

Embracing hybrid cloud

Storage edition

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Hybrid cloud is the preferred model for IT environments

For many enterprises, hybrid cloud is already a reality and will be the preferred model for IT environments going forward. Indeed, a recent report from the IBM Institute for Business Value states that 97% of business are piloting, implementing or integrating cloud in their operations.¹

Across industries, businesses are adopting a hybrid cloud strategy for various use cases. These include making a more flexible transition to cloud, modernizing IT investments, increasing operational agility, standardizing heterogeneous infrastructure components, creating a consistent experience for users, and improving data protection and disaster recovery.

And they're getting more value from their infrastructure in the process. According to a 2020 study, a hybrid cloud approach can deliver up to 2.5 times the value of using a public cloud only approach*.²

Today's hybrid cloud strategies center around optimizing environments to support the business, allowing you to:

- Strengthen data and cyber resilience
- Take full advantage of cloud resources
- Adjust easily and quickly to changing requirements
- Understand and control IT infrastructure, both on and off premises

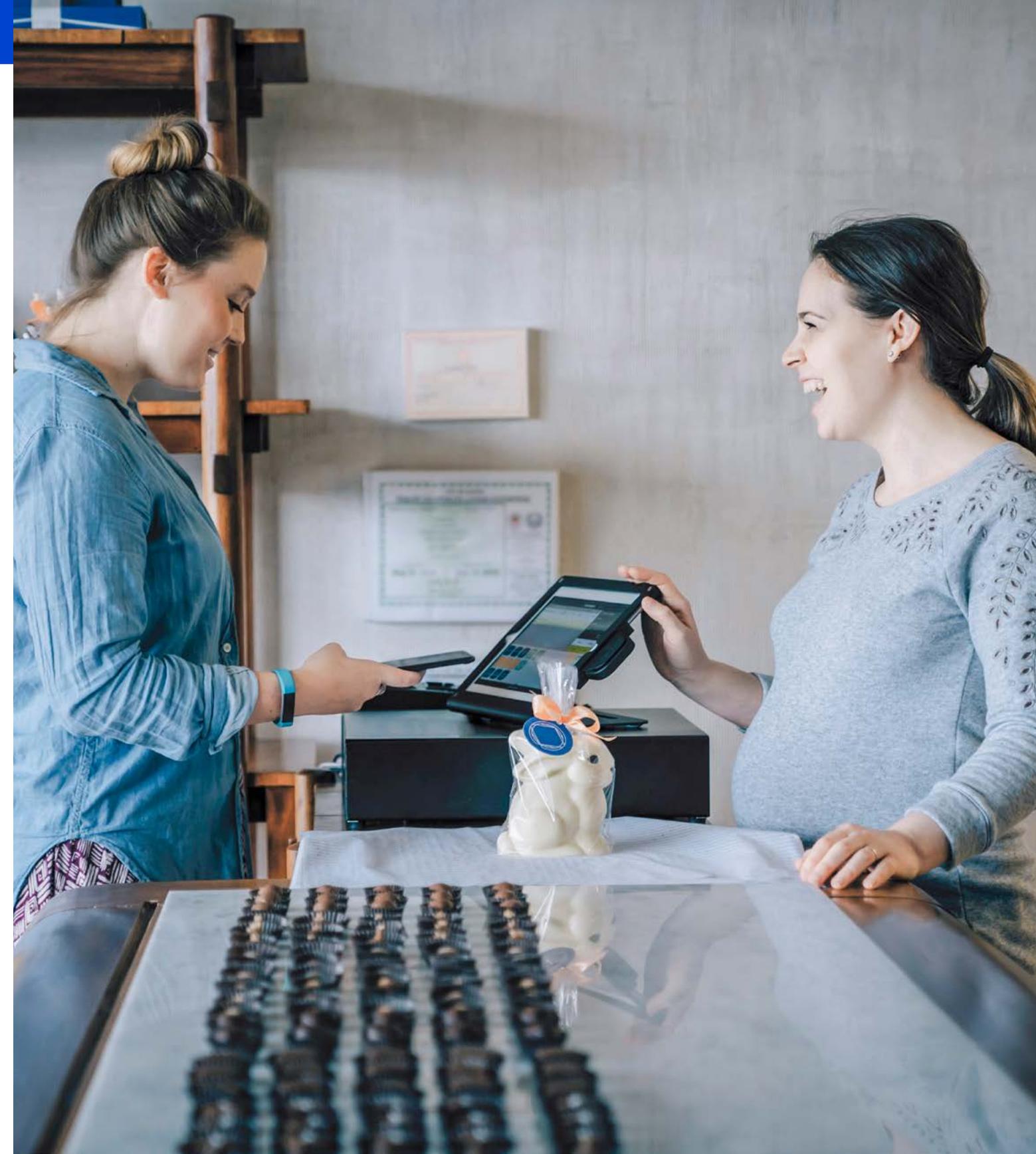
- Lower IT costs and increase efficiencies so you can dedicate more resources to innovation

Avoid gaps in your approach to digital transformation

Data storage plays a powerful role in your hybrid cloud since you use it to manage your most important assets. The right storage approach provides the foundation for data and business agility. At any stage in your digital transformation, optimizing your storage is an opportunity to bring more precision to the movement, placement and management of your data.

This guide covers the importance of data storage within a hybrid cloud environment. First, we'll look at why organizations are embracing hybrid cloud architectures—the challenges they want to overcome and the efficiencies they seek to gain. Then we'll look at the advantages of maintaining storage consistency with a one-platform approach and outline some important considerations for choosing hybrid cloud storage solutions to support modern IT environments. And finally, we'll explain how embracing [hybrid cloud storage solutions from IBM](#) can help you simplify hybrid cloud and solve your IT and business challenges.

*Based on an [IBM-commissioned study](#) of 30 clients measured across five key value areas: business acceleration, developer productivity, infrastructure costs, regulatory and compliance, deployment flexibility.





A hybrid cloud approach combines IT resources from private cloud, public cloud and traditional environments, and allows you to be more strategic about running services on the most appropriate platforms and location to support your workloads. With hybrid cloud, you can take advantage of the agility and cost-effectiveness of cloud-based environments without sacrificing control and exposing all applications and data beyond the corporate intranet.

- **Private cloud:** Cloud environment where access is limited to members of an enterprise and its partner networks. Many private clouds exist on premises, but you can also run a private cloud on infrastructure from a public cloud provider.
- **Public cloud:** Cloud environment where access to standardized resources such as infrastructure, multi-tenant hardware, and services, is available to subscribers on a pay-per-use basis. Meaning, you're renting your own slice of an infrastructure that is available to the general public. Public cloud services can be provided at no cost, as a subscription or as a pay-as-you-go model.
- **Traditional environments:** On-premises environment where compute and storage resources are physically located on a company's own property. With on-premises infrastructure, the responsibility of running, maintaining and supporting storage backup and recovery is maintained by the onsite owner.

Drivers of hybrid cloud adoption

Most enterprises today are in the process of digital transformation and contending with growing data and application demands. As a result, the ways in which core and new business applications are shared and developed across the organization are changing. The move to a hybrid cloud is driven by the need to reduce IT complexity and modernize the way IT interfaces with and supports the entire enterprise and its business initiatives — today and in the future.

Consider the following: 75% of IT decision makers surveyed by Enterprise Strategy Group (ESG) believe IT is more complex now than it was just two years ago — and that percentage is up from 64% just last year. Top complexity drivers include higher data volumes followed by an increase in applications that leverage modern architectures such as Kubernetes.³

Additionally, a 2021 study by Forrester Consulting found that the ability to deliver IT projects more quickly and provide for growing demands on existing IT infrastructure are top investment priorities for the IT decision makers surveyed.⁴

Hybrid cloud architectures provide business and technical benefits

Across IBM IT infrastructure, we see three primary use cases for hybrid cloud adoption⁵:

- Modernize and [containerize applications](#) to increase developer velocity and provide consistent hybrid cloud management.

- Establish low-latency integration between applications and business-critical data by co-locating cloud-native and traditional applications.
- Make cloud-native apps secure, scalable and resilient with co-optimized software and hardware infrastructure that deliver encryption everywhere and vertical scalability.

Ultimately, embracing hybrid cloud is about gaining greater agility without sacrificing control over data and performance, and it can simplify IT and improve economics in the process. For example, hybrid cloud enables organizations to:

- Standardize IT around agile cloud architectures and methods. This makes it easier to manage data across siloes and allows developers to build once and deploy anywhere, speeding up innovation while supporting continuous delivery.
- Combine modern DevOps practices using microservices, containers and Kubernetes on cloud. This gives you a more flexible framework to support changing business models and scale on demand.
- Use consistent controls across clouds and IT, which can reduce compliance spend by up to 25%.²

The key to hybrid cloud success is deploying a modern data infrastructure that supports digital initiatives while reducing IT complexity. This is heavily dependent on how you access, manage and control your data — and that's where a hybrid cloud storage strategy comes in.



Your hybrid cloud storage strategy defines how you access, manage and control your data.

To simplify IT environments, control costs and speed operations, ESG recommends storage consistency — that is, standardizing on a single, consolidated storage platform based on open standards and serving a diverse set of application needs. A one-platform approach can bring better automation of storage-related activities and the ability to manage all storage infrastructure across any location.⁶

This level of efficiency can be achieved through software-defined storage (SDS) technologies and capabilities. With SDS, a layer of software always exists between application hosts and the basic underlying storage hardware. This SDS layer provides flexibility and additional functionality, including various encryption capabilities.

An on-premises storage infrastructure built from a strategic software foundation is not tied to a physical storage infrastructure. It can run on premises with just about any vendor hardware and equally on multiple public clouds of your choice, giving you a much more familiar and consistent experience across the hybrid cloud environment.

A key aspect of SDS is that it can be updated and enhanced much more easily than the underlying hardware. If your infrastructure is built on a software foundation that supports nearly every hardware platform, then you can implement new innovations

into your infrastructure without having to change APIs or procedures.

Here are some benefits of leveraging a consistent storage strategy across your hybrid cloud environment.

Increase developer productivity and support containerization

While traditional developers typically spend 70% of their time on overhead, a recent study showed that those who adopted a consistent platform approach to cloud were able to flip the equation — spending 70% of their time on development. Organizations that adopted a consistent platform approach were able to reduce the time it takes from the ideation stage to a full-scale production service by 80% (a reduction from 20 months to only 4 months).²

Containers are technologies that allow you to package and isolate applications with their entire runtime environment—all of the files necessary to run. This makes it easy to move the contained application between environments (dev, test, production, etc.) while retaining full functionality, so developers can build once and deploy anywhere. [Containerized storage solutions](#) accelerate modernization by offering fast and easy deployment with container-native access.

Centralize storage resources and simplify operations

A storage platform built on a single software architecture, with the ability to consolidate and virtualize existing heterogeneous storage infrastructure, will eliminate storage siloes and provide a centralized view of all your data. With a consistent software-defined storage foundation that extends across your hybrid cloud, you can simplify operations by supporting all your storage systems with the same set of APIs, procedures and interfaces regardless of vendor, giving your applications and operations a consistent experience across on-premises and cloud infrastructure. This also makes it easier to accommodate technology shifts through updates, and to extend data reduction across all your storage to store more data.

Improve data mobility

There are many reasons you'll need to move data without disruption among storage systems, such as lease expirations, performance optimization, tiering to place the right data on the right hardware, and technology or vendor changes. If your hybrid cloud storage solution has the latest technologies and capabilities, you can move data sets between cloud providers and on-premises resources almost instantaneously to improve your own data economics.



Strengthen cybersecurity, data protection and resilience

According to a study by Forrester, security is the single most important consideration when making an infrastructure purchase decision for most IT decision makers surveyed (75%).⁴ During uncertain times, a hybrid cloud strategy can provide more control over sensitive data and where it resides. Your storage needs to keep your data available while protecting against both traditional and modern challenges — from power outages to natural disasters to cyberattacks — and do so cost effectively. On top of that, it should help you maintain compliance regulation standards, such as General Data Protection Regulation (GDPR).

An important data protection mechanism that a hybrid cloud storage solution can offer is centralized management of file permissions. This allows you to establish system policies that limit or facilitate data access anywhere, anytime. You can then quickly manage access control lists and grant or deny access to data for specific business units or users.

Some hybrid cloud storage solutions provide pervasive encryption, which means that your data can be encrypted both at rest and in flight while substantially simplifying encryption and reducing its costs. This allows you to break down data silos, giving you a single source of truth for your data. By encrypting data at rest across all your storage, a software-defined storage platform can make the storage you already own more resilient to the dangers old and new while maintaining your mission-critical systems. As new [data protection technologies](#) become available, either as downloadable tools deployed on premises or on

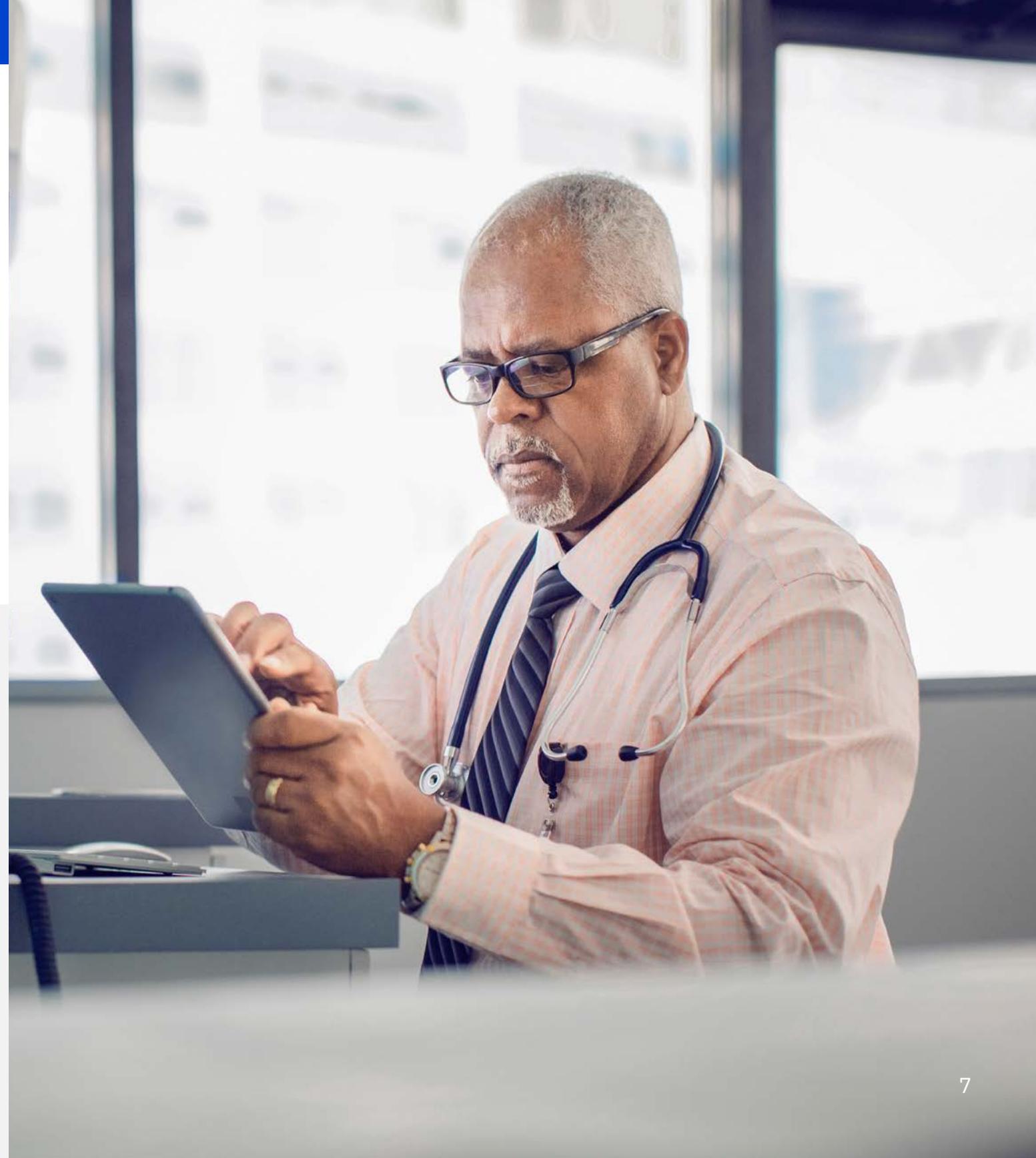
cloud-based offerings, your hybrid cloud storage solution should adjust to your specialized needs.

Facilitate analytics and AI

Hybrid cloud environments support the flexibility that lines of business need for their new products, services and business models —which leverage AI infrastructure, big data, analytics and mobile. The value that AI applications offer stems from their ability to make sense of enormous data streams. The more data used to train the AI algorithm, the better it performs. With the right storage solution, you can [support data management at each stage of the AI lifecycle](#).

Benefits of storage consistency within hybrid cloud environments:

- Increase developer productivity and support containerization
- Centralize storage resources and simplify operations
- Improve data mobility
- Strengthen cybersecurity, data protection and resilience
- Facilitate analytics and AI



Your data storage needs to provide high performance and availability, security and data protection, and disaster recovery. When evaluating solutions, look for the following capabilities to ensure that your storage infrastructure will support your larger hybrid cloud strategy.

High performance and simplified management

Data typically needs to be located as physically close as possible to application hosts to minimize network latency. An effective hybrid cloud storage solution will enable agile data movement from wherever any particular data set may be stored, ideally with a built-in software-defined virtualization layer to reduce complexity by managing all storage infrastructure across any location in the hybrid cloud.

Working with a mix of cloud and on-premises applications, clouds and vendor applications, you want to ensure that you can provide the same level of service quality and resilience while continually delivering new features. Modern storage solutions can increase performance via automation, giving you the ability to simplify management of multiple clusters across different technology platforms for public and private clouds, containers and Kubernetes.

Security and data protection

Your storage needs to protect your data against both traditional and modern challenges — from power outages to natural disasters to increasingly sophisticated cyberattacks — as well as help maintain compliance regulation standards. Some hybrid cloud storage solutions provide pervasive encryption, which means that your data can efficiently be encrypted both at rest and in flight. Another important data protection mechanism is centralized management of file permissions, which will allow you to quickly manage access control lists and grant or deny access to data for specific business units or users. As new data protection technologies become available, either as downloadable tools deployed on premises or on cloud-based offerings, your hybrid cloud storage solution should adjust to your specialized needs.

Disaster recovery and system availability

Replication and snapshots need to work across the hybrid cloud as well. Tools within the cloud environment may provide the choice of synchronous or asynchronous replication, automatic two- or three-site replication and metro or global replication distances.

But if all these choices are already native to your storage infrastructure, you can more easily craft business resilience solutions tailored to your business objectives and budget constraints.

A consistent, one-platform approach to hybrid cloud storage can optimize the availability, management and security of your data. Equally as important, it can bring greater cost efficiency to your operations. We'll explore how in the next chapter.

Is flash storage right for your business? [Get the flash storage buyer's guide](#)

Considerations for evaluating hybrid cloud storage solutions:

- High performance and simplified management
- Security and data protection
- Disaster recovery and system availability





There are several ways to purchase storage for hybrid cloud environments, and they are continually evolving. The economics of cloud-based offerings have influenced vendors to offer on-premises storage with cloud-like consumption models to improve efficiency. Customers are billed monthly for the capacity they use as a per-gigabyte OPEX charge rather than a CAPEX purchase, with the necessary automation and monitoring delivered by the vendor. As data usage becomes more unpredictable and IT budgets continue to tighten, flexible capacity, utility and storage as a service options are becoming more popular.

It's important to choose the deployment and IT consumption model that best fits your storage strategy. Here is an overview of typical purchase options.

- **Traditional purchase model:** An upfront or leased capital expense in which you purchase infrastructure that is deployed in your data center and will meet your maximum capacity requirements.
- **Consumption-based:** You purchase, lease or rent a committed level of base storage capacity that meets your immediate needs, and the vendor provides you with storage systems as defined by your requirements with between 25% to 200% additional “growth” capacity. You then pay for what you use above that level when you use it, scaling capacity use up or down as business needs dictate. These models typically have terms from 3 to 5 years.
- **Subscription-based:** Much like cloud-based services, STaaS provides fast, on-demand capacity in your data center. The infrastructure still physically resides in your data center, or in a co-location center, but you pay only for what you use, and the vendor takes care of the lifecycle management (deployment, maintenance, growth, refresh and disposal).
- **Cloud-only approach:** Also a pay-per-use model, cloud services are readily scalable and can be easily adjusted to meet changing workload demands, with guaranteed service levels, set pricing and predictable quarterly charges aligned directly with your business needs. Some providers also charge for the number of accesses and for amount of data transferred out of the cloud (also known as “egress”).
- **Hybrid approach:** This approach integrates a mix of services from public cloud, private cloud and on-premises infrastructure, with orchestration, management and application delivered across all three using software-defined management.



For a deep dive on IT consumption models for storage, [read our blog](#).

When considering which deployment and IT consumption model best fits your storage strategy, keep the following in mind:

- Total cost of ownership
- Reliability and availability
- Price transparency and predictability
- Maintaining security and control of data
- Ease of management and reducing IT complexity
- Ability to shift workloads or data to capitalize on or satisfy changing requirements

While next-generation applications are accelerating the pace of data growth, for many organizations, IT budgets are not growing at the same pace. When you evaluate storage choices, consider cost efficiency from the angles of cost control, cost reduction and total cost of ownership.

Infrastructure choices must balance cost with performance, security and availability without impacting service levels so that you maintain reliability. With a software-defined, one-platform approach, you can reduce the complexity of managing separate storage systems and reduce overall IT complexity.

Plus, many of the efficiencies of the platform can extend to existing storage through virtualization, including data protection to help maintain security and control of data. By consolidating to one virtualized platform in this manner, businesses surveyed by Forrester were able to store up to five times as much data in the same space through data reduction techniques, move data to the most cost-effective hardware without disruption, and right-size their storage purchases, freeing up capex.⁷

Cost transparency and predictability matter too. Being able to reuse existing technology already on the floor, monitor and automate storage and pay only for the capacity you use (without being surprised by cloud costs such as egress) are also strategic options to look for in a storage solution. Storage monitoring software can help you plan capacity more accurately and, in some cases, reduce costs through automating data movement to the most effective storage tier. This improves overall IT agility.

Your hybrid cloud storage architecture can be a powerful tool to help you handle the massive data flows from your software and solutions and transform them into value for your business and your customers. With the right storage strategy in place, you can benefit from cost reductions, added reliability, simpler management, rapid provisioning and a faster time to market for your products and services.

You'll know that your hybrid cloud environment is set up for your success when:

- Your data moves where and when you need it in real time.
- You're gaining all the value you can from your data assets.
- You're able to manage all your storage as "one" whether it's deployed on-premises or in the cloud.
- Your IT infrastructure provides the flexibility, performance, and cost-efficiency you need to capture and keep a competitive advantage.

What IBM offers

IBM is here to support your storage transformation with offerings designed for high ROI, cost control, and pay-per-use. IBM hybrid cloud storage solutions make it simple to deploy container-enabled enterprise storage seamlessly across on-premises and cloud storage environments. IBM Storage consolidates multi-cloud, multi-app environments,

delivering high performance, enterprise-level storage capabilities that are designed for modern data lakes.

IBM FlashSystem®, built on IBM Spectrum®

Virtualize software: Flash storage is an ideal solution for meeting growing performance demands while bringing speed, scalability and savings to your business. The [IBM FlashSystem family](#) is a single platform of high-performing all-flash storage with an open, end-to-end architecture that can be deployed in any environment. This comprehensive portfolio of software-defined flash solutions fits a range of budgets, workloads and performance profiles and is designed to save you time and money by reducing complexity of management, monitoring and virtualization. Customers have achieved 359% ROI in an 8-month payback period and reduced storage management effort up to 60%.⁷ Advanced security features include data-at-rest encryption and the ability to isolate immutable data copies, creating a logical air gap and supporting faster recovery following a cyber attack.

At the heart of on-premises IBM FlashSystem storage and public cloud deployments, IBM Spectrum Virtualize software is a flexible software foundation that consolidates and simplifies storage management across differing storage resources and hybrid cloud environments to reduce costs, enhance existing storage and increase hybrid cloud efficiency and agility. And [IBM Storage Insights](#) brings cloud-based storage management and support using predictive analytics developed by IBM Research to deliver insights that help you take the guesswork out of capacity planning, increase utilization and reduce costs.

IBM Spectrum Virtualize for Public Cloud. Built on the common foundation provided by IBM Spectrum Virtualize, [IBM Spectrum Virtualize for Public Cloud](#) promotes true hybrid cloud flexibility and mobility. Data can be moved to other clouds: on-premises private cloud, a managed service provider (MSP) hosted private cloud, another supported public cloud or even a traditional on-premises infrastructure. Regardless of platform, data management and storage function are consistent, and a full range of storage types are supported.

Flexible consumption options. In addition to traditional, cloud and hybrid deployments, IBM offers flexible consumption options for hybrid cloud storage:

- [IBM Storage as a Service \(STaaS\)](#) delivers secure, cloud-like services on-premises with procurement and capacity choices. IT is managed by IBM Storage experts so you can free up IT resources.
- [IBM Storage Utility](#) offers a procurement choice with capacity on demand and usage-based billing.
- [IBM Global Financing](#) (IGF) offers flexible financing options including leases, loans and deferred payments.





Next steps

To learn more about how IBM Storage solutions can help you compose a more agile, cost-effective and secure hybrid cloud infrastructure, [schedule a consult with our storage experts](#) or contact your IBM Business Partner today.

[Take tour of IBM FlashSystem >](#)

[Visit our FlashSystem configurations page >](#)

Resources

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