Inspiring Innovation with the Cloud

Transform Your Data into a Strategic Asset

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NetApp
Data Driven

Contents

Data-Driven Organizations Will Thrive

"The world's most valuable resource is no longer oil, but data."
—The Economist[1]

Data is the lifeblood of modern business, and companies that succeed with digital transformation achieve a sustainable competitive advantage. *The Economist* noted that in today's economy, "the world's most valuable resource is no longer oil, but data." Data-driven companies operate more efficiently and outperform the competition. Enterprises that are positioned to gain the greatest insights from data will decide the future.

Becoming a data-driven organization starts with your company's culture. You need visionaries who recognize and evangelize the importance of data-driven decision making at all levels of the organization. You also need partners who can help you create a unified strategy to turn your vision into reality. Success hinges on treating data as your company's primary source of value and equipping your entire organization with the tools, training, and culture to change the world with data.

Data-driven organizations are the ones that are thriving, not just surviving, in the face of digital disruption. Three key initiatives underlie the path to success:

- Transform your organization to become data driven
- Control and secure your data in a hybrid cloud
- Accelerate IT innovation to drive business growth

Transform into a Data-Driven Organization

According to IDC[2], leading digital organizations are turning to the cloud—with its power to deliver agility and flexibility—to satisfy digital transformation objectives. This realization leads most organizations to hybrid IT, with data generated and stored across a combination of on-premises, private cloud, and public cloud resources.

90%

"By 2024, 90% of Global 1000 organizations will have a multicloud management strategy that includes integrated tools across public and private clouds."

—IDC[3]

However, this approach creates numerous challenges for IT teams, such as knowing what data is where, protecting and integrating data, ensuring data security and compliance, optimizing data placement, and moving data into and out of the cloud as needed. To address these challenges, organizations must invest in cloud services, taking advantage of new data services that are tailored to a hybrid cloud environment and are capable of delivering the performance, reliability, and efficiency that critical applications and services require.

Deploying data services across a hybrid cloud can help you respond faster and stay ahead of the competition. However, all the data in the world won't do your company any good if the people who need it can't access it. Employees at every level, not just executive teams, must be able to make data-driven decisions. Your IT team needs to be able to make informed decisions about where to place data so that it provides the greatest value—whether that means a corporate data center, a production facility, a public cloud, or a cloud service provider—with the ability to easily move data as requirements change.

The key to success in the digital era is maximizing the value of your data. That can range from simply making information more accessible to stakeholders to using machine learning to improve the customer experience or to identify opportunities that lead to new markets and new customers.

Control and Secure Your Data

Becoming a data-driven company requires a rigorous approach to all aspects of your data. Careful attention to where and how data is stored, data protection, and compliance and governance can make the difference between survival and extinction.

It's impossible to gain value from data that you don't know you have. Over the last decade, keeping track of data resources across a large enterprise has become exponentially more difficult. And today, data is moving at an increasing rate: to hyperscale public clouds, such as Microsoft Azure, Google Cloud Platform (GPC), and Amazon Web Services (AWS) to software-as-a-service (SaaS) providers; and to remote and edge environments. New challenges are emerging, based on the sheer amount of data that must be managed and the proliferation of new types, such as social data and data created by the Internet of Things.

"In 2018, the average IT security budget reached $15M, increasing 9.5% over the previous year."

—IDG[4]

Not only do you need full data visibility across multiple clouds, but your governance and data protection policies must extend beyond your data center boundaries. In its research report "Data Protection Cloud Strategies," Enterprise Strategy Group notes that "corporate data needs to be protected to a corporate standard, regardless of whether that data resides on servers or within cloud services."[5]

IT leaders must maintain full control over all enterprise data, no matter where it is, and keep it secure against attacks, accidents, and disasters. According to the IDG report "U.S. State of Cybercrime," enterprises responded to the increasing threat by increasing IT security spending by 9.5% in 2018.4 Data protection is no longer just a question of protecting your company against lost productivity. It's now an essential element of protecting your company's brand and balance sheet.

Accelerate Innovation

When data is siloed across divisions or functional groups such as finance, marketing, engineering, manufacturing, and other teams, it's difficult or impossible to identify deeper correlations. According to eBay CIO Dan Morales, "Data is becoming more and more disparate every day. You have on-premises systems; you have cloud systems. So now it becomes important to be able to pull those all together so that you can get insights."[6]

By transforming into a data-driven company, you're strategically positioned to harness your data and grow your business. After you identify and map your data assets—both on premises and in the cloud—and make them accessible, your teams are empowered to discover new ways of looking at data to improve operations, gain new business insights, and spot new opportunities. Your company can move quickly to advance new ideas from concept to production, while reacting faster to market changes.

As your organization embarks on new big data and AI initiatives—both on the premises and in the cloud—it becomes even more critical to think about your company's data assets in a holistic manner. Having the right governance policies in place helps ensure that datasets are available, usable, and consistent when your data science teams need them, while satisfying key regulations for data protection and data privacy.

60% **"By 2022, 60% of G2000 enterprises will be AI-enabled, with over 50% of enterprise application workflows aided by AI to better utilize legacy data, real-time operational data, and third-party data feeds."**

—IDC[3]

As your business evolves, your approach to IT purchasing must also evolve to take advantage of cloud economics. Otherwise, you risk leaving your business dangerously over or underprovisioned. Smart IT teams complement their on-premises infrastructure with cloud services so that they are never caught flatfooted by unexpected infrastructure demands.

GENOMICS LEADER LEVERAGES CLOUD INNOVATION FOR BIG DATA AND HPC

Over the last 20 years, WuXi NextCODE has amassed the world's largest database of human genome sequences. The challenge is to take a dataset of 5 million people and identify the mutations that are important—which ones cause rare diseases, which ones cause cancer, and which ones can potentially be used to treat patients.

At the heart of the WuXi NextCODE platform is its genomic relational database, the only data architecture designed to optimize the use of massive genomic data. For years, WuXi has been looking for a cloud solution that is capable of handling this database. By leveraging NetApp® Cloud Volumes Service, the genome platform can now integrate data in the cloud on the fly to deliver unprecedented computational efficiency. Today, this architecture underpins genomics efforts on four continents and is the emerging global standard for organizing, mining, and sharing large-sequence datasets.

"The benchmark for analyzing genomic data is accessing data from 100,000 individuals; we always had timeouts or file failures. But when we tested this using the NetApp Cloud Volumes Service, it actually finished in less than an hour. That was a great breakthrough for us."

—Dr. Hakon Gudbjartsson, CIO, WuXi NextCODE[7]

Master Your Cloud Strategy

It's rapidly becoming a multicloud world. As IDC notes, "The proliferation of application deployment models and data formats across hybrid IT has resulted in organizational data being widely and unpredictably spread across multiple repositories."[8] To become a data-driven company in the digital era, you need to completely rethink your cloud strategy and your approach to data services.

50% **"By 2020, over 50% of all corporate data will reside outside of the corporate data center."**

—Gartner[9]

Your cloud environment is probably the result of organic growth and stopgap efforts to respond to changing business demands, and your hybrid cloud "strategy" at this point might be more tactical than strategic. Different lines of business in your organization are probably using whatever tools they need to get their jobs done. It's time to assess all of the elements that make up your hybrid cloud, decide what to keep, what to add, and what to discontinue, and start formulating a data services plan that encompasses everything.

The starting point is to establish data insight and control. This approach means finding out not only where all of your data is stored, but also how much performance, capacity, and availability it requires and what your storage costs are. Then you can begin to integrate cloud data services that extend your capabilities, such as backup and recovery, disaster recovery, DevOps, production workloads, cloud-based analytics, machine learning, and artificial intelligence.

Deliver Data Insight and Control

It's crucial to understand where all of your data is located across multiple clouds, how it's being stored and managed, how much it's costing your company, and whether or not you're meeting service-level requirements. A recent IDC Executive Brief[10] offers a prescription for effective data services in a hybrid cloud. In particular, IDC emphasized the importance of:

- In-depth monitoring and analytics
- A single data management tier

These capabilities must encompass both on-premises and cloud environments, allowing you to assess the performance and availability of all of the services in your portfolio to make better-informed decisions about data placement. Infrastructure analytics and machine learning should be applied across your hybrid cloud environment to help you understand the performance, capacity, and availability of each dataset.

Visibility into your IT infrastructure is crucial for making informed decisions. You need monitoring tools that ensure that your hybrid cloud environment is operating at peak efficiency. You must have visibility into all of your infrastructure, from on-premises multivendor systems to cloud-based IaaS. An infrastructure monitoring tool must address these important use cases:

- **Monitor** to prevent infrastructure issues from impacting your users and your business
- **Troubleshoot** to identify and fix problems quickly
- **Optimize** to reduce costs

NETAPP SOLUTIONS FOR DATA INSIGHT AND CONTROL

NetApp offers two infrastructure monitoring products to monitor, troubleshoot, and optimize all of your cloud and on-premises infrastructure, Both solutions:

- Monitor and prevent up to 80% of cloud-infrastructure issues from ever affecting your end users.
- Reduce mean time to resolution (MTTR) by up to 90%.
- Reduce cloud infrastructure costs by an average of 33%.

NetApp Cloud Insights is designed to monitor modern cloud infrastructures, including microservices, Kubernetes, and containers. It is offered as a SaaS solution and is intended for organizations that are executing a cloud-first strategy.

NetApp OnCommand® Insight is offered as on-premises software and is ideal for enterprise IT organizations that operate large multivendor data centers.

INFRASTRUCTURE ANALYTICS OPTIMIZE CLOUD RESOURCES

Pharmaceutical giant AstraZeneca faced three major cloud data management challenges:

- Determining where to run workloads, based on cost and performance
- Providing a unified view of data across clouds to ensure compliance and protection
- Accelerating research and improving time to market

The visibility into cloud usage provided by NetApp infrastructure analytics has helped AstraZeneca to understand its workload dynamics and control its cloud costs. With infrastructure analytics, the company can identify the optimal location for workloads and data across multiple clouds while meeting stringent compliance requirements.

Integrate Cloud Data Services

Hybrid cloud data services act as a toolkit for mastering your digital transformation objectives, allowing you to retain full control over your data while getting the most business value and velocity from the resources at your disposal.

Data Protection and Security

Data protection and security are essential to the success of data-driven organizations. Many IT teams struggle to meet recovery time and recovery point objectives. Traditional backup and restore methods are not designed for hybrid cloud and may no longer meet the stringent service-level objectives that your business demands. The right cloud data services can help you to address all of your backup/recovery and disaster recovery needs, whether that means protecting on-premises data in the cloud to reduce complexity and cut costs, or protecting data that's already in the cloud.

> **"DR [Disaster recovery] is often the first step that organizations take when going to the cloud."**
>
> —IDC[11]

NETAPP CLOUD DATA PROTECTION SOLUTIONS

NetApp offers a number of services and solutions to address data protection and security needs, including:

- SaaS data protection solutions offer backup and restore services for SaaS data
- NetApp Data Availability Services enable easy data movement from primary to secondary to Amazon S3 storage for data protection while enabling backup data copies to be repurposed in the cloud for development, analytics, and more
- NetApp Cloud Backup Service offers simple, reliable data protection for cloud data stored in NetApp Cloud Volumes Service

A DIVISION OF THE DEPARTMENT OF JUSTICE ADOPTS CLOUD DATA PROTECTION

When faced with a government-mandated move to cloud-based backup, the Environment and Natural Resources Division (ENRD) of the Department of Justice needed a secure, easy to manage, and powerful solution. By partnering with NetApp, the agency was able to make a simple and seamless transition. A solution built on NetApp cloud data services made the transition to cloud-based backup straightforward and simplified the entire data protection process.

"Our mission is not 'to do IT,' it's 'to do litigation'—so our solutions need to be seamless."

—CIO, ENRD

Cloud-Based File Services

According to IDC, nearly 80% of firms are using file-based storage for unstructured data associated with mission-critical work-loads[12]. As organizations seek to harness the full value of corporate data, they are looking to move more data and file workloads to public clouds. However, there is a lack of robust, performant data options in the cloud to enable large-scale migration of file-based data and applications.

> **"451 Research anticipates that cloud-based NAS will nearly double in its usage over the next two years."[13]**

NETAPP CLOUD FILE SERVICES

NetApp offers cloud-based file services that deliver the features that enterprises need and expect, including support for NFS, SMB, and multiprotocol access.

NetApp Cloud Volumes Service offers consistent, reliable storage and data management with multiprotocol support for AWS and Google Cloud, enabling existing file-based applications to be migrated at scale and new applications to consume data and extract value quickly.

Azure NetApp Files offers consistent, reliable storage and data management with multiprotocol support for Microsoft Azure, enabling existing file-based applications to be migrated at scale and new applications to consume data and extract value quickly.

DevOps

Embracing digital transformation means accelerating the delivery of new data-driven applications and services to increase customer engagement and satisfy the needs of employees and business partners. Many enterprises are turning to DevOps as the best way to deliver new software features, services, and applications more quickly and with higher quality. By bringing developer and operations teams together, DevOps can reduce friction and put your company on the path to continuous integration and continuous delivery.

According to the 2017 State of DevOps Report,[14] published by DevOps Research and Assessment, organizations that use DevOps principles effectively can realize massive benefits, such as:

- 46 times more frequent software deployments
- 96 times faster recovery from failures

NETAPP CLOUD SOLUTIONS FOR DEVOPS

By simplifying data services and providing features such as space-efficient cloning, NetApp cloud data services facilitate DevOps practices both on the premises and in the cloud.

NetApp Cloud Volumes Service enables you to scale development activities in AWS and Google Cloud, including building out developer workspaces in seconds rather than hours, and feeding pipelines to build jobs in a fraction of the time. Container-based workloads and microservices achieve better resiliency with the persistent storage provided by Cloud Volumes Service.

Azure NetApp Files offers similar developer benefits for Microsoft Azure – all in a fully managed native Azure service.

NetApp Cloud Volumes ONTAP® enables developers and IT operators to use the same capabilities in the cloud as on the premises, making it possible to support legacy applications in the cloud with less effort and allowing DevOps to easily span environments.

NetApp Kubernetes Service (NKS) takes advantage of reliable NetApp file services and makes it fast and easy to deploy Kubernetes clusters in the public cloud, facilitating DevOps and supporting cloud-native applications. You can configure and manage clusters across AWS, Azure, and Google Cloud as part of a multicloud strategy. Clusters can be customized with a variety of popular software options for Kubernetes environments, including Prometheus, Istio, and Trident. Upgrading to the latest software versions is as easy as a mouse click.

CHANGING THE FACE OF HEALTHCARE BY INNOVATING IN THE CLOUD

McKesson is leading the charge in healthcare technology, using the cloud to improve preventive care and wage a data-based battle against the opioid epidemic. With NetApp Cloud Volumes ONTAP, the company is able to take huge amounts of data and run correlations in the cloud, providing insight on providers, clinics, and pharmacies that may be overprescribing. Until recently, these types of data analyses were nearly impossible. With NetApp, McKesson has been able to breathe new life into older applications, gaining the performance they need to do more with data.

"The interaction between pharmacy and patient is going to get a lot more interactive and proactive, and the data is what's going to drive us to be able to do it."

—Judy Jones, Director of Storage and Data Protection Solutions, McKesson

Databases and ERP

Organizations need cloud data services to help optimize the business data stored in database applications and enterprise resource planning systems by migrating the data to public clouds and building out new applications quickly. To achieve these goals, you need services that give you consistent performance, durability, and high availability, ensuring that existing databases and ERP systems can be moved with less risk of disruption and downtime.

NETAPP CLOUD SOLUTIONS FOR DATABASE AND ERP

NetApp Cloud Volumes Service (AWS or Google Cloud) and Azure NetApp Files (Microsoft Azure) offer reliable and consistent enterprise-grade performance and file-based architecture for existing databases and ERP applications, so you can move these applications to a public cloud without replatforming and with minimal migration complexity.

Cloud Analytics and Artificial Intelligence

A variety of data analytics services are now available in the public cloud. Public cloud providers offer these services as a way to differentiate themselves and attract customers. Organizations can also move their own analytics workloads into public clouds, along with consolidating their data into large cloud-based data lakes.

85% **"85% of enterprises worldwide are relying on hybrid or public clouds to enable big data analytics."**

—MicroStrategy[15]

Many enterprises want to apply cloud-based analytics and AI services to existing datasets. However, moving large volumes of data into the cloud can be time-consuming and costly. After data has been moved, it can rapidly get out of sync with the parent copy. Once analytics and data are in the cloud, it can be challenging to feed data pipelines with the right level of performance, scale, and cost.

NETAPP CLOUD SOLUTIONS FOR CLOUD ANALYTICS AND AI

NetApp offers the following services that simplify the use of cloud services.

NetApp Cloud Volumes Service (AWS and Google Cloud) and Azure NetApp Files (Microsoft Azure) enable you to store and manage large datasets in the public cloud and feed data pipelines for analytics and AI training jobs. These services are designed to deliver the performance, availability, and unconstrained capacity these processes require—all in a fully managed no-ops service that lets data scientists focus on results instead of infrastructure.

NetApp Cloud Volumes ONTAP streamlines the process of moving data to and from AWS and Azure.

Cloud Sync lets you safely and efficiently move datasets to the cloud while making sure that the cloud versions remain in sync with the original.

NetApp Private Storage lets you place data near the cloud with high-speed access to multiple hyperscale cloud providers. This approach eliminates the risk that your data will be locked in and facilitates the use of multiple analytics services.

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NETAPP CLOUD SOLUTIONS FOR CLOUD ANALYTICS AND AI

NetApp is partnering with NVIDIA and an ecosystem of AI providers to help you accelerate AI deployments. NetApp cloud data services complement our on-premises AI solutions, including ONTAP AI and FlexPod® AI.

NetApp Kubernetes Services (NKS) delivers rapid, seamless deployment of NVIDIA GPU Cloud that allows data scientists to deploy applications rapidly and securely without Kubernetes expertise. With NVIDIA GPU Cloud, NKS, and NetApp Cloud Volume Services, machine learning and AI scientists can become instantly productive.

Learn about NetApp AI initiatives at netapp.com/ai

SYNCING ON-PREMISES BIG DATA TO THE CLOUD

The IT team at an online real estate listing service was under pressure to use the cloud to increase agility and reduce costs. To meet the cloud mandate, the team needed to quickly move nearly 2 billion files—more than 85 terabytes of data—from on-premises systems to AWS S3 storage. By using NetApp Cloud Sync, they were able to transfer the data without impacting the company's customer-facing services, and within the time constraints of the cloud project.

Inspire Innovation with the Cloud

Industry-First Cloud Data Services

NetApp is committed to connecting companies to more clouds in more ways to achieve their transformation goals. This commitment includes helping you move on-premises applications that rely on file services to hybrid cloud and cloud-only models. Working with industry-leading cloud providers, we have pioneered the delivery of enterprise data services in the cloud.

Available through Microsoft Azure, Google Cloud Platform, and the AWS Marketplace, NetApp cloud data services offer high levels of performance and availability to speed enterprise applications, including file services, analytics and AI, databases, and DevOps. Cloud architects, developers, and storage administrators can provision, automate, and scale NetApp services quickly and easily by using RESTful APIs.

NetApp cloud data services:

- Support hybrid cloud and cloud-only environments
- Integrate with on-premises systems for seamless data migration and synchronization
- Integrate with cloud-based analytics, databases, and other cloud-native services

> **"Working together, we will deliver new solutions that give customers using NetApp and Microsoft Azure even more freedom to build and deploy applications however they want."**
>
> —Scott Guthrie, Executive Vice President, Cloud and Enterprise Group, Microsoft Corp.[16]

NetApp Strategic Partnerships

At NetApp, we have recognized the power and potential of the cloud since its inception. We work tirelessly to forge partnerships that offer greater insight and reach, enabling us to create cloud data services to meet demanding customer needs both on the premises and in the cloud.

Our growing portfolio of partners includes cloud industry leaders Microsoft, Google Cloud, and AWS.

In addition, the NetApp Cloud First Partner Initiative supports cloud services partners that help implement architectures in public cloud environments. Cloud First includes both consulting and technology partnerships, with NetApp working behind the scenes to ensure our partners' success.

The NetApp Data Fabric

NetApp Data Fabric enabled solutions empower organizations to use data to make intelligent decisions about how to optimize their business and get the most out of their IT infrastructure. They provide essential data visibility and insight, data access and control, and data protection and security. With the Data Fabric, you can simplify the deployment of data services across cloud and on-premises environments to accelerate digital transformation and gain a competitive advantage.

NetApp cloud data services enable you to put your data-driven vision into practice so that you can respond faster to market changes and rapidly advance new ideas from concept to production. We can help you transform your data into a strategic asset so that you can advance your business and change the world with data.

About NetApp

NetApp is the data authority for hybrid cloud. We provide a full range of hybrid cloud data services that simplify management of applications and data across cloud and on-premises environments to accelerate digital transformation. Together with our partners, we empower global organizations to unleash the full potential of their data to expand customer touchpoints, foster greater innovation, and optimize their operations. For more information, visit www.netapp.com. #DataDriven

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Learn more about NetApp cloud data services and how they can help your business at:

netapp.com/cloud

Notes

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