

WHITE PAPER

Making the most of hybrid cloud architectures: three effective strategies





Executive summary

For many enterprises, the cloud has become a double-edged sword. On one hand, it provides a way to quickly access new resources and realize greater operational and financial flexibility. On the other, projects and their costs don't always pan out as expected, leaving IT teams struggling to find the best way forward with new initiatives and infrastructure modernization efforts.

One thing is certain: cloud is evolving quickly and its role in enterprise computing will only grow. And rapidly. In its *The Future of Cloud in 2025* report, Gartner® argues cloud computing use will be widespread by 2025 and that, *"IT leaders must increase the pace of cloud adoption to meet digital business needs."*¹ Of course, the question of meeting needs is different for every enterprise. Going all in on cloud comes with its own set of risks; some organizations that experiment with moving every workload and application to the cloud end up repatriating some or all of them due to higher-than-expected costs, broken workflows, application compatibility issues, and other factors. While some flops are inevitable with any computing approach, your team can avoid them and make important performance, security, and flexibility gains with a smart hybrid cloud strategy.

NetApp customers across virtually every industry are using hybrid strategies to take big leaps forward with things like modernization, innovation, delivering better customer experiences, and increasing collaboration and decision making. It all starts with carefully considering which workloads make sense to move to the public cloud versus keeping on-prem. But that's only the beginning of an efficient hybrid approach. To realize all the potential benefits, and minimize cloud-related pitfalls, it's essential to get integration and management right.

This white paper consolidates some of the key insights NetApp has taken away from thousands of hybrid cloud related engagements with our customers to help you understand:

- Often overlooked but important nuances of hybrid cloud approaches
- Why hybrid cloud is ideal for fast-moving businesses
- The most favorable use cases for hybrid architectures
- Three proven strategies for hybrid cloud success
- How NetApp supports efficient, manageable, and flexible cloud-vendor-agnostic architectures

Clearing up hybrid cloud confusion

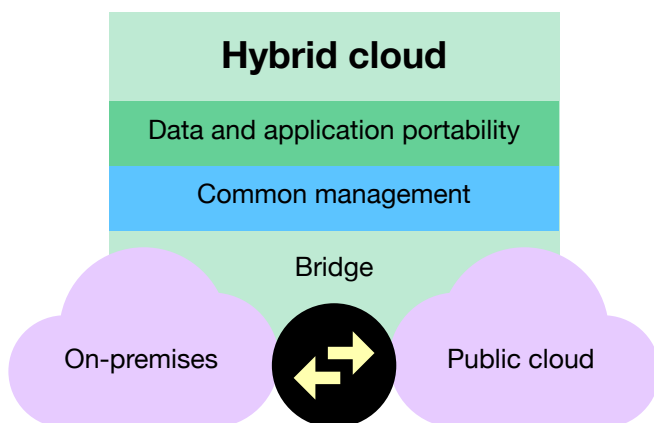
Ask any enterprise infrastructure leader if they've deployed a hybrid cloud, and nearly all of them will answer yes. In the past few years alone, cloud adoption in some form or another nearly hit the roof. Just consider that in 2017, 62% of respondents to an Evaluator Group survey indicated they had deployed a hybrid architecture. By 2021, that number jumped to a full 98% of respondents.²

But just because an architecture looks and quacks like a hybrid cloud doesn't mean it's a fully optimized hybrid cloud. In reality, many enterprises simply have pools of siloed IT resources spread across multiple places, including on-prem, public clouds, and edge with little or no coordination between them. It's often "hybrid cloud" by accident rather than by design. And it's driven by all kinds of factors, such as shadow IT, reactive scrambles to support new projects or workloads, or cloud mandates that were not part of longer-term plans or holistic strategies. The problem is that these uncoordinated hybrid architectures are typically difficult to manage and inefficient, so anticipated benefits around flexing and scaling and greater efficiency go unrealized.

Level set: defining hybrid cloud

The National Institute of Standards and Technology has long defined hybrid cloud as follows:

The [hybrid] cloud infrastructure is a composition of two or more distinct cloud infrastructures (private, community, or public) that remain unique entities, but are bound together by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load balancing between clouds).³



Hybrid clouds bind together unique entities using common technology

NetApp would expand that slightly to say "...a composition of a cloud and on-prem infrastructure or two or more distinct cloud infrastructures..."

And being "bound together" is the key. Connecting public cloud and on-prem makes the public cloud resources a seamless extension of your on-prem environment. It creates an end-to-end platform. Conversely, pools of uncoordinated, siloed resources spread across distributed environments create numerous challenges, including:

- Management complexity
- Uncontrolled costs via impaired visibility and resource sprawl
- Security risks

That's why careful planning is so important. After all, organizations typically turn to hybrid approaches because they are seeking the agility and control to easily use the best resources for their data and applications. The intent is to get away from reactive management so IT teams have more options for proactively delivering results to the business. A well-designed hybrid cloud makes this possible. It logically consolidates disparate, physically separate resources via common technology, tools and processes for holistic interoperability and management.

An integrated hybrid cloud platform with the right set of common technology, tools, and processes can enable comprehensive visibility to track and control resources, data, and costs.

Siemens Healthineers drives innovation

Siemens Healthineers development teams in PLM, R&D, SCM, and sales use an agile hybrid cloud to easily and more cost effectively access storage and compute resources they need to innovate as they develop new apps. Siemens also reduced data center sprawl, expanding its data center to the cloud without refactoring or reducing application functionality.

Prioritizing use cases: where to start

The on-prem data center is not going away any time soon. Only about 5-10% of organizations¹ are considering shutting down their data center entirely as part of their efforts to transform or differentiate their business. Yet trends point to well-established and emerging organizations alike running more workloads in the cloud by 2025.¹ Since hybrid models will only expand for the foreseeable future, it's important to understand what types of use cases are most successful in the cloud versus what you might want to keep on prem. NetApp customers who outperform with hybrid cloud architectures typically focus on the following six hybrid cloud use cases.

Data protection

Why:

Organizations need to ensure that data is protected from loss, and that they can recover in the event of a disaster. Data needs to be backed up and recovered quickly and easily to ensure availability and business continuity.

How:

Incorporates the backup/restore of secondary data between on-prem and public cloud(s), consolidated data stores for client-side user access (i.e., home directories and shared files), and the creation of disaster recovery environments in one or more public cloud location.

Success factors:

An integrated experience that automatically triggers the backup from the same console used to manage on-prem data, plus quick and seamless recovery of data.

Benefits:

Moving secondary storage workloads to lower-cost cloud storage enables organizations to save money, get additional infrastructure resources to handle scale, and protect data via location diversity. All with minimal architecture changes.

Data tiering

Why:

Housing cold data in on-prem storage takes up capacity, reducing space for the data that's used the most.

How:

Automatically offload cold data from on-prem storage to public cloud storage to free up real estate space and reduce infrastructure management.

Success factors:

Tools that use automation to tier data from on-prem infrastructure to cloud infrastructure based on specified parameters.

Benefits:

Provides cost reduction for storage of infrequently accessed data or archives.

Hybrid production

Why:

Makes primary data available to the users and applications that need it most to run business-critical functions, regardless of physical location.

Also enables you to better leverage specific cloud provider capabilities, such as new artificial intelligence or machine learning services. This use case is typically driven by the need to address latency, data sovereignty, or scaling requirements.

How:

Move and integrate production data across on-premises resources and public clouds by integrating public cloud and on-prem storage to support the same workloads (for example, database, ERP, CRM, AI, analytics, or web hosting).

Success factors:

Tools that enable holistic visibility across the ecosystem. For example:

- Integrated control panels
- Insights dashboards for performance and capacity control
- Integrated security and governance tools
- Cost controls
- The ability to move data and resources dynamically between clouds via common tools and processes without the need for retooling

Benefits:

- Provides additional resources and capabilities needed to deliver new applications, accelerate innovation, and offer new customer experiences.
- Enables better collaboration with the help of improved data accessibility and availability.

Security and compliance

Why:

Data sovereignty laws may require that data remain within the nation it is collected, requiring organizations to maintain data in distributed locations across the world. Managing, controlling and securing this data can be complicated, creating risk.

How:

A sub-set of hybrid production, this use case involves storing data in specific cloud or on-prem locations to meet data sovereignty, security, and compliance requirements.

Success factors:

A consistent approach and tools for data and resource visibility, encryption, ransomware protection, and governance policies and processes.

Benefits:

Delivers strong safeguards and holistic visibility and control of data, regardless of where it is located.

DevOps

Why:

Increase the velocity of application development to enable the release of new applications and customer experiences faster and support continuous integration and delivery.

How:

Focuses on using integrated on-prem and cloud resources to create infrastructure as a service (IaaS) and platform as a service (PaaS) solutions.

Success factors:

Automation and orchestration capabilities, rich APIs, and support for multiple storage protocols (file, block, object), container-based workloads and micro-services application architecture.

Benefits:

Speeds application development with a “develop once, run anywhere” paradigm that is unhampered by infrastructure limitations or the need to retool apps when moving between clouds.

Burst for cloud processing

Why:

Enable dynamic workload flexibility.

How:

Enable cloud resources to immediately complement data center resources on demand. Temporarily move data or clones of data from on-prem to the cloud, or between clouds for data processing.

Success factors:

- Access to a range of cloud providers to leverage new capabilities as they become available (for example, using AI or ML offerings to support data science initiatives).
- Cost control tools that can span across cloud provider solution offerings.
- Data efficiency and compression techniques that limit the impact of cloud provider data egress fees.

Benefits:

Reduces the need for acquiring more compute power on-prem by temporarily leveraging scalable, lower-cost compute as a service in the public cloud while maintaining storage on-prem for security or cost optimization.

Dow Jones pivots quickly to stand out

Dow Jones uses a hybrid cloud to create game-changing customer experiences and boost competitive differentiation. The key was creating a data fabric across a hybrid environment to support big data analytics, helping them:

- Eliminate data silos
- Unify valuable data points
- Give stakeholders access to data when and where they need it

Three proven hybrid cloud strategies

When it comes to devising a hybrid cloud strategy, it will come as no surprise that there’s no one-size-fits-all methodology. The key to success is to focus on prudent drivers and weigh potential use cases from above against your short- and long-term data and application requirements. Keep in mind that the pursuit of cost savings or optimization alone probably isn’t worth it; according to a Gartner study, only 13% of organizations reported cost savings or cost optimization as a top outcome from using cloud services.¹ Although it is possible to achieve cost benefits in the cloud with the right cost optimization tools and strategies, organizations that focus on the following drivers in their hybrid strategies typically see the best results:

- Modernization
- Enhanced productivity
- Increased agility
- Faster innovation

It all starts with high-level questions, like “*What applications and data do we have across our infrastructure footprint?*” and “*Given accessibility, cost, security, risk, and performance requirements, where does it make most sense to store data for each workload or data source?*”

From there, you need to consider how you want to use the cloud over the near or long term. Organizations that are the most successful with hybrid cloud typically build their strategies around one of the following approaches.

Ducati accelerates time to market

Ducati uses a hybrid cloud as part of its ongoing efforts to optimize motorcycle performance, evaluate its customer experience, and position the company for sustainable data-driven innovation. Its hybrid cloud solution consolidates applications, workloads and large volumes of data from around the world into a single unified environment, connecting engineering and design teams and accelerating time to market.



Long-term hybrid cloud strategy

For: Organizations where the following types of factors necessitate an ongoing combination of on-prem and cloud workloads:

- Data privacy
- Regulations
- Recovery time objectives
- Application architecture
- Other technology, regulatory, or operational requirements

These environments often have infrastructure requirements that are more static, with low data portability needed between on-prem and cloud environments, initially. To ensure long-term success, the hybrid environment must be bound together via common tools and processes to streamline management and monitoring and improve security across multiple distinct environments.



Short-term hybrid cloud strategy

For: Organizations seeking to ultimately transition to a cloud-only architecture to shift their focus away from managing infrastructure.

The absence of long-term technology, regulatory, or operational factors that might constrain cloud-based operations are a prerequisite for this less-common strategy. Organizations that pursue it typically begin by transitioning non-business-critical workloads, such as AppDev and DevOps. Or they shift secondary storage to cloud for data protection. As the cost and model assumptions are proven, they move on to more critical workloads.

This approach requires the skills to migrate data from on-prem, including an understanding of:

- Application dependencies
- Refactoring and optimization requirements
- Cost expectations
- Security and performance considerations

It also requires a similar set of tools and processes in the cloud to what's used on prem to make migration efforts and ongoing management in the cloud easier for IT teams.



Continuously optimizing hybrid strategy

For: Organizations seeking a way to continuously optimize infrastructure performance and costs.

These environments often have more dynamic infrastructure requirements and the need to frequently shift workloads, applications, and/or data between cloud and on-prem resources as IT and business needs change. This strategy requires the most flexibility in infrastructure and resources.

Organizations that are successful with strategy typically rely on familiar out-of-the-box infrastructure and storage functionality within areas such as data management. They also strive for feature parity between on-prem and cloud environments (i.e. common skillsets, procedures, and policies) to help optimize staff and operational efficiencies. Tools that help optimize costs along with automation capabilities to scale and run workloads in the most appropriate environments at any time underpin success.

Aston Martin speeds decision making

Aston Martin uses a hybrid cloud to integrate data from the edge (trackside) to on-prem (factory) systems—supporting faster, more confident decision making that translated to a winning edge on the track.

NetApp gives you the ultimate hybrid cloud flexibility

Without the right tools and capabilities, managing applications and data across a hybrid cloud is complex and time intensive. As cloud and storage specialists, NetApp can help you develop, execute, and evolve your hybrid cloud approach – regardless of your current state of hybrid cloud maturity and strategy. We help remove complexity and risk by providing a common layer for cloud-based and on-prem storage. NetApp also offers application-driven infrastructure capabilities that are designed to optimize costs, security, performance, and manageability by supporting your core production, developer, web hosting, analytics, containers, and database services across your hybrid infrastructure.

Enable centralized management and avoid platform lock-in

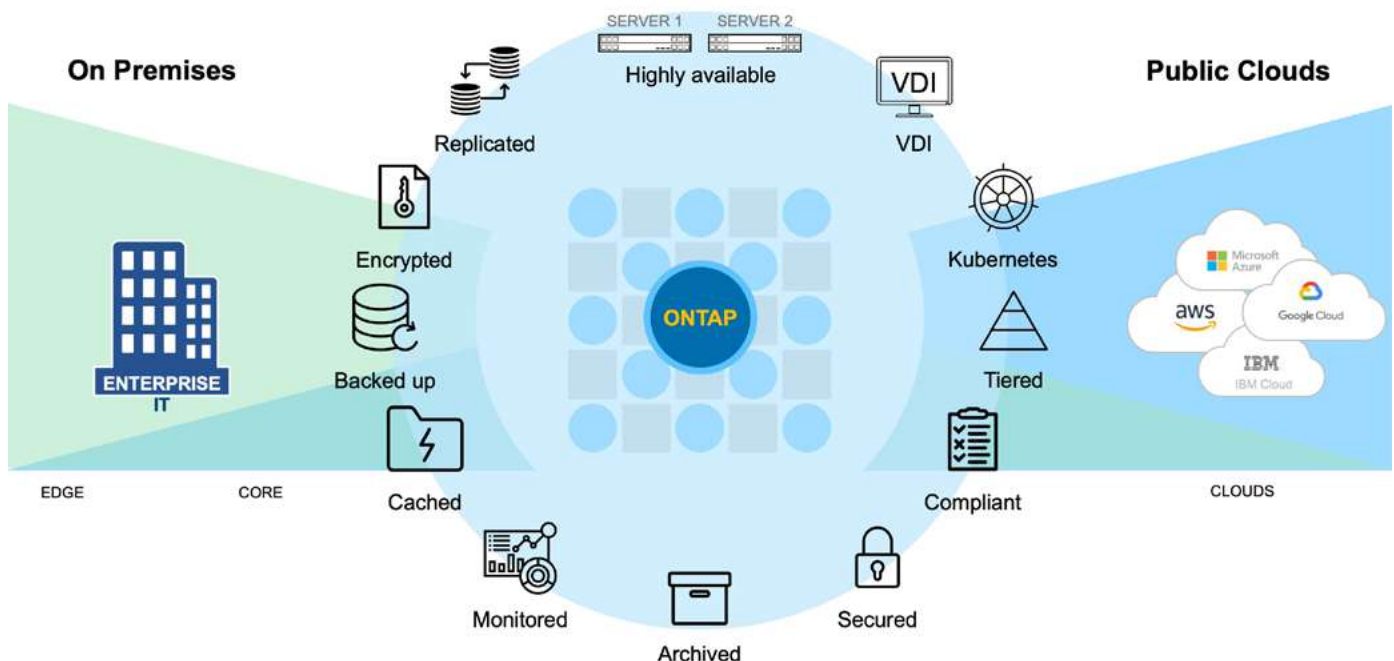
In a perfect hybrid world, you can move and store your data wherever it makes the most sense for

your business requirements. In reality, without the right data management software enabling easy portability, it's easy to get locked into one platform. And it's common to struggle with juggling the different requirements for on-prem and cloud data management.

With NetApp ONTAP®, you can rely on the same rich set of data services on-prem and in all the world's biggest clouds for full interoperability and consistent data storage, management, and protection in any environment. As the only data management software running both on premises and natively in the leading public clouds, ONTAP enables a location- and cloud-vendor-agnostic hybrid cloud architecture. It supports file, block, and object data storage to satisfy multiple use cases and enable application and data mobility with no refactoring or re-platforming of applications.

Simplified data management

NetApp provides a full suite of application-driven infrastructure management services to help you consistently manage, analyze, and optimize your data and underlying hybrid cloud infrastructure. Whether you're dealing with legacy, monolithic or cloud-native, container-based workloads, we provide a consistent approach.



Infrastructure and data management: NetApp Cloud Manager console provides a consistent way to manage, secure and protect your data more efficiently across distributed hybrid cloud environments without the need for new skills or staff. In addition, NetApp's extensive set of APIs enable automation of infrastructure and application management using your preferred automation and orchestration frameworks. Cloud Backup Service delivers seamless and cost-effective backup and restore capabilities for protecting and archiving cloud and on-premises ONTAP data.

Infrastructure analytics: NetApp's AIOps tools use predictive capabilities to help you proactively manage your environment to reduce administration and downtime costs. NetApp Active IQ® Digital Advisor uses artificial intelligence to automatically protect and optimize your infrastructure while NetApp Cloud Insights gives you complete visibility into your infrastructure and applications. You can monitor, troubleshoot, and optimize all your resources and applications across your entire technology stack, whether they are on-prem or in the cloud. Cloud Secure, a feature of Cloud Insights, analyzes data access patterns to identify risks from ransomware attacks.

Data analytics: Driven by powerful AI algorithms, NetApp® Cloud Data Sense provides hybrid cloud and on-premises data discovery, mapping, and classification. It offers automated controls and reporting so that you can always stay on top of your data.

Optimization: Spot by NetApp, a cloud automation solution, uses advanced analytics to continuously optimize your cloud infrastructure resources.

Cloud-native application-aware data management: NetApp Astra provides application storage management and data provisioning for stateful cloud native applications powered by NetApp's trusted data protection technology. Astra presents a consistent data management experience across a hybrid cloud.

Enable “as a service” operational and financial flexibility

NetApp Keystone® gives you public-cloud-like consumption and experience, consistently across your entire hybrid cloud. You can rely on a portfolio of payment solutions and storage-as-service offerings to buy and deliver infrastructure to your organization “as a service” regardless of whether the infrastructure is in the public cloud or on-prem.

Rely on expert data services

Trust NetApp and our partners to help you execute your ideal hybrid cloud strategy. From workshops and consulting to implementation and support, our specialists draw on NetApp's nearly 30 years of data management innovation to help you design, build, and optimize the right solution for your business.

About NetApp

In a world full of generalists, NetApp is a specialist. We're focused on one thing, helping your business get the most out of your data. NetApp brings the enterprise-grade data services you rely on into the cloud, and the simple flexibility of cloud into the data center. Our industry-leading solutions work across diverse customer environments and the world's biggest public clouds.

As a cloud-led, data-centric software company, only NetApp can help build your unique data fabric, simplify and connect your cloud, and securely deliver the right data, services and applications to the right people—anytime, anywhere. www.netapp.com

Ready to build a more unified hybrid cloud?



**Discover more about
NetApp hybrid cloud**



Learn more about NetApp



1 Gartner, The Future of Cloud in 2025: From Technology to Innovation, Andrew Lerner, Arun Chandrasekaran, Dennis Smith, David Smith, Neil MacDonald, 29 October 2020 GARTNER is a registered trademark and service mark of Gartner, Inc. and/or its affiliates in the U.S. and internationally and is used herein with permission. All rights reserved.

2 Hybrid Cloud Matures, Pragmatism in a post-COVID-19 World, Evaluator Group, July 2021.

3 The NIST Definition of Cloud Computing, National Institute of Standards and Technology, September 2011.



Copyright Information

Refer to the [Interoperability Matrix Tool \(IMT\)](#) on the NetApp Support site to validate that the exact product and feature versions described in this document are supported for your specific environment. The NetApp IMT defines the product components and versions that can be used to construct configurations that are supported by NetApp. Specific results depend on each customer's installation in accordance with published specifications.

Copyright © 2021 NetApp, Inc. All Rights Reserved. Printed in the U.S. No part of this document covered by copyright may be reproduced in any form or by any means—graphic, electronic, or mechanical, including photocopying, recording, taping, or storage in an electronic retrieval system—without prior written permission of the copyright owner.

Software derived from copyrighted NetApp material is subject to the following license and disclaimer:

THIS SOFTWARE IS PROVIDED BY NETAPP "AS IS" AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY DISCLAIMED. IN NO EVENT SHALL NETAPP BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

NetApp reserves the right to change any products described herein at any time, and without notice. NetApp assumes no responsibility or liability arising from the use of products described herein, except as expressly agreed to in writing by NetApp. The use or purchase of this product does not convey a license under any patent rights, trademark rights, or any other intellectual property rights of NetApp.

The product described in this manual may be protected by one or more U.S. patents, foreign patents, or pending applications.

Data contained herein pertains to a commercial item (as defined in FAR 2.101) and is proprietary to NetApp, Inc. The U.S. Government has a non-exclusive, non-transferrable, non-sublicensable, worldwide, limited irrevocable license to use the Data only in connection with and in support of the U.S. Government contract under which the Data was delivered. Except as provided herein, the Data may not be used, disclosed, reproduced, modified, performed, or displayed without the prior written approval of NetApp, Inc.

United States Government license rights for the Department of Defense are limited to those rights identified in DFARS clause 252.227-7015(b).