Hybrid cloud: The best of all worlds

Learn the benefits and best practices of bringing a hybrid cloud strategy to life within your organization

IBM

Table of Contents

Hybrid cloud for IT transformation

In a world of complex security, workload and data hosting needs, enterprise leaders may find that a "one-cloud-fits-all" strategy does not effectively address the needs of their organization. Instead, a more tailored approach is needed to truly transform their digital landscape and provide them with the ability to deploy applications and data in a secure, integrated, flexible and simple-to-manage way.

For a majority of enterprises, a hybrid cloud strategy has become the preferred model for deploying applications and data. According to 451 Research, more than two-thirds of companies (68%) are choosing the default approach of making strategic IT investments in hybrid IT and integrated on-premises/

off-premises cloud environments.[1] And among top IT spending priorities for these organizations in 2019 are new IT projects for digital transformation (35%), upgrade/refresh existing IT (30%) and customer experience/engagement improvements (29%).

This shift to hybrid cloud offers IT leadership a unique blend of security for mission-critical workloads, flexibility for dynamic delivery and performance to meet the need for continuous and effective innovation. Adoption of a hybrid cloud strategy enables a large organization to customize their framework and deploy a model that best serves their business objectives, critical workloads and future initiatives to better serve their customers.

Hybrid is the preferred (or in effect, default) approach for:

69%
of large enterprises with more than 10,000 employees[1]

73%
of government/ education oganizations[1]

Among top IT spending priorities for these organizations in 2019 are:

35% Projects for digital transformation

30% Upgrade/refresh existing IT

29% Customer experience/ engagement improvements[1]

Understanding cloud environments and multicloud management

A hybrid approach may be the best move for an enterprise looking to keep their data protected and private while meeting the demand for business agility. The truth is, many of the critical workloads of enterprise businesses cannot or should not be moved to the public cloud. Such a move could compromise the security of mission-critical data for core business applications. Major financial, health, government and other large enterprises cannot take the risk with their business and customer data.

Understanding cloud environments and making decisions about multicloud management is complex. Many questions arise, such as, what resides on-premises? What lives in a private cloud vs. public cloud? Which public clouds should be used? What data or applications should be on-premises rather than off-premises? Why did your IT team deploy some applications in those respective environments and was it the right decision? It's important to have a solid understanding of your current IT infrastructure and the alignment of workloads with this type of deployment. With that in mind, let's take the time to explore the various cloud deployments.

If you are already familiar with all your infrastructure options, please feel free to skip to the next chapter where we continue to discuss the benefits and challenges of a hybrid cloud approach to business.

Private cloud[2]

A private cloud refers to a cloud solution where the infrastructure is provisioned for the exclusive use of a single organization, either on premises or off premises. The organization often acts as a cloud service provider to internal business units that obtain all the benefits of a cloud without having to provision their own infrastructure. By consolidating and centralizing services into a private cloud, the organization benefits from centralized service management and economies of scale.

An on-premises private cloud provides some advantages over an off-premises private cloud. For example, an organization gains greater control over the resources and data that make up the cloud. In addition, on-premises private clouds are ideal when the type of work being done is not practical for an off-premises private cloud because of network latency, security or regulatory concerns.

Public cloud[2]

A public cloud infrastructure is made available to the general public or a large industry over the Internet. The infrastructure is not owned by any single user, but by an organization that provides cloud services to a variety of businesses. Public cloud services can be provided at no up-front cost, as a subscription or as a pay-as-you-go model, and resources can be shared across multiple businesses to reduce costs.

Hybrid cloud[2]

A hybrid cloud deployment typically describes a situation in which a company is operating a mixture of private cloud, public cloud and traditional environments — regardless of whether they are located on premises or off premises. In a hybrid cloud environment, private and public cloud services are integrated with one another.

Hybrid cloud enables a business to take advantage of the agility and cost-effectiveness of off-premises, third-party resources without exposing all applications and data beyond the corporate intranet. A well-constructed hybrid cloud can service secure, mission-critical processes, such as receiving customer payments (a private cloud service) and secondary processes, such as employee payroll processing (a public cloud service).

The challenges for a hybrid cloud are the difficulty of effective creation and governance, the need to ensure portability of data and applications in the cloud, and the management of complexity. Services from various sources must be obtained and provisioned as though they originated from a single location, and interactions between private cloud and public cloud components make the implementation even more complicated.

Hybrid multicloud architecture

Hybrid multicloud refers to an organization that uses multiple public clouds from several vendors to deliver its IT services, in addition to private cloud and traditional on-premises IT. A hybrid multicloud environment consists of a combination of private, public and hybrid infrastructure-as-a-service (IaaS) environments all of which are interconnected and work together to avoid data silos.

Many enterprise companies are failing to make their various data repositories and systems 'talk to each other' effectively and efficiently, if at all. The result: more data silos that hinder or prevent data movement and sharing.

With a modern hybrid multicloud architecture in place, you gain access to a single source of truth as it relates to your data. If optimized properly, you can quickly access data that is reliable and accurate. Moreover, data that is unified in one location is accessible whether it resides on-premises or off-premises.

Benefits of a hybrid cloud strategy

Get the best of all environments

Hybrid multicloud is the new normal for enterprises investing in IT modernization. And with it you can get the best of all environments — while public cloud is prized for delivering customer-facing applications, on-premises private cloud is valued for securing data and prized for quick access to on-site data and applications. Optimizing for both agility and essential business needs can lead to cost efficiencies as well. That's because keeping critical workloads on-premises can save a business big on frequently used data. Let's explore the benefits of a hybrid cloud environment.
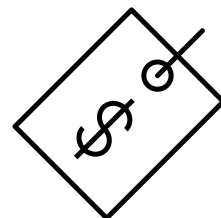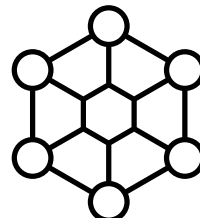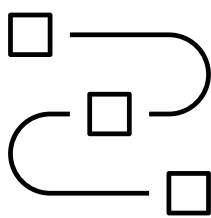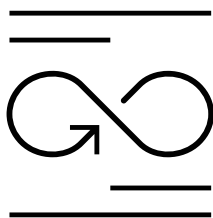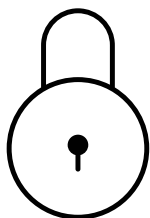
Five benefits of a hybrid cloud environment

Security   In this era of frequently reported data breaches, securing all of an organization's data is essential to maintaining customer confidence and protecting critical business data. Just as important is being able to prove to regulators that customer data is fully protected. Storing secured data on-premises and enabling fast access from cloud applications is a good start; extending the protection of data into both private and public cloud enables flexibility. A hybrid cloud environment gives you a choice of how and where your data is housed within your organization and it is important to keep it protected wherever it resides.

Agility

A hybrid cloud environment will enable you to rapidly deploy applications to satisfy customer demand and exploit business opportunities. It makes applications and data more easily accessible to a wide variety of users. And, it gives the ability to integrate your on-premises applications and data with public cloud to securely make all of your data and applications available.

Mobility

Develop new cloud-native applications using containers so they can be hosted on private and public cloud. This enables you to run applications on the right platform and take advantage of available resources. Deploying these applications using Kubernetes can help you manage cloud complexity while minimizing cost. Central to all of this is the flexibility of open-source and an infrastructure-independent common operating environment that runs anywhere — from on-premises private clouds across your entire value chain.

Integration

Remove data silos so that your core business data and applications can fuel new development and surface new insights across your business. Co-locate applications close to the data to enable faster processing and insights — from corporate data or data generated by Internet of Things (IoT) devices — while ensuring critical data remains in the most secure environment.

Cost

The hybrid cloud enables optimized placement of workloads and sharing of resources, which can help minimize both predictable costs like datacenter, software purchases and licensing costs, as well as the cost of supporting spikes in demand. A hybrid approach is flexible enough for the life of your organization.

Insider advice for CIOs building hybrid clouds

To shift to a hybrid cloud approach means to listen and adjust to each business unit (BU) within your organization. One BU may favor a specific public cloud service for their work while another BU may have established a critical and efficient system with a different cloud service. A hybrid approach accommodates the needs of each BU's dependencies, so you can select the right service for their workloads and your customers.

According to 451 Research[1], "hybrid is the preferred (or in effect, default) approach for a greater proportion of large enterprises, more than 10,000 employees (69%) and government/ education organizations (73%)." Moving forward with building your hybrid cloud environment means addressing a variety of organizational issues and demands.

Optimizing costs

Ultimately your future plans are restricted by the budgetary concerns of your organization. While transformative change is not free, it may surprise you how many opportunities there are for cost-saving efficiencies with a hybrid cloud environment:

— Use of open-source to minimize software costs and avoid lock-in to cloud vendors

— Application mobility through containers and Kubernetes

— Optimized workload location choice for efficient execution

— Reduced system administration costs through reliable, scalable centralized systems

Ensuring security

There can be no compromising when it comes to the security and privacy of your data and your customers. To prepare for data growth and future regulations you need a secure hybrid cloud that protects you from all IT threats. But not all vendors use a secure-by-design approach. Your secure hybrid cloud should do the following:

— Encrypt 100% of data, both at rest and in-flight – using on-chip hardware crypto accelerators wherever possible to minimize encryption overhead
— Protect and store encryption keys using the highest NIST certified FIPS-certified Hardware Security Modules[3]
— Localize data on-premises in a private cloud to meet data privacy regulations
— Secure application environments to run trusted workloads, designed for protection from internal and external threats
— Extend data privacy beyond the host server and across the hybrid cloud

Managing complexity

Collaborating across your organization requires a cultural and technological investment. It can be challenging but it's something many organizations are pursuing to lower cost and raise availability for their critical and experimental work. To enable collaboration across your organization, consider investing in:

— Infrastructure-independent common operating environments that run anywhere — from the data center to multiple clouds to the edge
— Building cloud-native applications using multi-architecture containers and deploy across the hybrid cloud using Kubernetes
— Integrating new applications with existing data and systems to maximize value
— Leveraging multicloud management to ensure the best use of resources

Building your hybrid cloud

Hybrid cloud with the right technology

In order to be an agent of change in your organization, you'll need to have the right technology in place to support your every move. So, we put together a list of hybrid cloud technologies worth looking into as you begin or continue on your hybrid cloud journey. As you plan out your environment, here's what you'll need.

Open-source software to avoid vendor lock-in and enable innovation.

→ *Recommended technology:*
Linux

Lightweight virtualization and orchestration software to package applications with their software dependencies, and to accelerate development and deployment.

→ *Recommended technology:*
Containers and Kubernetes

Infrastructure-independent common operating environment to enable the portability of applications across hybrid cloud environments.

→ *Recommended technology:*
Red Hat OpenShift Container Platform

Database and middleware software integration to help move and integrate core business applications to the hybrid cloud securely.

→ *Recommended technology:*
IBM Cloud Paks

A short technology deep-dive

Linux

Linux has established itself as the leading operating system, both for traditional IT and in the cloud. It has been ported to multiple architectures and systems, from embedded IoT devices to supercomputers. Although there are many Linux distributions available, three have emerged as the leaders for enterprise Linux: Red Hat Enterprise Linux, SUSE Linux Enterprise Server and Ubuntu from Canonical.

Containers

Containers are a feature of Linux and other operating systems which package together application code along with all the software dependencies that it needs in order to run. This ensures that the application has everything it needs to run out of the box, independent of the operating environment in which the container runs.

Containers make life easier for both developers and administrators. They are lightweight to run and extremely quick to start, which can increase performance time. Administrators can run many of them at once to create a highly scalable environment. Their cloud-friendly nature makes it easier to deploy them automatically, and containers can run in many different operating environments because they contain the files on which they depend. And multi-architecture containers are now possible, to enable container development on one architecture and deployment on another.

Kubernetes

Containers have been widely adopted, which means there can be lots of them, making them difficult to manage. This requires a new way of managing application deployment. Containers need to be created, provisioned, run, and deleted very quickly, and so require powerful orchestration software to manage them at scale.

Kubernetes, another open-source project, has emerged as the most popular container orchestration tool. It is declarative rather than procedural, which means the systems administrator specifies the desired end state of deployment and Kubernetes works out how to achieve it.

Red Hat OpenShift

Red Hat OpenShift Container Platform provides an infrastructure-independent common operating environment that runs anywhere — from any data center to multiple clouds to the edge. It includes support for containers and Kubernetes, as well as additional services and management capabilities.

IBM Cloud Paks

IBM Cloud Paks are enterprise-ready, containerized software solutions that offer an open, faster and more secure way to move core business applications to any cloud. Built on Red Hat OpenShift, each IBM Cloud Pak includes a container platform, containerized IBM middleware and open source components, and common software services for development and management.

Building your hybrid cloud on IBM LinuxONE

IBM LinuxONE is an enterprise platform designed to deliver high availability, security and scalability and with the agility to develop next-generation applications. As such, it can provide an ideal platform for building each element of the hybrid cloud – whether public cloud, private cloud, or traditional on-premises IT.

Here are some of the benefits of building your hybrid cloud on LinuxONE:

— **Supports Linux, containers and Kubernetes** for cloud-native application development, deployment and management — with future support for Red Hat OpenShift and IBM Cloud Paks announced in a recent Statement of Direction

— **Engineered to deliver a highly scalable, secure, reliable** and cost-effective platform for building and deploying containers — whether on private or public cloud

  • Scales both vertically and horizontally, so supporting big containers (for applications which have been containerized but not yet factored into microservices), and lots of parallel containers (for new cloud-native applications using containers and microservices)

  • Protects data and applications from both internal and external threats through pervasive encryption, key protection, and a highly secure environment for running applications

  • Designed for 99.999% availability to meet consumer and business expectations, LinuxONE is able to quickly recover from disaster scenarios

— **Improved quality of service vs public and private clouds**
There are limits to public and private clouds' ability to deliver high quality of service to your partners and customers. This is another area where the hybrid cloud model shines. A hybrid approach gives you the power to integrate new cloud workloads with your existing IT infrastructure. This can lead to faster service for your customers. And, by having a fuller view into all your workloads, you can leverage big data for new insights that can lead to future application improvements.

— **Reduces Total Cost of Ownership** by sharing resources, consolidating licensed software onto fewer cores, and simplifying management of IT

With an open approach, you will be able to take on more advanced servers built with the highest levels of security, scalability and reliability and apply those advantages across all your workloads. The added scale won't come at the cost of security either. Hybrid cloud lets you containerize existing and future applications.

Plastic Bank

As scientists predict more plastic than fish in the ocean by 2050, the Plastic Bank founders wonder what they can do to protect the natural world? Working with IBM and service provider Cognition Foundry, Plastic Bank is mobilizing recycling entrepreneurs from amongst the world's poorest communities to clean up plastic waste in return for life-changing goods. To support their expansion, the Plastic Bank selected IBM Blockchain technology

Read the case study →

delivered on a private cloud by managed service provider Cognition Foundry, powered by IBM LinuxONE. The application front-end was designed and developed by Cognition Foundry and is hosted in Cognition Foundry's datacenter and the IBM Cloud, creating a hybrid multicloud architecture. Blockchain is used to track the entire cycle of recycled plastic from collection, credit and compensation through delivery to companies for re-use.
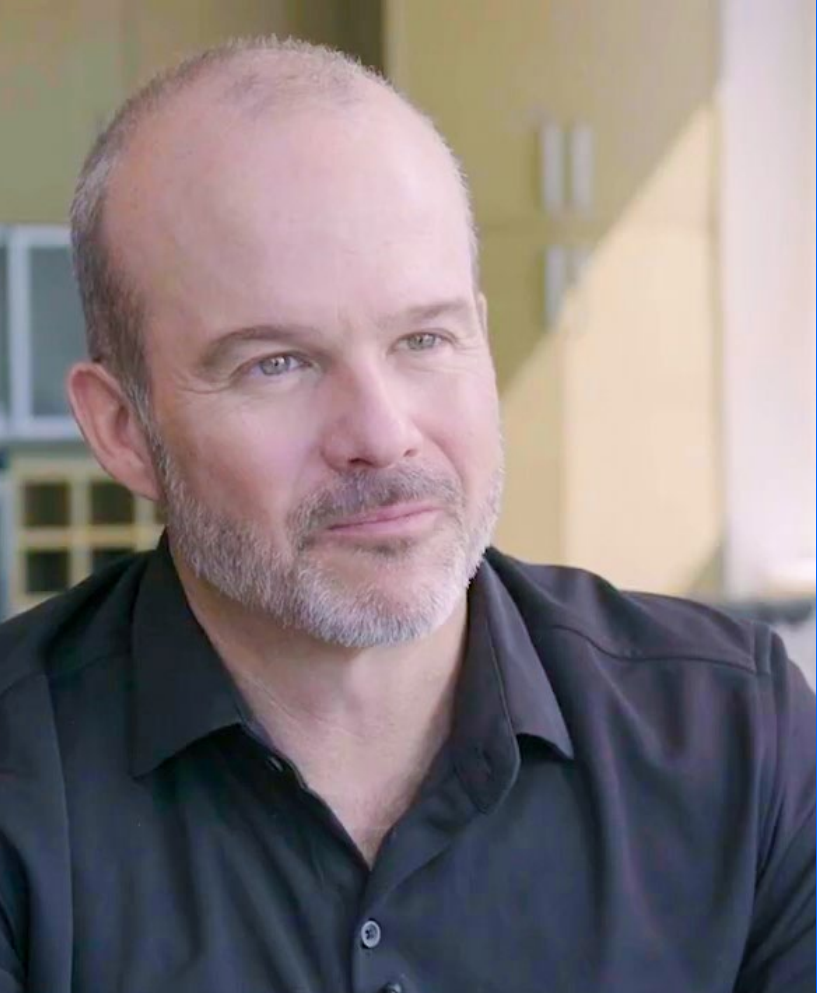
"By taking a hybrid multicloud approach, we create a geographically dispersed architecture that's better protected against cyberattack and bring transactions closer to users, keeping response times super-short."

Bill Stark
President of Cognition Foundry

Digital Asset Custody Services (DACS)

Smart contracts and crypto-asset technologies are set to transform the way enterprises across industries do business. Existing solutions tend to force people to choose between either security or convenience. For example, cold storage options generate and store assets in an offline environment. While this approach protects assets from cyber attackers, it slows down transactions. On the other hand, relying on exchanges or third-party wallets to manage digital assets means trusting that they will safeguard them adequately, and that there won't be any interruptions to their services.

To enable companies to protect and use their digital assets freely, Digital Asset Custody Services (DACS), a subsidiary of Shuttle Holdings, is working with IBM to create a first-of-its-kind servicing platform based on IBM LinuxONE™ servers and IBM Secure Service Container for IBM Cloud Private. Customers will have the choice to deploy the solution on-premises as part of a private cloud environment or as a service.

Read the case study →

"Using our platform, whether deployed on-premises or in the cloud, customers will be able to gain near-instant access to their digital assets. This is much faster than the lead time of 24 hours or more you get with cold storage options."

Brad Chun
Chairman and Chief Investment Officer at Shuttle Holdings, parent company of DACS

ICU IT Services

ICU IT Services, a Dutch IT infrastructure service provider, built a solution to capture new clients by merging the best of open-source and enterprise technology. Recognizing the growing popularity of open-source technology, the company saw an opportunity to tap into a new part of the marketplace. As an example of the innovation enabled by the IBM solution, ICU IT has created its own multi-architecture cloud environment using OpenStack solutions and IBM Cloud™ Private. This sophisticated cloud infrastructure incorporates both Intel and LinuxONE nodes and is integrated with the IBM z/OS environment.

Read the case study →

"IBM LinuxONE Rockhopper affords us the freedom to experiment and develop new ways of working, helping us to provide more effective services for our clients without compromising on security."

Johan Schelling
Infrastructure Solution Architect,
ICU IT Services

HCL

HCL Technologies, a Sweden-based IT services company, leverages their hybrid cloud environment to satisfy the needs of their customers. This is especially important since HCL's customers expect that their applications and private cloud services will support their increasing demands for performance, manageability and security. With no two customers alike, HCL Services is able to provide scalable, consistent, predictable and secure cloud services that their customers demand.

Read the blog →

"In the end, it is the efficiency of the LinuxONE design that facilitates HCL's ability to scale up, manage and control thousands of virtual machines on one machine. The advantages to HCL's clients are clear: faster delivery of enterprise applications and cloud services than in clusters of scale-out small servers."

Alf Thunberg
Associate General Manager
at HCL Technologies

Four steps to hybrid cloud readiness

1. Align your IT with C-suite business priorities and goals

— Understand C-suite business goals and align with strategic initiatives. You don't want to go into the meeting with inaccurate information. You'll want to align and talk to their needs.

— This could include:

- Technology priorities: modernize technology and build agility between teams. Be able to speak to how DevOps connects to cloud, data analytics to AI and data protection to security and resiliency.

- Business priorities: Delivering better customer experience, creating a digital business model, building AI training models, or implementing thorough security mechanisms to remain compliant with current regulations.

2. Choose an infrastructure mix of private cloud, public cloud, and on-premises traditional IT that fits your hybrid cloud plan

— Look at the workloads, data placement, and agility need

— Match workload requirements to platforms

— Choose an infrastructure-independent common operating environment that runs anywhere

— Leverage multi-architecture containers and interpreted languages in application development and deployment to achieve true portability of applications across the hybrid cloud

3. Share your plan with your leadership team

— Be direct and concise. State the key takeaways from your research efforts.
  - Key differences between public and private clouds
  - What an optimized hybrid cloud environment offers
  - Your hybrid cloud plan and next steps

— Prepare for the C-suite Q&A. This is your research and meeting, so make sure you are ready for any question that may come your way.

— Press for investment/clarify timeline. Time is of the essence, so this is a great opportunity to encourage investment urgency.

4. Conclude and reiterate the business value

— Restate the business benefits as a result of implementing a mature hybrid cloud solution.
  - Unify data to gain a single source of truth
  - Ensure applications are delivering accurate insights
  - Derive greater value from unstructured data to enable better business outcomes
  - Ensure greater business resilience
  - Deploy modern applications
  - Drive business satisfaction
  - Enable data scalability as business grows

— With the meeting over, be sure to have follow-up action items and encourage any and all feedback from stakeholders.

Embracing hybrid cloud

A hybrid cloud strategy is a huge advantage for any data-driven enterprise up to the challenge. Yet, a project of this scale demands more than a will to lead on digital transformation. It requires the tools to support your every move. With the right team, goals and solutions in place, your data-driven enterprise can benefit from the following:

— Cost reductions

— Added reliability

— Simpler data management

— More rapid provisioning

— Faster time to market for your products and services

IBM can help.

The combination of trusted expertise and technology, along with Red Hat's open hybrid cloud portfolio and partners can speed your enterprise transformation and growth.

To learn more about how IBM LinuxONE™ can help you, schedule a consultation or contact your IBM business partner today.

1. Jean Atelsek and Owen Rogers. "Secure Hybrid Cloud: The Strategic Approach to Enterprise IT." 451 Research, May 2019. https://www.ibm.com/downloads/cas/8APRAXO5

2. Larry Coyne, Joe Dain, Eric Forestier, Patrizia Guaitani, Robert Haas, Christopher D. Maestas, Antoine Maille, Tony Pearson, Brian Sherman and Christopher Vollmar. "IBM Private, Public, and Hybrid Cloud Storage Solutions." Redbooks. April 2018. http://www.redbooks.ibm.com/redpapers/pdfs/redp4873.pdf

3. See IBM Systems cryptographic HSMs https://www.ibm.com/security/cryptocards/hsms