

White Paper

How File Storage Services in the Cloud Help Make SAP Migrations a Reality

Sponsored by: NetApp

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EXECUTIVE SUMMARY

Cloud migration is the gradual migration of existing applications to cloud-based deployments. As such, cloud migration is typically achieved through a series of discrete migration exercises – each one migrating a specific workload or set of workloads into public cloud. On the surface, migrating workloads to the cloud – and specifically to a public cloud – from a datacenter (on premises or off premises in a colocation) should be no different from a traditional migration. Similarly, migrating workloads by refactoring, replatforming, or repackaging them or simply doing a "lift and shift" to the cloud should be a straightforward exercise. However, this is often not the case. Many cloud initiatives fail because organizations underestimate the effort to migrate workloads to the cloud. Others implement migration processes in an ad hoc manner, with little consideration for the nuances of the target environment, which can vary from cloud to cloud. A common theme among challenges faced during cloud migrations is the limited amount of up-front time spent to assess the organization, the workload being migrated, and the overall cloud migration road map.

With this broad-based context regarding cloud migration established, this document focuses on the challenges and opportunities associated with one specific workload: SAP migrations to S/4HANA on public cloud. The document also explores how cloud infrastructure services – specifically Azure NetApp Files (ANF) – can help customers address their SAP migration and performance challenges from an infrastructure perspective. Finally, the document dives deeper into how ANF is positioned within the NetApp Cloud portfolio, as well as the broader market (e.g., how NetApp and Azure jointly go to market). Overall, this document leaves the reader with detailed insight into how NetApp's cloud portfolio enables enterprises to cost effectively and reliably execute SAP HANA migrations and run their tier 1, mission-critical file services in the cloud.

Definitions

- **Cloud migration:** In the context of this document, cloud migration refers specifically to migration of workloads to public cloud. In this document, the term *cloud* will specifically refer to public cloud infrastructure services.
- **Public cloud services:** These are shared among unrelated enterprises and/or consumers, open to a largely unrestricted universe of potential users, and designed for a market, not a single enterprise.
- **"Tier 1" or primary application:** Online transaction processing (OLTP) databases, enterprise resource management applications, and collaboration platforms are all examples of primary applications/workloads. These are applications that typically have dedicated compute and

storage resources, low-latency bandwidth requirements (measured in single or 10s of milliseconds), and the highest availability requirements (typically measured in nines). For context, applications outside tier 1 or primary applications may be grouped into "general purpose" or "secondary workloads" based on lower resource or availability requirements.

- **Mission critical:** A mission-critical system or application is something that is fundamental to the business' operation. Mission-critical applications relate to primary applications in that an application, system, or workload may meet the criteria of both internal and external users. These two categories are not mutually exclusive. A mission-critical application might be an internal employee-accessed application or a customer-facing application. Downtime or inaccessibility of a mission-critical application or system typically results in halted business operations and measurable loss of revenue.

SITUATION OVERVIEW

IT organizations have struggled with workload and data migrations for as long as they have had to manage infrastructure in datacenters. It is a known fact that what gets implemented in a datacenter – applications, their data, and the infrastructure they are hosted on – gradually loses its currency and ultimately its value to the business. This loss of currency drives the need for organizations to consistently evaluate, migrate, and upgrade their enterprise applications and infrastructure to remain at the competitive edge. Running a digital business requires next-generation applications, which, in turn, need highly agile and elastic infrastructure. One of the fastest ways to deploy this infrastructure is through adoption of a cloud infrastructure service. But before doing this, enterprises have to identify which applications will benefit the most from this type of deployment and how best to migrate them to cloud. This is one of the first major roadblocks enterprises will face when creating a business case for cloud migration.

Building the Foundation for Effective Cloud Workload Migration

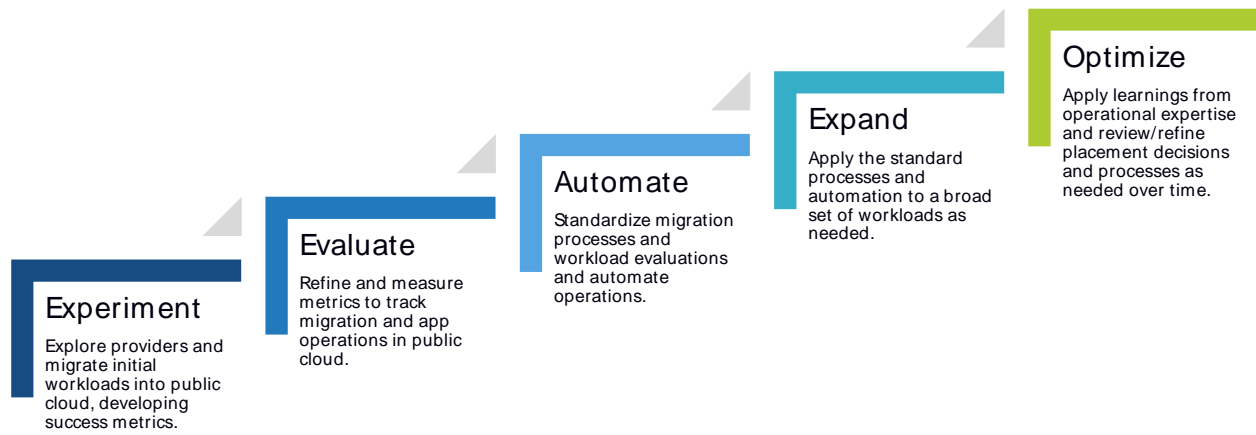
IDC research shows that there isn't a simple way of categorizing workloads as "suited for the cloud" or "not suited for the cloud" based on the workload functionality, and functionality alone is not a sufficiently strong criteria to prioritize workloads for movement. Moreover, many use cases require multiple workloads operating together, often in close proximity, to deliver the desired user experience. The selection of workloads is further complicated by the lack of consensus around application owners within an organization. These suggest the need for:

- A workload selection framework that is agreed upon across the different application owners in the enterprise or division, particularly for selection of workloads to move to cloud during the early phase of cloud adoption
- A framework that selects workloads not based on the "workload type" or functionality of the workload but other characteristics that can be compared across workload type

This type of workload selection framework can help enterprises conceptualize the logical steps needed to migrate workloads or groups of workloads in a way that is efficient and cost effective. This helps an organization form the operational foundation to make cloud workload migration a reality. In practice, we typically see cloud application migration achieved through a series of discrete migration exercises – each one focused on moving a specific workload or set of workloads into public cloud. We group these migration steps into five distinct stages of cloud migration: experiment, evaluate, automate, expand, and optimize (see Figure 1).

FIGURE 1

Five Stages of Cloud Migration



Note: The figure is adapted from *Five Phases of Cloud Migration: A Workload-Centric Discussion on Planning Through the Journey* (IDC #US45328519, July 2019).

Source: IDC, 2020

Each stage of cloud migration represents different levels of maturity and will also present unique challenges to an organization. While rehosting (lift and shift) a workload may be the easiest way to migrate to cloud infrastructure, it is not always the most cost-effective option. Rehosting workloads aggressively may also prevent an opportunity to revisit a monolithic workload and possibly modernize (re-architect or refactor) the workload. For example, a three-tier Model-View-Controller (MVC) application can easily be rehosted on any cloud service provider (SP) as a similar three-tier application. However, hosting the database back end on a reasonably sized virtual machine (VM) 24 x 7 may not be cost effective. It might be more cost effective to refactor this three-tier application to a web server (PaaS application) that consumes database as a service at the back end. On the contrary, trying to modernize every workload is not a cost-effective or a scalable approach. As we discussed previously, some workloads may need to be retained or retired.

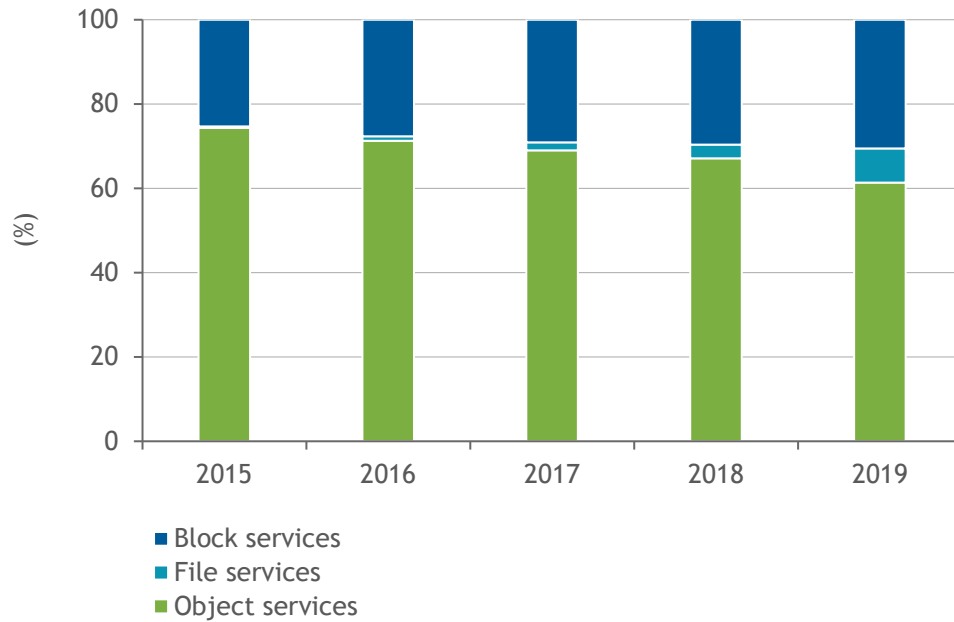
Due to this level of complexity, many organizations are still early in the process of developing their migration strategy, as well as the organizational maturity and skill sets needed to support cloud migration. We recommend viewing cloud migration and cloud adoption as enablers that impact all aspects of IT, not just as a change to the environment where workloads reside. To leverage cloud migration to the fullest, organizations need to have a strong foundation of infrastructure automation, efficient IT processes, and adaptive business practices.

The Growth of Enterprise-Grade File Services in the Cloud

File storage services have experienced significant growth and adoption in the public cloud over the past several years. IDC estimates that spending on public cloud file storage grew 153% annually in 2019. The steady growth of public cloud file storage services revenue has resulted in the segment expanding from less than 1% of the total public cloud file storage services market to 8% in 2019 – which represents more than \$1 billion in total revenue (see Figure 2).

FIGURE 2

Expansion of Public Cloud File Storage Services Market Share, 2015-2019



Source: IDC, 2020

The file storage segment is still a fraction of the total public cloud storage market, which is dominated by object- and block-based storage services. However, the annual growth rate is a clear indication that buyers are increasingly migrating and deploying enterprise-grade applications to public cloud by leveraging file-based shared storage. Vendor strategy also serves as an indicator of demand. We have seen file storage services added to all major public cloud platforms, either natively or via third parties (or both). And expansion of these services is a key road map feature of major public cloud service providers.

Looking at this growth from a workloads perspective, much of it is driven by cloud migration, as many file-based workloads and/or applications are not native to the public cloud but are being rehosted from on-premises environments (e.g., lift and shift). File storage services offer on-premises consistency and latency performance relevant for both existing applications moving to public cloud and new applications being developed on public cloud. This consistency becomes increasingly important as enterprises increase their use of cloud for business-critical production workloads (e.g., SAP HANA). Additional benefits offered by file storage services in the public cloud include:

- When moving several enterprise applications to public cloud, it helps to have consistency with existing on-premises environments – either to enable an easy lift and shift of applications into public cloud or to enable a hybrid infrastructure where both public cloud and on premises offer similar environments to the application. As more enterprise applications are deployed to the cloud, a file-based storage solution that can offer similar functionality as the on-premises environment can help reduce challenges associated with application migration.

- Not all workloads or applications require the massive scalability offered by object-based storage. IT organizations and application owners have developed a good understanding of the benefits, challenges, and effort involved in re-architecting applications to use object storage.
- Even when considering new applications, there are readily available development libraries and SDKs to develop client software to access shared file storage services. These intrinsically handle underlying errors and common failure issues associated with these services. Unless the effort justifies the benefit, shared file storage offers a simpler path to completion.
- Performance- and latency-sensitive applications prefer the low-latency access and hierarchical framework of file-based storage services. These include applications with highly dynamic data sets that need to be stored and retrieved at a high frequency, such as stateless application architectures that store state data into shared storage for rapid failover or for timely event-triggered execution.

The key challenge regarding cloud file services for many customers is meeting the right levels of service and performance required to run mission-critical applications. Typically, the levels of performance at scale offered by on-premises infrastructure are not available in the public cloud (or cannot be sustained past a certain point). As a result, we have seen storage OEMs attempt to fill this gap by releasing versions of their platforms (storage operating system [OS]) integrated or natively embedded alongside public cloud providers. These services may act as an overlay on public cloud resources or may be natively embedded within the public cloud ecosystem. The development of these services gives enterprises more options than ever before when it comes to connecting enterprise-grade file storage to public cloud compute resources. The section that follows addresses migration considerations and challenges specific to SAP S/4 HANA and the role cloud file storage services play in helping organizations overcome some of their infrastructure-related migration difficulties.

SAP S/4 HANA Migrations and Challenges Moving from On-Premises SAP Workload Deployment to Public Cloud

Research by IDC has determined that migrating on-premises SAP workloads to a public cloud requires careful consideration on a number of aspects, some of which are more or less significant impediments. These various aspects are relevant for SAP customers depending on their starting point in the process. IDC's SAP infrastructure research typically distinguishes four SAP customer types:

- **SAP aspirants:** Organizations that currently do not have SAP solutions but plan to switch their OLTP and/or OLAP software to SAP in the next 12 months, either on premises or on IaaS
- **SAP customers on AnyDB:** Organizations that run SAP applications on premises, with MSPs, or on IaaS leveraging such databases as Oracle, DB2, MS SQL, or MaxDB
- **SAP HANA/S/4HANA customers:** Organizations that run SAP applications on premises, with MSPs, or on IaaS leveraging the SAP HANA database, including the solution S/4HANA that integrates business suite and SAP HANA
- **SaaS SAP customers:** Organizations that primarily run SAP solutions as a service

For the purpose of this document, we only look at the second and third categories of organizations, whereby organizations in the third category are embarking on a cloud IaaS migration and those in the second category are potentially on a double or combined migration – to an IaaS cloud and to SAP HANA or S/4HANA. With regard to these latter businesses, they say that they expect to migrate to SAP HANA in the next three years; 34% say in the next 24 months; only 0.6% said that they will probably never migrate to SAP HANA. With regard to both the second and the third categories, they

say that, on average, they expect to migrate almost half of their on-premises SAP deployments to an IaaS cloud provider in the next 12 months; only 2% expect to migrate almost all of it.

To be able to offer SAP HANA infrastructure, server, storage, and IaaS providers need to be certified by SAP. The certified IaaS providers today are Alibaba, AWS, GCP, Huawei, IBM Cloud, MS Azure, and Open Telekom Cloud. These providers offer virtual CPU instances and/or bare metal, as well as storage (including file services) for SAP HANA. On AWS, for example, Amazon Elastic File System (EFS) is available as the file system for SAP HANA; on MS Azure, Microsoft offers Azure Files, its own in-house storage solutions for SAP HANA.

However, the performance and scaling limitations of the native file storage that the cloud service providers offer have been an impediment for SAP customers that want to move to SAP HANA on IaaS. Latency is higher than with on-premises file storage, and shared file storage cannot be easily scaled independently. Certainly, these providers' basic HDDs and SSDs do not support HANA, and their own in-house premium products that do support HANA do not always meet sub-millisecond latency expectations.

This impediment is being removed as some storage OEMs have begun making their file storage systems available on public clouds. There are five storage vendors with SAP-certified shared file system solutions in the market: EMC, Huawei, Infinidat, Lenovo, and NetApp. Currently, only NetApp and Huawei deliver an SAP-certified file storage solution via a cloud service provider, namely on Azure and on Google Cloud Platform (as a reference architecture) for NetApp and on Huawei Cloud for Huawei.

Other factors that play a role in an organization's SAP cloud migration process are:

- **Size and level of fragmentation of the landscape:** Many organizations are severely fragmented on multiple levels: geographically, functionally, and/or technologically. Their SAP landscape may consist of many geographically dispersed landscapes; they may have sales organizations, factory plants, and distribution centers, each with their own SAP or non-SAP solutions; and the level of modernization, including the underlying hardware, may vary per business unit. Often, this fragmentation is the result of mergers and acquisitions. Consolidating the many landscapes on S/4HANA in the cloud has a profound modernization effect, with attractive cost, revenue, and customer experience impacts, but it is a multiyear and difficult process that requires a team, planning, consultants, and significant financial resources.
- **Complexity of the landscape:** IDC data shows that businesses consider the complexity of their SAP landscape to be the single largest hurdle in their migration to the cloud. Existing SAP landscapes may be richly extended with custom applications or deeply integrated with other parts of an organization's IT. Extracting the components that are to remain and reintegrating them with SAP HANA in the cloud are more complex and time consuming than launching a greenfield deployment of SAP HANA or S/4HANA. Systems integrators are typically used to solve these issues.
- **Business criticality of the landscape:** For many organizations, the most prevalent concern about SAP cloud migration is a disruption in the production environment during the migration process. These businesses state unequivocally that SAP cannot be down. The stages they therefore need to go through and the precision with which they do so require special skill sets, and they will be time consuming. Figure 3 shows the per-hour cost of downtime that businesses say they incur for general applications – SAP downtime costs would be higher.

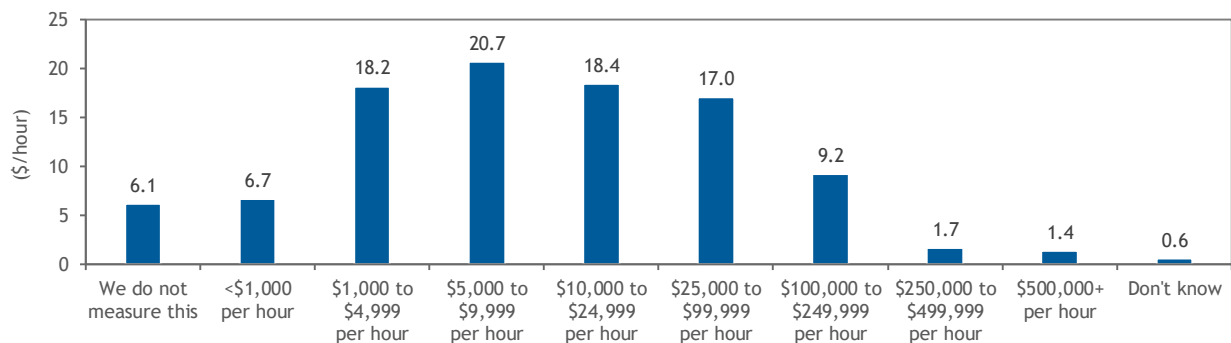
- **Real-time aspects of the landscape:** SAP applications are increasingly providing real-time analytical functionality, in IoT solutions for example. In such real-time applications, low latency is critical. Businesses will only migrate their SAP landscape to the cloud if their real-time applications will not suffer a performance setback. Improved file storage for SAP in the cloud, therefore, is an important enabler.
- **Security requirements of the landscape:** According to IDC data, SAP security software is the SAP software segment that SAP customers spend the most on. Security is of paramount importance, and until recently, it was thought that security from attacks could be better guaranteed on premises than in the cloud, but this has changed. IDC data shows that security and compliance are now the top drivers for moving SAP solutions to the cloud and that security is the highest-ranking benefit businesses say they have experienced from moving their SAP workloads to the cloud.
- **Resiliency requirements for the landscape:** The second most often cited benefit from moving SAP workloads to the cloud (after security) is better business continuity in terms of higher availability and better disaster recovery. What is more, speed of provisioning a disaster recovery service in the cloud was the second highest-rated service in terms of satisfaction that businesses said they have experienced after moving to the cloud for their SAP workloads.
- **Scalability requirements of the landscape:** Scalability is an important consideration for migrating an SAP landscape to the cloud, but businesses are also conservative with their scaling ambitions for reasons of cost. IDC has found that organizations say they expect to pay nearly 60% more when scaling S/4HANA by doubling either the memory or the compute they purchase from their IaaS provider.
- **Available skill sets:** SAP migrations to the cloud can be exceedingly complex, often requiring new hires, contractors, or third-party expertise. The latter is the most common approach, and IDC has found that organizations prefer to work first and foremost with global systems integrators, then with more local systems integrators, next with a managed services provider or hosting partner, and rarely with a so-called "born in the cloud" SAP partner. Most SAP-certified cloud providers offer their own services and tools for supporting customers with SAP migrations. Obtaining these skill sets, one way or the other, is a costly aspect of an SAP cloud migration.
- **Timing:** IDC has found that the time to plan and implement the cloud migration of an SAP production system takes – on average – 12 months, with some migrations taking more than 36 months and some less than 1 month. The most often cited time frame is 5-7 months. There is a lot of debate about these time frames, with providers typically suggesting it can be done faster and businesses saying that the second-greatest hurdle they experienced was that a migration takes longer than expected. Obviously, many factors contribute to the length of the process, such as size, complexity, available skill sets, and available resources.
- **Budget:** Businesses say that after complexity as a hurdle in SAP cloud migration, cost is the next impediment. IDC has spoken with organizations that executed an SAP migration to the cloud and found the total cost to be anywhere from \$100,000 to more than \$25 million.
- **Return on investment (ROI):** Regardless of the cost mentioned previously, most businesses say that they were able to meet their ROI targets, which are typically spread out over several years. Some businesses were unable to calculate an ROI up front for their SAP migration to the cloud because of the many variables in play; however, they nevertheless were given the go-ahead, which is indicative of how important C-level stakeholders can find such an initiative.
- **Integrations with on-premises components and SaaS components:** IDC has found that businesses do not rank the ability to integrate their SAP landscape on IaaS with on-premises components and SaaS components very high. Improvements in this area are expected,

though, as SAP is working toward containerization of its products. POCs have been performed, and SAP Data Hub is already containerized; furthermore, both Red Hat and SUSE offer containerized operating environments for SAP. Once SAP moves to containerization, IDC expects integration to become much easier.

- **On-premises/edge capex reduction:** Migrating an SAP landscape to the cloud reduces an organization's capex in various ways – if the hardware was at the end of its life cycle, then some portion of the on-premises infrastructure will be decommissioned, while the rest will be modernized, which often means consolidated and converged at an overall lower cost. Yet IDC has found that lower capex and opex were among the least often cited benefits achieved from moving SAP to the cloud. This does not mean that such advantages did not exist but rather that they were not the priority of the migration initiative.
- **Cloud SP selection:** As mentioned previously, there are multiple SAP-certified cloud service providers that offer bare metal or virtualized instances as well as file storage for SAP; some of them also have purpose-built infrastructure for SAP that allows for very high memory configurations. Relevant for the context of this document is that (apart from Huawei) only MS Azure and Google Cloud offer SAP-certified file storage solutions from a storage OEM to improve the latency for SAP.
- **Cloud SP requirements:** Important considerations when selecting a cloud provider for SAP are the available configurations; compute, memory, and storage scalability; integrations with other SAP platforms such as SAP Cloud Platform; the availability of purpose-built instances for SAP; and the availability of both virtualized and bare metal environments for SAP. Also important to evaluate are the tools and expertise that the cloud SP provides to support the migration. Some of the tools are provided by SAP, while some are developed by the cloud SP.
- **Benefits experienced from migrating SAP to IaaS:** Ultimately, businesses stated that the benefits they experienced from moving SAP to an IaaS provider were, in ranking order, better security, better business continuity, cost savings, better customer experience, faster transactions, better business analytics, simplified IT operations, and faster product releases.

FIGURE 3

Cost of Downtime



Source: IDC, 2020

CONSIDERING NETAPP'S CLOUD SOLUTIONS FOR SAP MIGRATIONS

NetApp's cloud strategy is focused on allowing customers to procure public cloud resources transparently and move workloads across clouds (either public or private) seamlessly. NetApp promotes the sale of traditional storage to IT organizations for deployment in on-premises private clouds but increasingly facilitates adoption of public cloud file storage resources via its Cloud Volumes portfolio. NetApp Cloud Volumes branding can be confusing, so it is worth a quick overview to understand the differences of each in the sections that follow.

Cloud Volumes ONTAP

Released seven years ago (originally as Cloud ONTAP), Cloud Volumes ONTAP was NetApp's first cloud file storage solution. NetApp Cloud Volumes ONTAP is a software-only storage subscription services running the NetApp ONTAP storage operating system. Cloud Volumes ONTAP is configured as a virtual machine version of Data ONTAP, which runs on top of public cloud compute and storage resources (e.g., AWS EC2 and EBS). Cloud Volumes ONTAP was primarily designed for existing NetApp customers familiar with the ONTAP experience, allowing them to download a software version that could be deployed on cloud resources while offering all the features available in their on-premises deployment. Cloud Volumes ONTAP experienced initial success with NetApp storage admins by helping them recreate the same enterprise storage experiences on the public cloud.

NetApp Cloud Volumes Service

Cloud Volumes Service (CVS) differs from Cloud Volumes ONTAP in that it is a fully managed file service designed to appeal to a wider range of users and workloads (not just a storage admin already familiar with NetApp). CVS also offers additional deployment options (e.g., managed natively within the public cloud provider's platform). At the technical level, the key differentiation between CVS and Cloud Volumes ONTAP is that CVS adds an additional layer of software management, which handles storage configuration, capacity provisioning, storage protocol, throughput, and so forth via API. Enterprises subscribe to NetApp CVS according to the public cloud resources they want to provision volumes on. For the purposes of this document, we focus on the Azure ecosystem.

Azure NetApp Files

ANF is unique because it is a first-party service sold directly by Microsoft. The ANF experience is native to Azure, meaning customers provision the service like any other Azure service. Within the Azure console, users create a NetApp account, set up a capacity pool, and create NFS volumes. The volumes can then be mounted to any Azure VM. Microsoft handles all billing, implementation, and support of ANF. This is an important point and something NetApp continues to expand on as a key strategic differentiator. Through services like ANF, NetApp can natively provide a range of enterprise-grade data management capabilities that may be required for a user's file-based workloads – such as replication, backup and recovery, multiprotocol access, or tiering. Many of these capabilities are not offered natively by public cloud storage providers, which makes NetApp's portfolio highly relevant as an embedded partner solution and a critical component of an organization's cloud migration journey.

How ANF Enables SAP S/4 HANA Migrations to Cloud

Put simply, ANF is one of the few cloud file services available that can meet the performance and availability requirements of SAP S/4 HANA workloads. As a result, organizations can leverage ANF as a critical tool to enable their SAP migration in less time, with fewer allocated IaaS resources (lowering costs), while also achieving higher levels of data protection and availability (see Tables 1 and 2).

TABLE 1**Key SAP S/4 HANA Benefits Enabled by Azure NetApp Files**

Benefit	Description
Scalability	Scale up or scale out with infrastructure based on Azure compute resources
High availability (HA)	Infrastructure provisioned as a complete HA cluster with automatic outage detection and failover
Performance optimization	Automated VM placement minimizes latency
Infrastructure management	Native integration with other Azure services (Azure Backup, Azure Log Analytics, and SAP LaMa connector for Azure)
Data protection	Instant snapshot and restore of HANA database
Analytics	Access to data visualization via integration with Power BI and SAP Business Warehouse connector

Source: IDC, 2020

TABLE 2**Example Performance of ANF for SAP (Measured in Time to Complete Workload)**

Test Environment: 2.3TB Database	
Workload	NetApp ANF Snapshot-based solution
Backup	2 minutes
Restore and recovery	1 hour 40 minutes
SAP system refresh	1 hour

Source: NetApp, 2020

CHALLENGES AND OPPORTUNITIES

For Businesses: Cloud Migration Is a Journey, Not a Destination

Ideally, as an organization progresses through different phases of cloud workload migration, the underlying cloud infrastructure becomes an invisible enabler of business transformation. This vision of business transformation may then become the guiding principle of cloud migration, instead of migration being dictated by the applications or workloads themselves. But it is important to step back and remember that cloud adoption in enterprise IT organizations is still relatively nascent. Self-reported numbers on cloud maturity gathered by IDC (measured on a scale of 1-5) show that about half of the enterprises see themselves in the early three stages of cloud maturity (1-3). Many organizations are still in the early stages of evaluating and planning their cloud workload migration.

With this context in mind, we realize that it might not be feasible or realistic for an organization to jump straight to a complex migration of a mission-critical workload like SAP. Enterprises at the early stages of cloud adoption should target use cases that can quickly convey the value of deployment on a cloud services platform (e.g., immediately lower TCO), minimize risk so that inadvertent errors do not trigger a significant setback to the effort, and be quickly executed to demonstrate results. In the context of an SAP migration, this may mean migrating QA or test/dev environments to the cloud first, which may provide the foundation needed to slowly migrate the full production environment over time.

As organizations continue to invest in upskilling and training to build operational expertise to run infrastructure at scale, and as their workload migration projects continue to succeed and mature, these successes will be used to catalyze broader and more ambitious migration projects. The growth of the public cloud file storage market is a key indicator that adoption is accelerating at an aggressive rate, and that there is immediate opportunity for organizations to add file-based workload migration onto their road map.

For NetApp: Challenges and Opportunities

SAP S/4 HANA workload migration can be a complex, long-term journey. Successful execution requires the right levels of cloud infrastructure maturity on the part of the customer and close partnership among the services providers involved. ANF positions NetApp as a key enabler of this journey by providing the enterprise-grade shared file services needed to run SAP S/4 HANA at scale in a variety of environments.

Opportunities

- Organizations can rely on NetApp to bring native file services to the cloud at enterprise scale; ANF has several years of development and a steady track record of success and expansion in the Azure ecosystem.
- This approach with ANF helps better align compute resources with infrastructure requirements and, in the context of SAP workloads, helps lower cost and risk.
- Recent certification of ANF by SAP for SAP HANA production databases will help provide enterprises with confidence to move forward with ANF in their cloud migration journey.
- As customers become familiar with NetApp cloud services, there is opportunity to drive adoption of adjacent services within the NetApp cloud portfolio like Talon and the recently acquired Spot.

Challenges

- **Hybrid consistency:** A key component of the cloud migration journey is the adoption of hybrid cloud solutions; aspects of a workload may stay on premises, while others migrate to cloud, and these may change over time. Because the ANF experience is native to Azure, there is no easy way for a customer to connect its cloud and on-premises SAP environment. This may result in a disjointed customer experience if a user wants to replicate the same experience they have come to expect from NetApp but are not familiar with the Azure ecosystem.
- **Continuous improvement of customer experience:** Infrastructure buyers increasingly expect an experience that mimics other public cloud and services-driven engagements. There's a lot of variables that go into this, but some of the key aspects are consumption-based pricing; on-demand access to resources; continuous, nondisruptive platform updates; and seamless access to adjacent services. ANF can accommodate all of these requirements, but there may be initial challenges and education required with customers that are not familiar with running complex, shared file workloads in the public cloud. Consider this challenge a growing pain.
- **Gated cloud ecosystems:** Due to the way ANF is developed and sold (through MSFT as a first-party service), opportunities associated with cloud workload migration will be limited to the Azure ecosystem or customers specifically looking to migrate workloads to Azure.

CONCLUSION

IDC research has determined that on the one hand, the benefits of migrating portions of an SAP landscape to the cloud are substantial; on the other hand, the cost and complexity of such a migration can be significant. For many businesses, a major impediment in the cloud is the performance, reliability, and latency of cloud-native file storage solutions, which, in many cases, are less robust than the on-premises file storage that businesses run their SAP workloads on. In general, this performance and reliability gap has been getting narrower, but for SAP HANA and S/4HANA, the file storage requirements are more demanding than for most other workloads, and they require SAP certification. As a result, businesses have had to settle for SAP-certified file storage in the cloud that was, in some cases, less performant than their on-premises solutions. Also, the migration from their on-premises file storage to the cloud added significantly to the complexity of their cloud migration initiative.

Storage OEMs such as NetApp have stepped in to address this performance discrepancy by partnering with cloud service providers to make their solutions available in the cloud in a completely integrated fashion – as if they were native solutions, but bringing in all the technologies that have made them successful on premises. This is a triple-win development: SAP customers can achieve the file storage requirements they need in the cloud, cloud service providers can attract more SAP customers, and storage OEMs such as NetApp can service customers both on premises and in the cloud. Furthermore, solutions like ANF remove a good amount of risk, complexity, and resource demands from businesses' SAP migration path to the cloud, which any business on this challenging journey will welcome.

IDC believes that ANF is a robust public cloud file service that has been certified by SAP for SAP HANA and S/4HANA and that businesses can rely on to execute extremely demanding file-based workloads exceptionally well.

About IDC

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