

Building Your Hybrid Cloud Strategy with AWS eBook

A Guide to Extending and Optimizing
Your Hybrid Cloud Environment



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Introduction

Optimizing IT Across Cloud and On-Premises Environments

Public sector organizations continue to do more with less, find ways to innovate and bring new ideas to their organizations while dealing with security and maintaining mission-critical legacy systems.

Evolving cloud capabilities are transforming the IT landscape for many public sector organizations, some use cases a hybrid cloud approach can help ease and accelerate a path to modernization and cloud adoption. For some use cases a hybrid cloud approach became a more feasible path to IT modernization and cloud adoption. For example, some customers have applications that require the lowest network latency possible, or they already achieve consistent and predictable performance in an on-premises environment, but want to use new cloud tools to enhance the application (e.g. Enterprise Resource Planning systems, real-time sensor data processing, industrial automation and transaction processing). Some customers may encounter unique challenges such as federal regulations associated with data residency, or limitations on their use of the cloud.

A hybrid cloud (the use of both on-premises and cloud resources), allows IT organizations to optimize the performance and costs of every application, project and system in either the cloud, on-premises datacenters, or a combination of both. AWS hybrid cloud solutions maximize the value delivered across all IT environments, by offering a common tool set to manage both environments, seamless communication between environments, and innovative cloud services that upgrade and modernize legacy on-premises systems. That's why an AWS hybrid cloud approach is ideal for:

- Organizations that want the latest cloud analytics and artificial intelligence tools, and need the scalability of the cloud.
- Organizations that demand greater operational flexibility and scalability. Data that needs to stay on-premises for compliance reasons can remain in your data center, while application development and testing, HPC, and capacity can take place in the cloud.

This eBook highlights the benefits of a hybrid cloud deployment, and shows readers how AWS can optimize their current or planned hybrid architectures. We will also detail the most commonly used AWS services in a hybrid environment, some popular use cases, and customer best practices. Finally, readers will learn about AWS's new hybrid cloud offering – AWS Outposts.



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VMware Cloud on AWS:
The Painless Path to Hybrid Cloud



Hybrid Cloud Benefits

During a time of transition, budgetary uncertainty, and competition for IT talent, all organizations must do more with less. Hybrid cloud deployments facilitate cloud adoption by giving IT organizations the flexibility to achieve a wide range of goals, including increased efficiency and reliability, high availability, security, and cost efficiency. Let's look at three benefits of establishing a hybrid cloud.

Accelerate Innovation

Hybrid clouds help IT organizations navigate an ever-changing technological landscape, and evolve. Cloud environments remove barriers to innovation, as large capital expenditures are no longer required for IT modernization or new service adoption. The build-out of these physical IT infrastructure deployments requires long lead times, high labor costs for installation and maintenance. This places pressure on IT teams in the form of capacity management and forecasting against uncertain variables. This is why much of IT budgets are absorbed by the maintenance of legacy systems, whether they serve the mission or not.

In a cloud environment, prototyping new concepts and testing them is done without upfront capital expenditures or long procurement cycles. A complete cloud stack and cloud-managed services can be deployed instantly anytime, since they're available on-demand, when and where they are needed. In addition, the portions of your deployment that are in the cloud also benefit from increased automation. Hybrid clouds allow IT resources to be deployed and commissioned in an automated process. These benefits help reduce time-to-value, and allow organizations to spend time on higher value added projects such as application optimization, or researching of newer technologies such as business intelligence analytics or artificial intelligence pilots.

Business Continuity

When it comes to cyber security, many IT organizations are aware of the vulnerabilities that are inherent in managing aging applications and legacy infrastructure. And business continuity is one of the most important elements of successful IT operations. A business continuity solution involves more than simply backing up and/or replicating content to the cloud. Business continuity is the ability to continue to run critical operations during a failure or disaster. It also means that when a failure or disaster happens, that data is accessible with little to no downtime.



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No downtime on learning
Prince William County Public Schools commitment to the cloud



Hybrid cloud architectures are a key component of any business continuity solution where critical data is replicated to the cloud in a different location than the primary system. Data is available in the event of a downtime event, accelerating time to operations and reducing the costs of such an event. To realize this benefit, hybrid backup and disaster recovery solutions must provide a common methodology for the backup of your applications and data in the cloud, as well as on premises.

Scalability and Speed of Response

Scaling traditional IT infrastructure can be expensive, inefficient, and requires accurate forecasting in growing organizations. A hybrid cloud environment can provide the opportunity to scale out to a cloud environment for specific workloads. And implementing automation rules in the cloud gives IT the ability to scale resources up and down dynamically, as organizational demands change. This allows a hybrid cloud architecture to take advantage of nearly unlimited IT resources based on demand-driven usage and pay-as-you-go pricing, while optimizing the IT environment for performance and efficiency.

A hybrid cloud environment allows for “bursting,” or the temporary allocation of cloud capacity for short periods, at a lower cost than using physical and owned IT resources. This helps prevent over-provisioning and resource abandonment when the instances (virtual servers in the cloud) are no longer needed. This scalability is ideal for dynamic, spikey, or unpredictable workloads. In addition, elastic resources allow IT to move workloads to the cloud at their own pace. You can move some workloads on a small scale and see what works for your organization. If the move is successful, then continue expanding from your datacenter at your comfort level. Lastly, cloud resources are ideal for data-intensive workloads such as data warehousing, big data analytics, or data lakes. Most organizations cannot keep pace with the influx of data from newer sources, so on-premises data storage and data processing solutions are less viable year over year.

With a cloud deployment, you can reduce the time it takes to create a service for your internal stakeholders, move data intensive workloads to the cloud, and you can create tools and templates that enable a self-service environment with guardrails to avoid future headaches.

Common AWS Hybrid Cloud Workloads

Most customers choose to move to the cloud in phases, at their own pace. Many of their first cloud migrations lean towards workloads that are less mission critical and serve as proof-of-concepts for business-critical application migrations in the future. Some of the entry-level use cases for a hybrid cloud include:

- Disaster Recovery/Backup
- Application Development and Testing
- Web Servers
- HR, Payroll, Active Directory, and Productivity Applications

Backup and disaster recovery is the most common use case as it serves two primary benefits. First, it allows you to use a non-production workload as a proof-of-concept for your initial entry into a cloud environment. Second, it allows you to create immediate value for your organization by elevating and testing your business continuity strategy.

A common hybrid cloud backup architecture is informally called disk-to-disk-to-cloud backup. Data from servers or appliances is backed up to an on-premises storage solution, and then a copy of this data is stored in the cloud for two layers of redundancy, as well as other locations for increased data resiliency and durability. This model is popular with organizations with a complex IT delivery model such as remote or branch locations, or co-location deployments.

Example: AWS Hybrid Cloud Backup



Case Study: Biblioteca de Catalunya Deploys a Hybrid Storage Environment with AWS



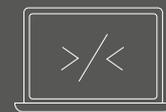
Biblioteca de Catalunya is a national library located in Barcelona, Catalonia, Spain, dedicated to collecting, preserving, and spreading Catalan linguistic and bibliographic heritage. The organization needed to preserve digitized materials and host documents in a publically accessible domain. It also needed to store and archive 26 TB of data and support 1 TB/month growth in database. Initially, Biblioteca de Catalunya chose an on-premises backup solution through another provider using remote replication, but found it was too expensive. The library looked for a cost-effective alternative and chose to migrate to AWS. Using a hybrid IT architecture, it created a backup and archive solution with cost-effective high availability. By using Amazon Glacier, Biblioteca de Catalunya has saved four times the costs compared to storing its 26 TB of data with its previous on-premises backup solution. The organization can also archive older media content reliably, and plans to move it to Amazon S3 for distribution when needed, giving it low-cost options for various retrieval needs, from a few minutes to several hours.

Application development and testing or “DevTest” is another popular use case, particularly in organizations focused on innovation. Many customers move their dev/test environments to the cloud to gain access to elastic and on-demand IT resources, while leaving their production application and database on premises. This helps with the integrity of your production environments, while also maintaining required latency between your database and application. In this model, you can provision full-stack environments in seconds with a cloud-hosted environment. This allows you to manage IT development and delivery across multiple programming languages and integrate with your preferred development tools. Depending on the applications being developed or moved, there may be hardware dependencies to be considered. AWS has infrastructure options based on the same Intel architecture many companies are running on-premises - providing a foundation for innovation ensuring the ultimate application portability and seamless data migration. Customers can also choose between using a managed database cloud service (DBaaS) to spin up a smaller database, to hosting data for their DevTest environment, or virtualizing a similar database on a cloud compute service. By using cloud-based tools, you benefit from improved task tracking, agile project management, life-cycle management, and additional team collaboration tools.



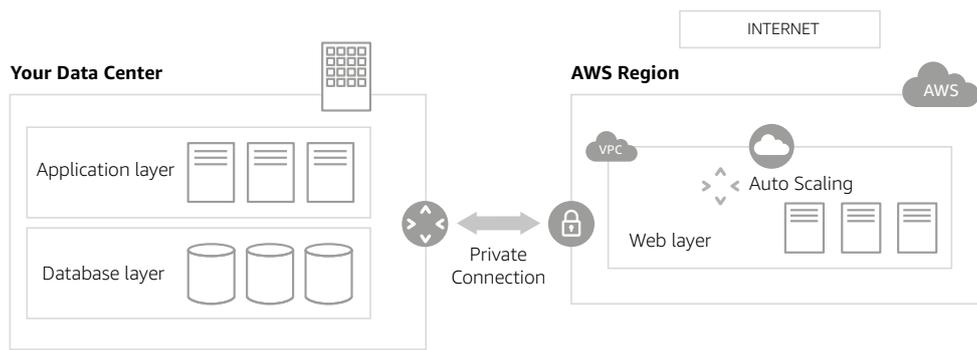
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Develop and Test Code on AWS



Third, customers move web servers to the cloud to take advantage of elastic compute resources. This allows a customer to leverage auto-scaling to right-size compute resources as demand spikes or declines. Organizations can also use the cloud for content delivery, placing their content closer to their end-users to reduce latency. This also adds another layer of business continuity as these customer-facing applications can be dispersed and stored across multiple locations to prevent a single point of failure. Whether customers migrate for elastic resources or for business continuity reasons, AWS built on Intel delivers industry-leading compute platform that supports the widest variety of enterprise, open, and cloud-native applications.

Example: Web Servers, Hybrid Cloud Architecture



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Running Microsoft Workloads in the AWS Cloud



Lastly, many customers are moving [first-workload applications](#) to the cloud as their entry point. These entry-point applications include Microsoft Active Directory, Microsoft SharePoint, Microsoft Exchange, and collaboration tools. Customers may also choose to move front-office workloads, such as CRM, or operational applications, such as HR and payroll. Moving these to the cloud will provide:

- Scalable resources for applications and ever-growing data consumption
- Improved accessibility – access data anywhere and from any device
- Improved business productivity
- Easier to address compliance
- Common compute architecture built on Intel delivering industry leading performance, security, and support for the widest set of Enterprise applications.

Second Phase AWS Workloads

The journey to the cloud is rarely accomplished in a single step. Many customers take years to migrate large portions of their data center to the cloud. Once a customer has moved traditional IT deployments, dev/test environments, and productivity applications, they are ready to start looking at advanced or mission-critical workloads. This next phase of hybrid cloud adoption includes:

- Databases and Data Warehouses
- Business Intelligence (BI) and Analytics
- Enterprise Applications such as ERP (Enterprise Resource Planning)
- HPC (High Performance Computing)

Hybrid Cloud Use Case #1:

Databases and Data Warehouses

Once a customer has moved their application development and test environment to the cloud, the next step is to move their production applications and associated databases. By moving their database to the cloud, customers will can take advantage of on-demand IT resources, automation, and ready-made templates for easier configuration. This greatly reduces the amount of administrative work required to bring a database online. The elasticity of the cloud lets users quickly scale compute and storage resources as demand on the database grows or contracts. And administrators can easily monitor databases for health and utilization, and when a database is no longer needed, it can be terminated quickly and automatically, lowering costs. Amazon EC2 instances deliver industry leading performance and scalability from Enterprise to cloud with the broadest validated and/or certified Database applications optimized for Intel processors minimizing operational costs required for cloud migration. And administrators can easily monitor database instances for health and utilization, and when a database instance is no longer needed, it can be terminated quickly and automatically, lowering costs.

Similarly, enterprise applications will benefit from cloud elasticity and built-in business continuity provided by the cloud. Organizations can quickly and programmatically back-up, mirror, or archive the data that powers your application and database. They can create snapshots so that when an anomaly occurs, they can return to a point of healthy operation and keep their application running. Lastly, IT does not need to worry about database management tasks such as server provisioning, patching, setup, configuration, backups, or recovery. Administrative tasks are greatly reduced, so IT can focus on higher value projects such as application fine-tuning, analytics, or enabling newer technologies such as big data or artificial intelligence and machine learning deployments.

Case Study: The United Nations Supports Mission Critical Websites with Enterprise Grade Performance from Amazon Aurora



The United Nations is an intergovernmental organisation, consisting of 193 member states, dedicated to promoting international cooperation on the issues of peace and security, human rights and sustainable development.

"At the UN, we operate multiple websites with global reach that require mission-critical reliability and consistent performance. We were able to achieve superb performance even with Amazon Aurora's smallest database engine. Amazon Aurora's new user-user-friendly monitoring interface made it easy to diagnose and address the issues. Its performance reliability and monitoring really shows Amazon Aurora is an enterprise grade ASW database"

Mohamad Reza

Information Systems Officer - United Nations

After databases, data warehouses are suitable for a move to the cloud, since they house massive amounts of data and become more viable and cost-effective when delivered in the cloud. Customers can maintain their mission-critical data on premises and create copies of datasets that are moved to a cloud data warehouse (a relational data repository that pulls together large volumes of data, from many different sources, for fast and complex data analysis) or data lake (a centralized repository that stores structured and unstructured raw data for analysis). This allows for data insights to be extracted faster, without impacting the golden copy of data resident on premises. Leveraging Intel Xeon Scalable Processors, Amazon EC2 instances deliver new opportunities for business insights through ground breaking technology such AVX512 to enable businesses to go further, faster.

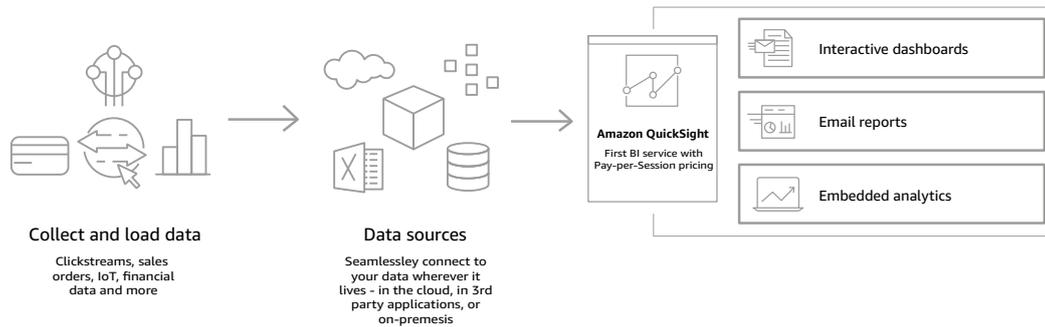
Moving your data to the cloud via a cloud data warehouse offers several benefits:

- **Easy to set up, deploy, and manage** – Data warehouses in the cloud are often simpler to use, enabling you to deploy a new data warehouse in minutes. They feature embedded automation for most of the common administrative tasks to manage, monitor, and scale your data warehouse.
- **Scale quickly to meet your needs** – Cloud data warehouse services enable you to scale from querying gigabytes to exabytes of data across your data warehouse and leverage cloud storage for your data lake deployment. Quickly analyze any size of data in with no loading or ETL (data extraction, transformation, and loading) required, and resize your data warehouse cluster with just a few clicks on the console or a simple API call. Scale up or down as your needs change. Extend your data insights through built-in capabilities of the Intel Xeon Scalable Processors to further your business insights and deliver new value to your business.
- **Faster Performance and lower cost** – See greater performance than on-premises data warehouse solutions. Use machine learning, a massively parallel architecture, compute-optimized hardware, and result-set caching to deliver high throughput and sub-second response times. Cloud data warehouse are less expensive than traditional data warehouses on premises. There are no upfront costs and you only pay for what you use.

Hybrid Cloud Use Case #2: Business Intelligence Analytics

A second common use case for hybrid clouds is the implementation of cloud-based, on-demand business intelligence and analytics services. Similarly to data warehousing in the cloud, customers can create a hybrid cloud model that leaves core data on-premises, and creates copies or data subsets for analysis and visualization in the cloud. Cloud analytics and BI solutions support real-time data analysis and IT benefits from a pay-as-you-go model, which reduces costs and time of deployment. Here are some examples of how adopting analytics can help organizations reduce costs:

Example: A Hybrid Cloud Big Data Analytics Model



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Healthdirect Australia My Architecture Video: Using AWS to Connect People with Healthcare

Learn how Healthdirect Australia created an analytics system that supports every health service, provider, and practitioner in Australia. The architecture is split into two sides—write-intensive and read-intensive—and leverages multiple AWS services including AWS Lambda, Amazon DynamoDB, Amazon Kinesis, Amazon S3, Amazon EMR, and Amazon Athena



Hybrid Cloud Use Case #3: Enterprise Workload Migration

The third most common trend is the migration of enterprise workloads to the cloud, or alongside and interacting with cloud-native tools, in a hybrid cloud configuration. Many customers are moving their Enterprise Resource Planning (ERP) deployments to the cloud, even moving mission-critical applications to take advantage of the latest cloud tools. The availability of on-demand, reliable access to external IT infrastructure makes cloud the new normal for IT organizations big and small. Amazon EC2 powered by Intel architecture deliver a foundation for seamless application portability, data mobility, and compelling total cost of ownership benefits across the broadest range of workloads and services – whether compute, networking, or storage.

There are many advantages to migrating an enterprise workloads, such as ERP, to the cloud. You are able to decommission aging infrastructure in favor of adopting a more flexible, on-demand operations model. Once the migration of your applications and data is complete, cloud-based IT resources can easily be added or reduced without penalty. And by relieving your staff from the tasks associated with maintaining hardware, employees are free to focus on projects that advance your mission.



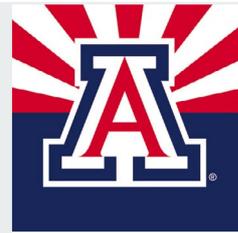
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Learn about the benefits of migrating ERP workloads to the cloud from the Portland Public Schools



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Getting Started on PeopleSoft: How the University of Arizona Began its PeopleSoft Transition



Case Study: Portland Public Schools Reduced Costs & Increased Performance by Moving Their ERP Workloads to AWS



"We discovered that end users had become so used to poor ERP system performance that they had simply stopped making formal complaints. After some investigation we determined that the underlying hardware was going to require a \$500K upgrade. By making use of AWS EC2 instances, we migrated our systems out to AWS resulting in a performance increase of 20 to 70%, and extending the life of the ERP investment by several years. This has allowed us to move away from an emergency replacement and engage a more thoughtful and thorough investigation and analysis of which system we would like to use next."

Travis Paakki
Senior Director, Department of Technology
Portland Public Schools

Hybrid Cloud Use Case #4: High Performance Computing

The final use case for hybrid cloud deployments is High Performance Computing (HPC). HPC is the use of large computing clusters (virtual servers) and parallel processing techniques to solve complex computational problems. HPC helps public sector organizations respond faster to emergencies, analyze fraudulent activity, and more accurately predict the weather. Life sciences and health care organizations also rely on HPC in the cloud for genomics analysis and research, imaging, and drug efficacy analysis. Many organizations are leaving their critical data, such as laboratory or clinical data, on premises and using cloud resources for the computation and analytics portion of the hybrid deployment. HPC on AWS enables engineers and researchers to develop faster applications and modernize code the broadest range of software tools, frameworks, and libraries optimized for Intel architecture.



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Architectures for HPC Workloads on AWS
Public Sector Summit



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Listen to the podcast

Cliff Addison (University of Liverpool)



AWS Hybrid Cloud Services

Across many hybrid cloud use cases you'll find a variety of AWS services to help you with your journey. For additional information, please reference the resources section at the end of the eBook.

Amazon Compute Services

Building and running your organization starts with compute – virtual servers and machines (VMs) in the cloud – whether you are building large, mobile apps, or running massive computing clusters (a set of loosely or tightly connected computers that work together) to sequence the human genome. AWS has over 70 infrastructure services with more than twice as many compute instance families, twice the compliance certifications, and the largest global footprint of any other cloud vendor. AWS compute services include:

Amazon Elastic Compute (Amazon EC2) – Secure and resizable compute capacity in the cloud. Launch applications when needed without upfront commitments.

AWS Lambda – A serverless compute service that enables you to run your code for virtually any type of application or backend service – with zero administration.

AWS Snowball Edge – Typically, Snowball Edge is used as data transfer and migration enabler, however, customers can also use this service to run compute on the edge in locations with limited connectivity.

Case Study: Managing Capacity and Security in a Hybrid World



The UK Driver and Vehicle Licensing Agency (DVLA) is using an API-based approach to empower people and organizations to create innovative applications and services with valuable public data. DVLA maintains the registration and licensing of more than 47 million driver records in Great Britain, as well as the collection and enforcement of Vehicle Excise Duty in the United Kingdom. The organization uses Amazon API Gateway to host and manage data APIs with the ability to scale to billions of transactions per month, and AWS Lambda for efficient, cost-effective operational tasks such as report generation.

A low cost, scalable, and secure place to store and backup data

Cloud storage is a critical component of cloud computing. Big data analytics, data warehouses, Internet of Things (IoT), databases, and backup and archiving applications rely on cloud data storage.

Amazon Simple Storage Service (Amazon S3) - A scalable, durable platform to make data accessible from any internet location, for user-generated content, active archive, big data storage or backup and recovery.

Amazon Elastic Block Store (Amazon EBS) - Persistent local storage for Amazon EC2, for relational and NoSQL databases, data warehousing, enterprise applications, Big Data processing, or backup and recovery.

AWS Storage Gateway - A hybrid storage cloud augmenting your on-premises environment with AWS cloud storage for bursting, tiering, or migration.

AWS Backup - A fully managed backup service that makes it easy to centralize and automate the back up of data across AWS services in the cloud as well as on premises using the AWS Storage Gateway.

Connect your physical network to your private virtual network to meet the needs of your application

AWS networking products enable you to isolate your cloud infrastructure, scale your request handling capacity, and connect your physical network to your private virtual network. AWS networking products work together to meet the needs of your application.

Amazon VPC - Isolate cloud resources with your own private virtual network.

AWS Direct Connect - Dedicated network connection between your network and your Amazon VPC.

Elastic Load Balancing - Automatically distribute application traffic across multiple Amazon EC2 instances in the cloud.

Amazon Route 53 - Highly available and scalable cloud DNS to connect user requests to your AWS resources.

Amazon CloudFront - Highly secure global CDN to get content to your viewers with low latency and high transfer speeds.

Keep your data and applications secure in the cloud

At AWS, cloud security is our highest priority. Customers benefit from data center and network architectures built to meet the requirements of the most security-sensitive organizations. The AWS Cloud provides you with a platform to scale and innovate, while still maintaining a secure environment. Some of the most common security services involved in hybrid cloud deployments include:

AWS Web Application Firewall (AWS WAF) – AWS WAF is a web application firewall that helps protect your web applications from common web exploits that could affect application availability, compromise security, or consume excessive resources.

AWS Shield - AWS Shield is a managed Distributed Denial of Service (DDoS) protection service that safeguards web applications running on AWS.

AWS GovCloud - AWS GovCloud (US) Regions were built for sensitive data and regulated workloads, including Controlled Unclassified Information, or CUI. AWS GovCloud (US) Regions give government customers and regulated commercial companies the flexibility to architect cloud solutions that comply with: the FedRAMP High baseline, the DOJ's Criminal Justice Information Systems (CJIS) Security Policy, U.S. International Traffic in Arms Regulations (ITAR), Export Administration Regulations (EAR), Department of Defense (DoD) Cloud Computing Security Requirements Guide (SRG) for Impact Levels 2, 4 and 5, and other compliance regimes. AWS GovCloud (US-East) and (US-West) Regions are operated by employees who are U.S. citizens on U.S. soil. AWS GovCloud (US) is only accessible to U.S. entities and root account holders who pass a screening process, where customers must confirm that they will only use a U.S. Person (green card holder or citizen as defined by the U.S. Department of State) to manage and access root account keys to these regions.

Fully managed for greater performance and scale at a lower cost

Cloud databases combine the performance and availability of high-end commercial databases with the simplicity and cost-effectiveness of open source databases. And these managed cloud databases automate time-consuming tasks like hardware provisioning, database setups, patching, and backups.

Amazon Relational Database Service (Amazon RDS) – Memory-optimized cloud database for performance or I/O, supporting six familiar database engines to choose from, including Amazon Aurora, PostgreSQL, MySQL, MariaDB, Oracle Database, and SQL Server.

Amazon Aurora – MySQL and PostgreSQL compatible relational database built for the cloud, that combines the performance and availability of traditional enterprise databases with the simplicity and cost-effectiveness of open source databases

Amazon DynamoDB – Key-value and document database that delivers single-digit millisecond performance at any scale.

Case Study: Arizona State University Replaces Oracle Database with Amazon Aurora for Lower Costs & Faster Time to Value



"We're using Amazon Aurora to cut reporting and extraction, transformation, and loading (ETL) time by a factor of over 10, replacing our Oracle workloads with a high-performance cloud database that delivers fast responses to our users. And, the new Amazon Aurora Serverless capability will help us reduce costs for non-production environments, giving us flexibility to support data warehouse and ETL processes with irregular usage patterns."

John Rome,
Deputy Chief Information Officer
Arizona State University

The broadest, and most cost-effective set of analytic services, purpose-built for a wide range of use cases

AWS delivers an integrated suite of services that provide everything needed to quickly and easily build and manage an analytics ecosystem.

Amazon Redshift – A fast, scalable data warehouse that makes it simple and cost-effective to analyze all your data across your data warehouse and data lake.

Amazon Athena – An interactive query service that makes it easy to analyze data in Amazon S3 using standard SQL. Athena is serverless, so there is no infrastructure to manage, and you pay only for the queries that you run.

Amazon EMR – A managed Hadoop framework that makes it easy, fast, and cost-effective to process vast amounts of data across dynamically scalable Amazon EC2 instances.

Amazon QuickSight – A fast, cloud-powered business intelligence (BI) service that makes it easy for you to create, publish and deliver insights to everyone in your organization.

VMware™ Cloud on AWS

VMware Cloud on AWS, an integrated cloud offering jointly developed by AWS and VMware, allowing organizations to seamlessly migrate and extend their on-premises VMware vSphere-based environments to the AWS Cloud. VMware Cloud on AWS simplifies and accelerates the migration of mission-critical production workloads to the cloud without conversion or re-architecture. You can leverage your existing VMware investments and tools, increase innovation, and deploy a hybrid cloud environment without complexity.

With VMware Cloud on AWS, organizations can simplify their hybrid IT operations by using the same VMware Cloud Foundation technologies (e.g. vSphere, vSAN, NSX, and vCenter Server) across their on-premises and cloud datacenters without having to purchase any new or custom hardware, rewrite applications, or adjust their operating models. The service automatically provisions infrastructure and provides full VM compatibility and workload portability between your on-premises environments and the AWS Cloud.

Key Benefits of VMware Cloud on AWS: Increased Innovation

VMware workloads running on the AWS Cloud have native access to a broad and rich set of AWS services including compute, database, analytics, IoT, AI/ML, security, mobile, resource deployment, application services, and more. Latency-sensitive applications hosted in VMware can now directly access databases on Amazon Aurora, Amazon DynamoDB or Amazon Redshift for petabyte-scale data analysis, as well as direct and secure access to low-cost S3 buckets, objects, and API functions.

Reduced Costs

VMware Cloud on AWS enables organizations to optimize the costs of operating a consistent and seamless hybrid IT environment. There is no custom hardware to deploy in your on-premises environment, and no need to rewrite or modify applications to shift to a hybrid cloud model. You can use VMware's management and policy tools across both on-premises and the VMware Cloud on AWS, so you have a unified and operationally consistent experience. These capabilities let you leverage all your existing investments to help save money and remove much of the complexity, risk and costs associated with moving to hybrid cloud.

Simplified Operations

With VMware Cloud on AWS lets IT use the same VMware Cloud Foundation technologies including vSphere, vSAN, NSX and vCenter Server, across both their on-premises and cloud environments. You can use the same tools you are using today, and keep the same VMware provisioning, storage, and lifecycle policies you use today. This means you can easily move applications between their on-premises environments and the AWS Cloud without having to purchase new hardware, rewrite applications, or modify your operations.

Enhanced Availability

VMware Cloud on AWS helps accelerate migration of VMware vSphere-based workloads to the highly available and scalable AWS Cloud. The service enables VMware-based workloads to run directly on the next-generation Nitro system-based Amazon EC2 bare metal (direct access to dedicated physical servers) infrastructure and provisioned in a single-tenant, isolated Amazon VPC. This approach allows organizations to take immediate advantage of the scalability, availability, security, and global reach of the AWS Cloud.

Getting Started

With the new time-bound Single Host SDDC starter configuration, you can now purchase a single host VMware Cloud on AWS environment with the ability to seamlessly scale the number of hosts up within that time, while retaining your data. A Single Host SDDC is our low-cost gateway into the VMware Cloud on AWS hybrid cloud solution. With production environments requiring a minimum three-host configuration, it is the perfect way to test your first workload and leverage the additional capability and flexibility of VMware Cloud on AWS for 30 days.

Learn More: VMware™ Technology Introductions and Architectural Deep Dives



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Hybrid Cloud Architectures with
VMware Cloud on AWS



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VMware Cloud on AWS Cloud
Migration Deep Dive Webinar



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This Is My Architecture:
Building VMware Cloud on AWS



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AWS Partner Story: State of Louisiana



AWS Outposts (Coming Soon): Run AWS Infrastructure On-premises for a Consistent Hybrid Cloud Experience

Can't move your data or applications to the cloud? AWS Outposts brings native AWS services, infrastructure, and operating models to virtually any data center, co-location space, or on-premises facility. You can use the same APIs, the same tools, the same hardware, and the same functionality across on-premises and the cloud to deliver a consistent hybrid experience. AWS Outposts are built using the same infrastructure used in AWS data centers. You get the same hardware security and performance you enjoy on AWS for your on-premises applications and eliminate the need to recertify your applications on different hardware. Outposts can be used to support workloads that need to remain on premises due to low latency or local data processing needs.



- AWS designed and fully managed infrastructure
- Develop once and deploy anywhere, without the need to recertify
- Deploy on-premises in datacenter or edge locations
- Run key AWS services locally
- Access to native AWS services
- Native access to full AWS service platform
- One consistent management plane across on-premises and cloud
- Choice of AWS or VMware control plane
- Ideal for low-latency and local data processing
- Industry leading performance built-on Intel Xeon Scalable processors, delivering a foundation for data and application migration.

AWS Outposts come in two varieties: 1) VMware Cloud on AWS Outposts allows you to use the same VMware control plane and APIs you use to run your infrastructure and 2) AWS native variant of AWS Outposts allows you to use the same exact APIs and control plane you use to run in the AWS Cloud, but on premises.



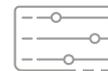
Low-latency Operations

Virtual Network Functions



Legacy Applications

Transaction Processing
ERP Applications Intel Xeon Scalable Processors provide the common compute foundation allowing portability and mobility of legacy and cloud-first applications



Financial Services

High Performance Analytics
Exchange Platforms
Fraud detection



Content Production and Distribution

Lossless Signal Ingestion,
Live Event Streaming



Real-time Inference

Processing Outdoor Sensor
Data



Industrial Automation

Manufacturing, Sensor
Control, Robotics

AWS Outposts infrastructure is fully managed, maintained, and supported by AWS to deliver access to the latest AWS services. You can order one or more servers, or quarter, half, and full rack units.

Extended AWS in-premises

Extended AWS On-premises AWS Outposts enable you to develop one and deploy in the AWS cloud or on-premises without having to rewrite your applications. With Outposts, you have the same hardware and software infrastructure and a consistent set of services and tools across your AWS cloud and on-premises environments to build and run modern, cloud-native applications anywhere, using industry proven and validated Intel Xeon Scalable processors.

Choice of management planes

AWS Outposts allow you to choose the AWS native variant of AWS Outposts or the VMware Cloud on AWS Outposts variant as your management plane for your API's, management console, automation, governance policies, and security controls for all your applications across the AWS cloud and on-premises locations.

Fully managed

AWS Outposts are fully managed and supported by AWS, and AWS automatically manages and updates AWS Outposts as part of its ongoing operations in the public AWS region. You do not have to worry about updating or patching infrastructure.

Future-proof infrastructure

AWS Outposts allow you to choose from a wide selection of compute, memory, and storage options based on your needs. Outposts can be easily upgraded with the latest hardware and next-generation instances to run all of your native AWS and VMware applications.

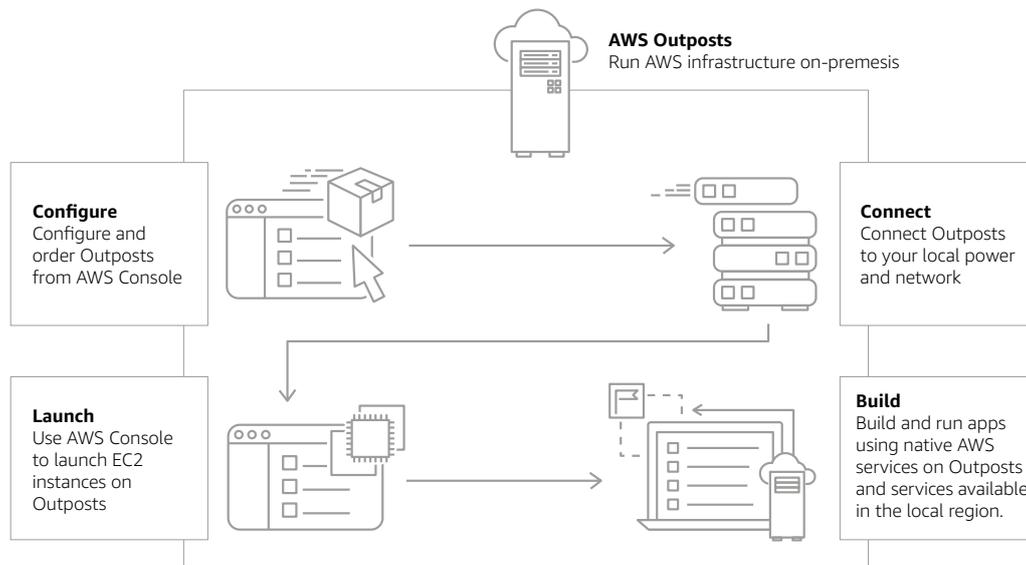


Learn More
Watch the Video

Video Introducing AWS Outposts



How AWS Outposts Works



Becoming Migration Ready

Migration Readiness and Planning (MRP) operationalizes the AWS Cloud Adoption Framework and consists of tools, processes, and best practices that prepare an organization for cloud migration. During the Migration Readiness and Planning (MRP) process, you will team with AWS Professional Services (ProServe) and/or a migration acceleration partner to build the foundation for a large-scale migration and gain experience migrating and operating several workloads on AWS. To prepare an operational cloud-based foundation, you will follow an agile approach with work streams for cloud center of excellence, landing zone, operation model, and security and compliance. In addition, we'll work with you to develop a strong migration plan and compelling business case that articulates the total cost of ownership (TCO) and return on investment (ROI) for a cloud migration.

AWS has also developed an online tool to help you assess your organization's current migration readiness. [The Cloud Adoption Readiness Tool \(CART\)](#) helps organizations of all sizes develop efficient and effective plans for cloud adoption and enterprise cloud migrations. This 16-question online survey and assessment report details your cloud migration readiness across six perspectives including business, people, process, platform, operations, and security. Once you complete a CART survey, you can download a customized cloud migration assessment that charts your readiness and what you can do to improve it. You may also request a formal Migration Readiness Assessment by the AWS Professional Services team or from one of our AWS Migration Partners.

AWS Professional Services

The AWS Professional Services (ProServe) organization is a global team that can help you realize your desired business outcomes with the AWS Cloud. We work closely with your team or your AWS partner to execute your enterprise cloud computing initiatives. Our ProServe team offers hands-on strategic planning and technical assistance with your large-scale cloud adoption projects. We also deliver focused guidance through our global specialty practices, which cover a variety of solutions, technologies, and industries.

Hybrid Cloud Enablement Partners

At AWS, everything we do starts with the customer. The AWS Partner Network (APN) is focused on helping partners demonstrate superior cloud expertise and deliver superb customer experiences. Our global community of APN Partners offers specialties to address a variety of customer needs. Look for an APN partner here. Or search for a Competency Partner by Solution, Workload, or Industry here.

Featured Partners:



VMware, an APN Advanced Technology Partner, enables organizations to flex and to harness new technology quickly without disrupting operations. It streamlines the journey for customers to become digital businesses that deliver better experiences for their customers, which in turn drives growth. VMware software helps business users simply and securely access the apps and data they need, from anywhere, to do their best work while supporting innovation at scale for competitive advantage. For more information, contact VMWare through their [website](#) or through its listing on the [APN Partner Solution Finder](#).



Successfully blending on-premises and cloud environments requires integration at various levels including network, security, application, and dashboard management layers. More sophisticated hybrid deployments may also integrate cross-cloud management and orchestration, workload balancing, storage, networking, and other infrastructure. AWS services built on Intel architecture and supported by Intel's robust ISV ecosystem delivers seamless application portability, data mobility, and compelling total cost of ownership benefits across the broadest range of workloads and services. Adopting a hybrid cloud strategy maximizes technology for strategic growth, because IT can leverage existing cloud expertise and economies in conjunction with legacy investments. With a combined on- and off-premises approach to cloud services, you can control costs, increase security, and improve performance. As much as 30–40 percent of traditional IT spending can shift to emerging technology initiatives that drive new revenue. Intel powers the cloud

with compatible processors, networking components, and solid-state drives, along with a rich portfolio of enabling technologies, easy-to-deploy cloud solutions, and a broad choice of industry collaborators. Intel powers the cloud with compatible processors, networking components, and solid-state drives, along with a rich portfolio of enabling technologies, easy-to-deploy cloud solutions, and a broad choice of industry collaborators. To launch and maintain a hybrid cloud, an enterprise needs: A high-performance, secure, cost-controlled platform ready for hybrid cloud advancement; an IT staff with specialized skills; a robust partner ecosystem that includes technology vendors and advisors, integration and deployment know-how, and support. Learn more here: [Cloud Solutions Provide a Competitive Advantage](#). For more information, contact Intel through their [website](#).

PRESIDIO™

Presidio is a leading IT solutions provider assisting clients in harnessing technology innovation and simplifying IT complexity to digitally transform their businesses and drive return on IT investment. Our Digital Infrastructure, Cloud and Security solutions enable our almost 7,000 middle market, enterprise, and government clients to take advantage of new digital revenue streams. See the [video](#) with AWS Phil Potloff, Head of Enterprise Strategy at AWS. For more information, contact Presidio through their [website](#).



Smartronix has been an AWS Premier Consulting Partner since 2009 and a VMware Partner since 2004. Smartronix built a worldwide team with the domain and technical expertise to deliver innovative, mission-critical cloud solutions for our customers. As a leader in securely implementing IT transformation through cloud technologies, our solutions help some of the world's largest highly regulated organizations successfully address the complexities of cloud migration, design, and security. The Colo-to-Cloud program is our latest offering to provide a single vendor solution that accelerates cloud migration, reduces costs, and manages their workloads in the cloud with optimal performance and predictable cost. For more information, contact Smartronix through their [website](#).



A recognized Oracle Platinum Partner and Oracle Standard Cloud Partner, Highstreet has been delivering solutions since 1997 with a sole focus on PeopleSoft and Oracle applications. Our managed application services are a complete business-driven application management solution that allows our customers to achieve high levels of performance, availability, agility, and control while reducing the costs of managing their applications. Due to a market shift and customer demand,

Highstreet now delivers their turnkey PeopleSoft hosting service leveraging AWS's cloud infrastructure. With the addition of the AWS portfolio, Highstreet is now able to build the hybrid cloud bridge for our customers providing for Public Cloud, Private Cloud, and On-Premise solutions. As customers demand more flexibility and cost efficiencies, Highstreet will continue to leverage AWS expanding portfolio of products to develop more integral solutions for our customers. For more information, contact Highstreet through their [website](#).



2nd Watch is an AWS Premier Consulting Partner in the AWS Partner Network (APN) providing managed cloud to enterprises. 2nd Watch provides professional services and managed services to organizations migrating or building new applications in the public cloud, with a core focus on optimization, DevOps, VMware Cloud on AWS, and Security. The company's subject matter experts, software-enabled services and cutting-edge solutions provide companies with tested, proven, and trusted solutions, allowing them to fully leverage the power of the cloud. 2nd Watch solutions are high performing, robust, increase operational excellence, decrease time to market, accelerate growth and lower risk. 2nd Watch is a new breed of partner which helps enterprises design, deploy and manage cloud solutions and monitors business critical workloads 24x7. 2nd Watch has more than 400 enterprise workloads under its management and more than 200,000 instances in its managed public cloud. The venture-backed company is headquartered in Seattle, Washington. For more information, contact 2nd Watch through their [website](#).

Conclusion

Many organizations are moving their workloads to the AWS Cloud to simplify infrastructure management, modernize applications, increase agility and innovate faster at a lower cost. In doing so, many customers are finding that a hybrid cloud approach provides the responsiveness and cost savings needed to support critical applications. Additionally, hybrid cloud environments transform IT departments into a more strategic function tied to an organization's mission, since IT professionals are freed from the heavy, undifferentiated lift of building out and maintaining on-premises infrastructure.

Additional Resources

AWS Migration Tools and Frameworks

- AWS Cloud Adoption Readiness Tool
- AWS Professional Services
- The AWS Cloud Adoption Framework
- AWS Migration Acceleration Program (MAP)
- AWS Well-Architected Framework
- AWS Migration Readiness Guide



AWS Hybrid Cloud Services

Computer

- Amazon Elastic Compute Cloud (Amazon EC2)
- AWS Lambda
- AWS Snowball Edge



Storage

- Amazon S3
- Amazon Elastic Block Store (Amazon EBS)
- AWS Storage Gateway
- AWS Backup



Networking

- Amazon VPC
- AWS Direct Connect
- Elastic Load Balancing
- Amazon Route 53
- Amazon CloudFront



Security & Compliance

- AWS Shield
- AWS Web Application Firewall (WAF)
- AWS GovCloud (US) Regions



Databases

- Amazon Aurora
- Amazon Relational Database Service (Amazon RDS)
- Amazon DynamoDB



Analytics

- Amazon Athena
- Amazon Redshift
- Amazon EMR
- Amazon QuickSight



Environment, Resource and Cost Optimization

- AWS Trusted Advisor



VMware on AWS Cloud

- VMware on AWS Cloud
- Single Host SDDC Access Request:
- VMware Cloud on AWS Blog

YouTube Channel Playlists:

- Customer stories
- Overview videos



AWS Outposts

- AWS Outposts

Hybrid Cloud & VMware Reference Architectures

- Reference Architecture: Backup and Restore to VMware Cloud on
- Reference Architecture: SQL Server on VMware Cloud on AWS
- Reference Architecture: SharePoint on VMware Cloud on AWS
- Reference Architecture: Hybrid Active Directory Trusted Domains