



Understanding Hybrid Cloud With AWS



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Until now, building hybrid clouds has been complex and challenging, with the focus on trying to integrate legacy systems and architectures with cloud services. This required customers to maintain different infrastructure platforms, different application programming models, and separate tools between their on-premises and cloud environments. What customers have been asking for is to extend the cloud to where their on-premises

applications reside. To meet these demands, they need the same cloud infrastructure and services to be deployed wherever they need them, for a truly consistent hybrid cloud experience.

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Common hybrid cloud challenges

Organizations are moving their computing workloads to the cloud at a faster pace than ever before. IDC forecasts that worldwide spending on public cloud services and infrastructure will nearly double, to around \$500 billion, by 2023¹. But as organizations go through this digital and agile transformation, a lift and shift to the cloud for certain applications, services and operations just isn't possible. AWS has an extensive cloud service portfolio to address some of the most common use cases:

- **Low latency** – for use cases such as manufacturing automation, media and entertainment content creation, real-time gaming, financial trading platforms, electronic design automation, and machine learning inference at the edge.
- **Local data processing** – some datasets need to be processed locally, because they can't be easily migrated to the cloud due to cost, size, bandwidth, or timing constraints. Customers want a consistent hybrid cloud architecture to process data on premises and easily move data to the cloud for long-term archival.
- **Data residency** – security/tax regulations, data sovereignty, and geo-political dynamics can require customers to store data in a country, state, or municipality – often with financial services, healthcare, oil and gas, and other highly-regulated industries.
- **VMware cloud migration** – many enterprises who have made significant investments in VMware are looking to leverage those tools and skills as they start their migration to the cloud.
- **Enterprise cloud migration** – enterprise applications can be complex and require hybrid architectures when application components operate across both on premises and cloud.
- **Data center extension** – for use cases such as cloud bursting, backup and disaster recovery to the cloud.

Hybrid means more than just extending an existing data center to the cloud



AWS is reinventing what hybrid cloud means, by enabling AWS cloud infrastructure and services to be deployed into a range of locations. These could include the traditional data center, but now extending to branch offices, retail and hospitality sites, at the 5G mobile edge or other remote locations that require data capture, storage, and processing.

Organizations are becoming increasingly familiar with the benefits of running workloads in the cloud, where both hardware deployment and management are taken care of on their behalf. When you add in all the other benefits of cloud computing including lower cost, scalability, and increased flexibility, it's clear why there's such a strong desire for organizations to extend to these remote locations where their data processing is required to stay where it's generated.

What does this look like in practice? It can mean deploying cloud infrastructure and applications in locations where they never existed before, such as in a restaurant, an oil rig, inside the 5G cellular network or inside an organization's own data center or colocation facility. Organizations can use cloud infrastructure and services to achieve ultra-low-latency performance, process local data in specific geographic locations, or modernize legacy applications while keeping them on premises.

There are further advantages of extending the cloud to on-premises environments. By using a common set of tools, services, and APIs across the cloud and on premises, applications currently running in the cloud can be extended to anywhere the business needs it, without the need for costly re-platforming or refactoring. Equally, by using the same tools to deploy and manage workloads in all environments, operational overheads can be greatly reduced.

What are the challenges driving hybrid adoption?

True hybrid computing does bring challenges, but how can organizations access infrastructure that serves their unique use cases? How can it integrate edge resources with on-premises and cloud infrastructure, so that development and operational work is not duplicated? There is a need for hybrid services that provide:



Computing resources that meet specific use cases where they are needed most. for lower latency, data residency requirements or local data processing needs.



Consistency of infrastructure, service availability, and performance across all deployments wherever you need them. Whether they are based in an on-premises data center, colocation facility, factory floor, a retail store or a remote location where data is generated and managed. This would allow developers to build an application once and deploy it flexibly across the hybrid enterprise.



Simplified infrastructure deployment and management that minimizes operational risk, maintenance downtime, and time and resources spent on management and support.

AWS hybrid solutions meet your business demands

AWS is reinventing hybrid cloud by enabling customers to extend AWS cloud services to where they are needed – in their own facilities, at the mobile edge or in a remote or branch location. AWS hybrid services support business initiatives such as digital transformation and can have a positive impact on IT service levels and productivity. It allows IT teams to build differentiated services and create new or enhanced end user experiences.

Accelerating digital transformation and innovation

Many organizations are undergoing digital transformation, requiring legacy applications and services to be modernized to meet new and changing business demands. For some of these applications, deployment in a cloud region isn't possible, because of latency, data residency or other limiting factors. Being able to deploy new generation applications regardless of physical location brings greater flexibility, reduces time and effort for development teams and enables applications to be deployed where they are needed.

For IT teams, being able to drive innovation and launch new services aligned to the business needs demonstrates true value, with IT staff able to proactively approach new projects and innovate with hybrid solutions that leverage AWS cloud services.

Improving IT productivity

By harmonizing management of all your IT facilities across cloud, on-premises, and at the edge, IT teams gain significant benefit from using a single management platform, common tools, services, and APIs. Using AWS, a common set of administration tools, services and processes can be used by all staff regardless of where resources are deployed. This avoids the need to operate different management platforms depending on what and where services are running, saving time, resources, and having to maintain knowledge and skills across different environments.

Build differentiated services and improve end user experiences

Extending the cloud and deploying applications to edge locations, on premises or remote sites can dramatically improve services that are latency dependent. Latency can play a massive part in affecting the user experience, especially for applications involving interactivity including AR/VR, gaming, connected vehicles, smart factories and live video streaming. Build latency dependent applications with confidence knowing that they can be deployed right where they are needed – either on the factory floor, in a branch location, in a retail site, at a major sporting event or on a mobile device or VR headset.

Customer use cases

Morningstar



The Challenge:

Morningstar provides market data and information to investors, at both a corporate and individual level to help democratise investing for all. The IT leadership was seeking a way to empower its Dev Ops teams to enable them to innovate faster, by reducing the amount of time spent on managing on premises compute infrastructure. They wanted to maintain a culture of agile development and drive added value to the business by maximising the amount of time developers are developing new services.

The Solution:

Morningstar deployed AWS Outposts into its data center, shifting management of the underlying infrastructure to AWS and thereby freeing the development staff to focus their attention on building applications locally with the same familiar services and resources as found in the AWS Regions. This delivers a faster turn-around of projects by the developers, leading to faster time to market for new and innovative services to meet the needs of investors worldwide.



Tipico



The Challenge:

Tipico is an international sports bookmaker, whose primary business is centred around Germany and Western Europe. Tipico wanted to enter the US market to expand its business and so needed to understand and comply with US Gaming regulations, which require online bookmakers to maintain user data on premises, and within state boundaries. It had also recently shifted its legacy on-premises applications to the AWS Cloud, meaning new skills and methods have been adopted by the Tipico team.

The Solution:

Using AWS Outposts deployed into a US colocation facility, Tipico was able to launch its service into the US market using the same application stack, tools, services, and APIs as it was already familiar with. It was able to meet all the regulation requirements to expand its business into the new territory and has a simple method to replicate the solution into new locations as they expand the business.



The Challenge:

Riot Games needed to update its global architecture supporting its gaming servers to ensure fairness for its players. Differences in latency for differing players of a game seriously affects the user experience and can mean an unfair advantage depending on the player's proximity to the gaming servers. As Riot Games planned to launch a new game, it wanted to ensure fairness for its subscribers by addressing the latency issues that affects their users. It also wanted a way of being able to deploy extra capacity quickly into colocation facilities to support their planned rollouts.

The Solution:

Using AWS, Riot Games was able to rapidly deploy an Outposts rack into a remote site, and manage this as part of its global architecture, using the same tools, services, and APIs that they already use for applications deployed inside an AWS Region, saving time and administration for operations staff. For users, Riot Games was able to reduce latency by between 10-20 milliseconds, ensuring greater fairness for players and improving the gamer experience.

Introducing AWS services

AWS has the most extensive, performant, reliable, and secure cloud platform. Using global infrastructure, AWS provides the ability to distribute cloud computing and services anywhere you need them, wherever you are in the world.



AWS Regions and Availability Zones

A Region is a physical geographic location that has a cluster of AWS data centers within it. These data centers are known as Availability Zones (AZs) and are grouped in a minimum of three per Region to provide redundancy and to enable our customers to build resilient applications and services. An Availability Zone is one or more physically separated data centers that features redundant power, networking and low latency dedicated connectivity to the other AZs in the Region for synchronous replication of data and services.



AWS Local Zones

A Local Zone is an extension of an AWS Region into a metropolitan area, providing lower latency for demanding applications such as media and entertainment, content creation, gaming and other latency sensitive applications. Local Zones have many of the same services found in the AWS Regions such as compute, storage, database and content distribution enabling workloads to be deployed locally with secure connectivity back to the AWS Regions and the full range of services accessed using the same



AWS Outposts

AWS Outposts puts native AWS cloud infrastructure and services into almost any data center, colocation site or on premise facility. It extends the AWS Cloud, its services, and APIs to locations that have local computational needs. This could be to process data locally due to data volumes or bandwidth limitations, or because of latency to on-premises systems in situations such as in manufacturing or other dependent systems or services. Outposts can be deployed as full-size racks fitted with compute storage and networking, or alternatively as individual compute platforms for deployment into smaller remote or branch office locations.



AWS Wavelength

AWS Wavelength puts AWS compute and storage services at the edge of the 5G mobile phone network, enabling developers to build mobile applications with sub 10 millisecond latency serving mobile devices and end users with the next generation of mobile applications and experiences. Wavelength extends services found in the AWS Regions all the way to the mobile edge, enabling applications such as AR/VR, gaming, live video streaming and machine learning at the edge that would not be possible or a very poor experience because of the round-trip latency if deployed to an AWS Region.



AWS Snow Family

The Snow family consists of storage and compute devices designed to provide storage and compute services in remote locations without persistent network connectivity and where using Outposts or another hybrid service just isn't practical.

AWS Snowcone is the smallest unit, consisting of a portable rugged secure edge computing device designed to capture, process and transfer data in remote locations. Data can be transferred online using AWS Datasync, or offline by shipping the unit to AWS for upload. Snowcone is portable enough to be used in the field or small enough to be installed into a vehicle.

AWS Snowball is a larger portable edge computing device that comes in two options: Storage optimized or Compute Optimized. The Storage optimized unit features 40 vCPUs and 80TB of available block or S3 storage, for local data capture and large-scale data transfer. Compute optimized units feature 52v CPUs and 42TB of usable storage capacity, with an optional GPU for AI/machine learning workloads.

AWS Snowmobile is the largest and consists of a portable data center deployed in a shipping container, giving up to 100PB of data capacity. This is ideal for data center migrations, exabyte media migrations or extreme data transfers. Snowmobile connects as a secure network attached storage device, and once transferred to Snowmobile, the unit is driven to an AWS Region where the data is uploaded to Amazon S3.



VMWare Cloud on AWS

AWS is the preferred partner of VMWare for vSphere-based workloads. If your organization depends on VMWare, the AWS and VMWare partnership provides a simpler, faster and more cost-effective path to hybrid cloud, whilst leveraging your current VMWare skills and experience. It features native integrations between AWS and VMWare which are the result of longstanding co-operation between the two companies. Run VMWare Software Defined Data Center (SDDC) software on bare metal AWS infrastructure for superior performance and migrate workloads between your existing VMWare environment and VMWare Cloud on AWS with ease as a cold migration, a VM template migration or a live migration using vMotion.

VMWare Cloud on AWS puts enterprise class SDDC into AWS and provides customers with the ability to run private, public, and hybrid cloud environments with optimized access to the breadth of AWS services.



Amazon ECS/EKS and ECS/EKS Anywhere

Amazon ECS (Elastic Container Service) and Amazon EKS (Elastic Kubernetes Service) can be used to manage deployments in the Regions, on Outposts, Wavelength and in AWS Local Zones, but for those customers who need to integrate and harmonize their container environments across AWS and non-AWS platforms such as their own managed infrastructure, AWS offers ECS Anywhere and EKS Anywhere. Both extend the reach of container management into the customer's facilities to run on the customer's own infrastructure. This allows customers to deploy native container tasks in any environment spanning AWS and the customer's infrastructure, supporting low latency applications, and managed with a single control plane running in the cloud.

Hybrid solutions at AWS



Conclusion

AWS has a broad range of services that enable hybrid, allowing customers to extend the cloud to anywhere its needed. This brings the benefits of AWS Cloud to workloads and applications that have a geographic dependency because of latency, data volumes, data sovereignty or other limiting factors. Being able to deploy the same applications and services regardless of location, utilise the same management services, APIs, and resources regardless of where the infrastructure is deployed, and consolidating your IT management and operations can have a significant impact to productivity, user experience, operating expense and efficiency. By choosing the right hybrid architecture and AWS services to build out your hybrid cloud, you can deliver the next generation of applications, services, and capabilities your business needs to stay competitive.

NEXT STEPS

AWS offers all the advantages of hybrid cloud capabilities while still supporting the on-premises use cases of local data processing, low latency, and legacy application migration. Take the next steps to modernize your organization today with AWS' hybrid solutions.

Learn more about our AWS hybrid solutions:

<https://pages.awscloud.com/hybrid-cloud-outposts.html>



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