloud), e.g. vCenter to manage critical workloads.

In addition, companies can call in a managed services provider. They set up a landing zone (which, for example, takes over basic security functions and identity management) and contributes the services up to the guest operating system. The advantage of this approach: The outsourcing company can focus on the application layer, all infrastructure and platform services are provided (with the exception of the configuration) as a service.

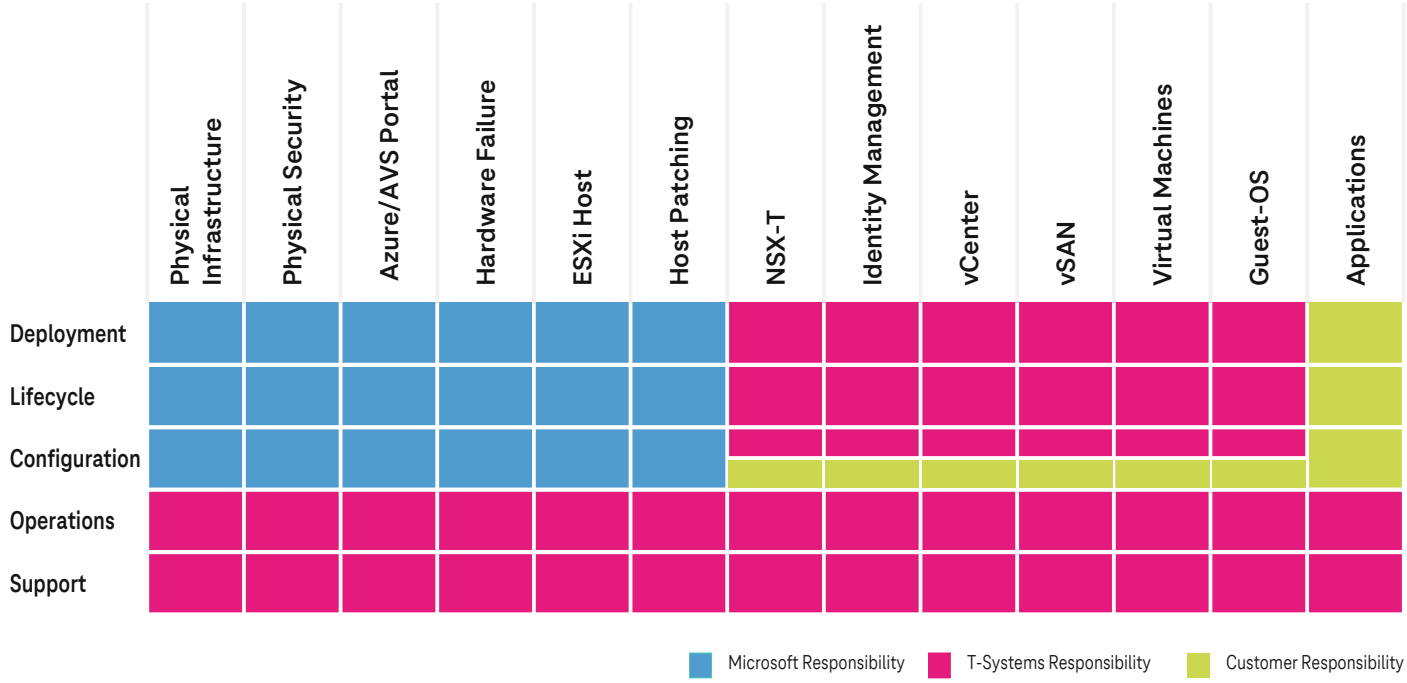


Fig.3: Hosted Azure VMware solution – Accountability matrix

A new solution for disaster recovery at the University of Miami [5]

The University of Miami very well knows the risks of operating in a hurricane region and were looking for an efficient solution to implement their disaster recovery (DR) strategy. The university decided to rely on the Azure VMware Solution. Because the university's IT team has been using vSphere and vSAN in a private cloud for more than a decade, they are familiar with VMware technology. So far, however, not all of VMware's functionalities and products could be used in the cloud. Now this was possible with Azure VMware Solution. "Once the environment was configured for the Azure VMware solution, moving the systems with VMware HCX was easy," explains Mari Lovo, who is responsible for cloud infrastructure services, "there was no need to retrain the admins either. For the most part, they were able to continue using their existing VMware knowledge." In addition to the originally targeted, improved reliability, the university also benefited from the lower license costs for VMware and increased flexibility. This enabled the new environment to be used to provide additional virtual desktops during the covid-phase work-from-home regulations.

The AVS acts as an extension of the on-premises data center. Enterprises gain the option of moving their workloads between their own data center and the AVS as desired – even in a hybrid model (mode 1).

At the same time, the installation serves as a springboard to modify the applications in and for the cloud (mode 2) or to enrich them with services from the Azure ecosystem.

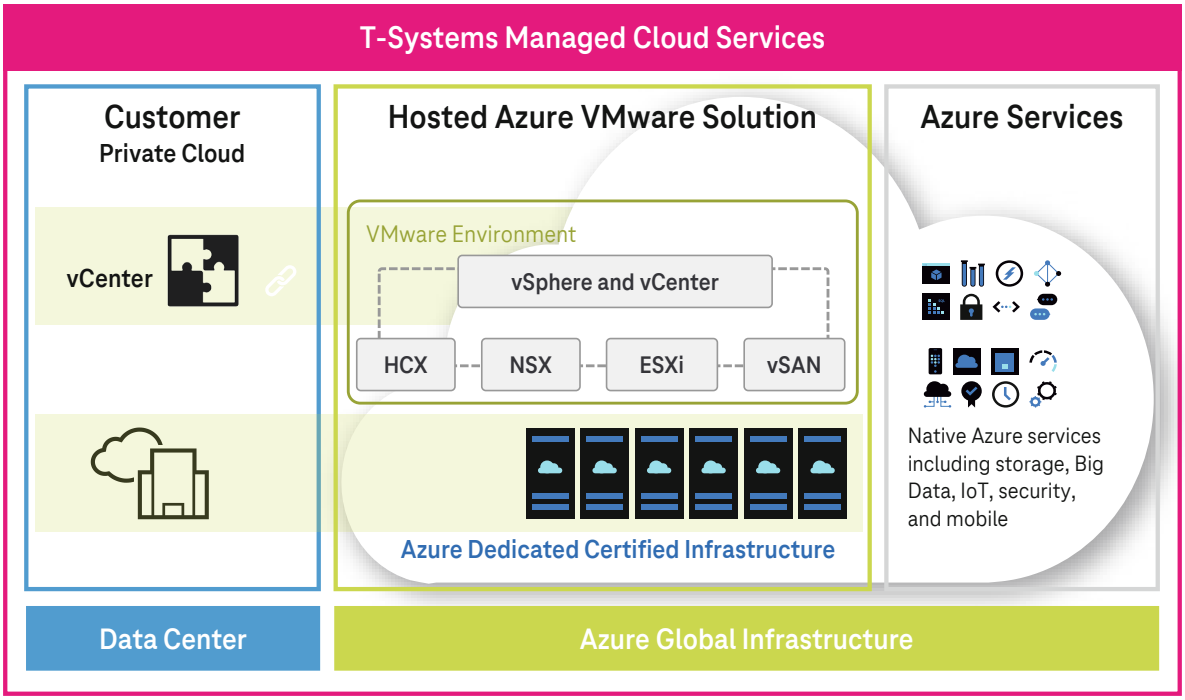


Fig.4: Key features of the Hosted Azure VMware solution

Availability

AVS is currently available in 20 Azure regions with 50 availability zones. Thus, workloads can also be easily operated or offered in other regions of the world. Burst scenarios and expansion strategies are efficiently supported.

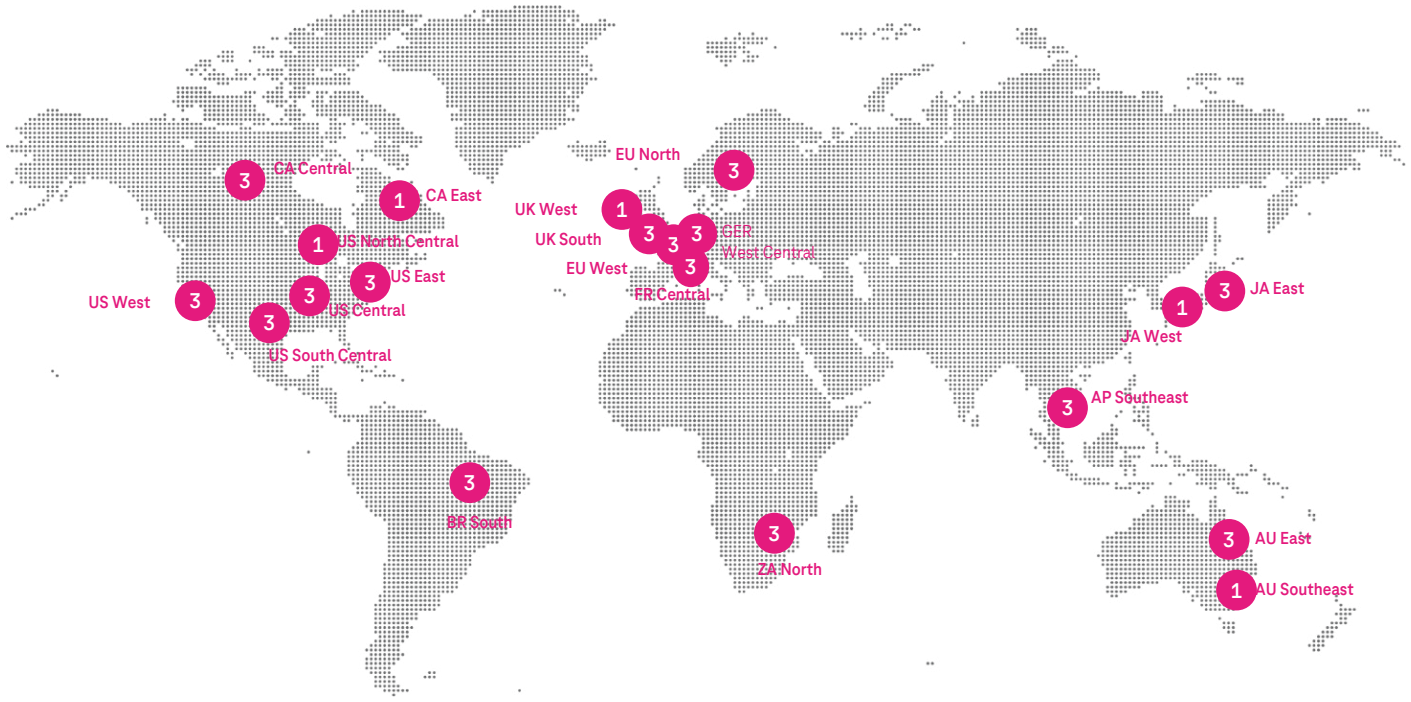


Fig.5: Available Microsoft Azure regions with AV nodes (Status May 2022, Microsoft[6])

Technical capacity

The on-premises data center is connected to the desired Azure platform via ExpressRoute or a site-to-site VPN. When connecting production workloads to on-premises or using HCX, Microsoft strongly recommends Express-Route. The native services of Azure are provided within the customer's own environment, the bare metal infrastructure and the vCenter with the components HCX, NSX, ESXi and vSAN in a separate AVS environment.

A cluster requires at least three nodes, up to a maximum of 16 hosts (with up to 6 clusters possible in a private cloud). A single node offers 36 CPU cores, 576 GB of RAM and a storage vSAN cache of 1.6 TB (NVMe connection). A total volume of 15.4 TB SSD storage is available per node.

	Software Specification	
ESXi	ESXi 6.7U3 Enterprise Plus	Hourly "Pay as you go"-billing, 1 yr or 3 yrs Reserved Instance requires minimum 3 Nodes, maximum 16 Nodes in a Cluster
vCenter	vCenter 6.7U3 Standard	
vSAN	vSAN 6.7 Enterprise	
NSX-T	NSX-T 2.5 Advanced	
HCX	HCX Advanced HCX Enterprise available on Demand	

Fig.6: VMware software used for AVS

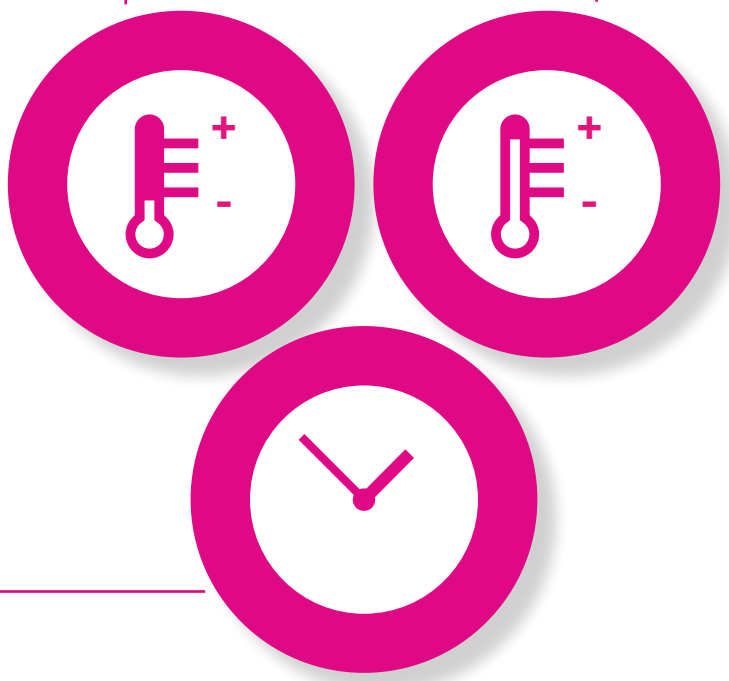
Workload migration

Within a few days, an extension of the data center can be established in the Azure cloud – including the establishment of a landing zone. Using VMware HCX™ (formerly Hybrid Cloud Extension and NSX Hybrid Connect), workloads can then be easily migrated bi-directionally between the two domains – the cloud is not a one-way street in this case.

HCX offers the possibility for migrations of the types "live", "warm" and “cold”.

Cold migration

The migration of backups, archives and templates is not time-critical. Downtime hardly disrupts operations. Cold migrations, in which the virtual machines (VM) are switched off and synchronized, are ideal for this. They will start again when all the data is copied to the target site.



Warm migration

This method supports the migration of multi-VM applications or mass migrations (e.g. when dissolving data centers) with minimal downtime. Here HCX creates replicas of the existing VMs in AVS.

Live migration

Minimal downtime or functional limitations apply to the operation – and also the migration – of business-critical applications. The business continuity requirements of such applications require live migrations. Until a few years ago, this was impossible. In this case, HCX mimics the functionality of vMotion to move VMs within a cluster – with the exception that the VM is moved from its source to a new data center. Status, connectivity (including IP address) and context are preserved. HCX usually sequences VMs for live migration, but with VMware Cloud a feature is available to realize migration of multiple VMs as well: HCX Replication Assisted vMotion.

Gain experience with a proof of concept

The decision to enter the cloud is a fundamental business decision that must include one essential component: experience. As part of a 4-week Proof of Concept (PoC), companies can gain experience with the Azure VMware solution.

The proof of concept follows a best practice approach. This includes an onboarding workshop and an AVS cluster in a region of the customer's choice, including a test environment.

The PoC starts with recording the basic requirements. The availability of an IP address range, firewall port opening, access permissions arrangements and connectivity.

In the first week of implementation, the AVS will be provided by T-Systems, Microsoft and the customer's VMware team. An essential part of this start phase is to integrate the AVS into the existing on-premises environment. On the first day the cluster is created, on the second day global access is established followed by a connectivity test between the on-premises environment and the Azure vNet. HCX is deployed on day three; the functionality of HCX is checked with the first test migrations. Day 4 and 5 are reserved for any further connectivity testing and troubleshooting.

In the second and third week, the customer can run through test scenarios. In this phase, T-Systems employees are available as contacts if specific questions arise during the test.

The conclusion of the PoC is a joint review, the shutdown of the test cluster and the possible agreement of further steps.

	Test scenarios	Expected results
1	Validation of the AVS setup	Successful rollout within three to four hours without manual intervention
2	Logging into the AVS components and validating the available versions	• ESXi 6.7 U3 • vCenter 6.7 U3 • vSAN 6.7 Enterprise • NSX-T 3.1.1 • HCX R147
3	Connectivity test between AVS and on-premises environment	• The URLs for vCenter and NSX in the AVS must be reachable from On-Prem • VMs in the AVS must be accessible from the on-prem servers and vice versa
4	Connectivity test between AVS and Azure-native resources/services	• The URLs for vCenter and NSX in the AVS must be reachable from Azure-native resources • VMs in the AVS must be reachable from Azure JumpBox VMs and vice versa • Azure Native VMs must be reachable from VMs in the AVS
5	vLAN test	Error-free vLAN extension
6	Migration test from on-premises to AVS	Error-free migrations with HCX vMotion and HCX Bulk Migration
7	Migration test from AVS to On-Premises	Error-free migrations with HCX vMotion and HCX Bulk Migration
8	Performance test of the migrated VMs	Comparable performance as in original operation

Fig.7: Test of the AVS solution incl. success criteria

An exemplary use case

A European retail company has had a data center for two decades. It no longer meets the current requirements for operational safety and, with a PUE of 1.8, also does not meet the necessary sustainability requirements.

The data center is fully utilized, further growth cannot be supported on the IT side. Because of the high costs, the IT managers decide to close the data center and relocate the workloads as part of a multi-cloud concept.

A small number of employees already have experience in cloud technology. The web shop and a customer app are already being developed in an agile manner on Azure using DevOps methods. However, the majority of the workloads run on established, VMware-based systems.

In order to leave the data center at short notice and migrate the workloads, the IT team relies on a lift-and-shift approach without changes to the application and platforms ("as-is" mode). VMware-based management is retained, and the operations team's preparation requires minimal training.

To this end, the company is establishing an initial AVS landscape including a landing zone with the help of T-Systems. During the course of this, the classic vCenter licenses will also be gradually replaced. The migration plan makes it possible to plan the resource development of the platform, new resources can be added to the landscape within a few days.

By dissolving the company's own data center, an extensive cloud skilling program can be started in the next few months. Together with T-Systems as a managed services provider, the retailer analyzes its application landscape for optimization potential and quick wins. Early initiatives include replacing the databases with cloud-native Azure SQL Services.

To exploit further cloud-native advantages, a roadmap for application modernization or consolidation and replacement is being drawn up. First teams start existing services around analytics capacities and AI functions for new reporting and business insight, e.g. for the CRM system. To do this, they use the platform services available on Azure and integrate them into the existing services via APIs.

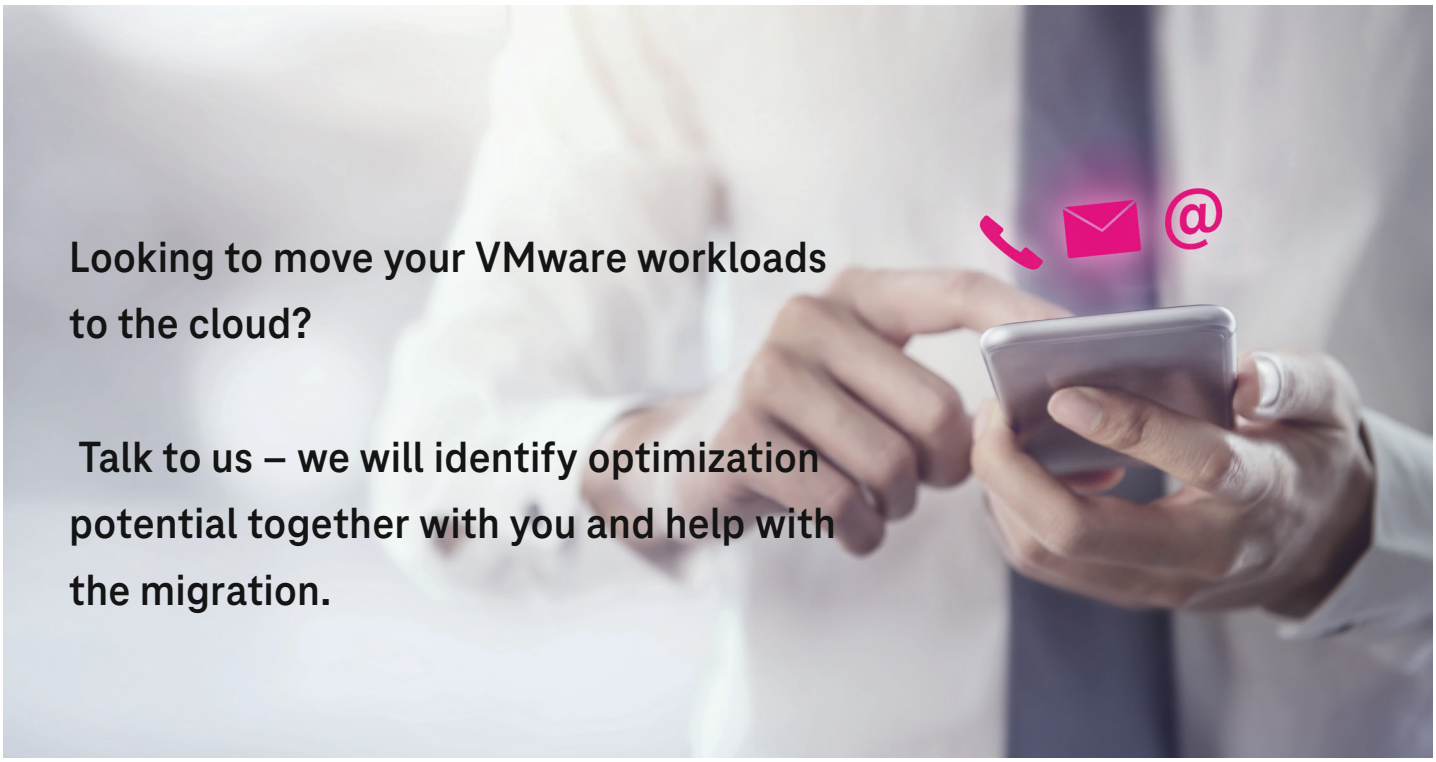
Conclusion

The Hosted Azure VMware Solution puts an end to different IT worlds. Companies that want to retain VMware know-how and the corresponding management tools, but still dare to take the step into the cloud, will find the right solution with AVS.

With this entry, cloud advantages such as fast scalability and cost flexibility, but also sustainability and up-to-date security are within reach. At the same time, operations teams can relieve themselves of the task of managing their own data centers and associated resources. The infrastructure, as well as the management tools, such as vCenter, come directly from the cloud. This is accompanied by a significant optimization of license costs.

In addition, services from the Azure cloud ecosystem that generate innovation potential become available. At the same time, with the leap into a "familiar" cloud environment, companies gain an excellent basis for driving forward the fundamental modernization of their applications (beyond a lift and shift).

A managed services partner with the right expertise can be the ideal companion to plan and take the next steps.



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