AWS Decision Guide

Choosing AWS migration services and tools

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Choosing AWS migration services and tools: AWS Decision Guide

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Choosing AWS migration services and tools

Taking the first step

Purpose	Help determine which AWS migration and transfer services are the best fit for your organization.
Last updated	December 29, 2023
Covered services	• AWS Application Discovery Service • AWS Application Migration Service • AWS Database Migration Service • AWS DataSync • AWS Direct Connect • AWS Migration Evaluator • AWS Migration Hub • Amazon S3 Transfer Acceleration • AWS Schema Conversion Tool • AWS Snow Family • AWS Storage Gateway • AWS Transfer Family

Introduction

Migration and modernization in the Amazon Web Services (AWS) cloud involves the process of relocating an organization's digital infrastructure, applications, and data to AWS. This shift allows you to not only modernize applications, but also use the range of scalable and secure cloud services and infrastructure offered by AWS to reduce reliance on physical hardware and optimize resource allocation.

The migration process typically begins with a comprehensive assessment of your existing IT assets and requirements, followed by strategic planning and architecture design to ensure an optimal

transition. This may involve re-hosting, re-platforming, or re-architecting applications to best use AWS services.

Once you have a migration plan in place, data is transferred to AWS, and applications are deployed in the cloud environment. Post-migration, ongoing management, monitoring, and optimization are crucial to maximize benefits.

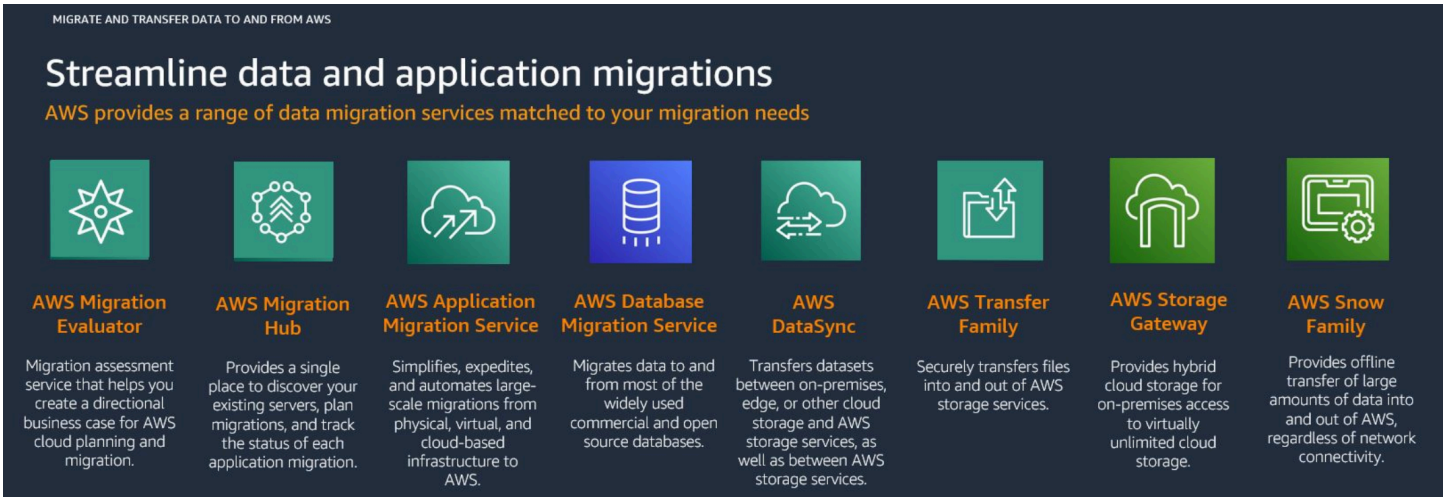
AWS offers a wide range of tools, resources, and support to help with this process, catering to diverse migration strategies, such as lift-and-shift, re-platforming, and refactoring. This guide is designed to help you choose the right tools and services to do your migration.

A four-minute video clip of a re:Invent 2023 presentation on migration and modernization.

Understand

Moving applications and data from on-premises infrastructure to AWS involves a strategic progression through key phases.

It starts with a phase of assessment and mobilization, where you build a business case for migrating to the cloud.



An assessment will take a snapshot of your current on-premises footprint to fine-tune licensing, view server and application dependencies, and deliver recommendations for migration and modernization scenarios.

In the mobilize phase, you'll build a strategy for optimizing infrastructure selection, creating landing zones and establishing cloud best practices within your team to begin a migration.

Here's more detail on each of those phases.

Assess and mobilize

The first phase of migrating on-premises workloads to AWS involves assessing your existing infrastructure and understanding the specific requirements. You can use tools such as AWS Migration Hub to create an inventory of applications and dependencies, or request a free migration assessment to build your business case. This initial step is crucial for formulating a comprehensive migration strategy. The AWS Migration Acceleration Program (MAP) can also help in the development of such a strategy.

Migrating applications and databases

In this phase, applications and databases are moved to AWS, and the migration strategy is executed. AWS provides services like Application Migration Service for large-scale application migration and AWS Database Migration Service (AWS DMS) for seamless migration of databases. The AWS Migration Hub is used as a central tool to recommend strategies and services, and track your progress. Organizations might choose to re-host (lift-and-shift) or re-architect applications for optimal performance in the cloud. The AWS Serverless Application Model (AWS SAM) aids in building serverless applications.

Hybrid cloud storage

To provide a smoother transition, you might choose to adopt a hybrid cloud storage approach during migration. AWS Storage Gateway can be used to provide integration of on-premises environments with cloud storage, enabling a unified data management strategy. This hybrid model is designed to offer data accessibility and availability, and help minimize disruptions during the migration process.

Online data transfer

For continuous operations, online data transfer mechanisms play a pivotal role. AWS DataSync, for instance, enables efficient and secure transfer of large datasets between on-premises environments and AWS storage services. This ensures minimal downtime and maintains data integrity throughout the migration.

Offline data transfer

If you need to transfer large volumes of data, offline methods may be the best way to do so. AWS Snowball devices are designed for this kind of scenario. They enable you to securely conduct

the physical transfer of terabytes to petabytes of data, mitigating bandwidth limitations and accelerating the migration of extensive datasets.

By navigating through these phases, you can realize the benefits of AWS, and make best use of the scalability, security, and services it provides, while minimizing disruptions to ongoing business operations.

Consider

In the domain of migration and transfer to AWS, organizations face a spectrum of challenges and concerns that AWS services are strategically designed to address. In the following, we will explore some of the criteria to consider for a timely, secure, and cost-effective migration to AWS.

Diverse migration scenarios

Migrating on-premises workloads to AWS demands a nuanced approach, primarily due to the diverse migration scenarios organizations encounter. These scenarios range from simple lift-and-shift migrations, where existing applications are moved with minimal changes, to more complex re-platforming or re-architecting, which involve optimizing applications for AWS services. Hybrid cloud deployments are another common scenario, allowing organizations to maintain on-premises infrastructure while leveraging AWS capabilities.

Furthermore, the choice between online and offline data transfer methods depends on data volume and network constraints. Organizations must assess their specific needs, balancing factors like downtime tolerance, cost-efficiency, and data integrity. Data sensitivity, compliance requirements, and industry regulations also influence migration strategies.

AWS offers a suite of tools and services to address this diversity, providing organizations with the flexibility to choose the most suitable migration approach for their unique circumstances. Navigating these diverse scenarios effectively ensures a successful transition to AWS, unlocking the full potential of cloud computing while aligning with organizational goals and constraints.

Minimizing downtime

Minimizing downtime is a critical consideration in migrating on-premises workloads to AWS, as any interruption in business operations can result in significant financial and operational setbacks. To achieve this, organizations employ several strategies.

First, they often opt for gradual migration approaches, such as the lift-and-shift method, where existing workloads are moved to AWS with minimal modification. This minimizes downtime but might not fully leverage AWS capabilities.

Second, implementing hybrid cloud solutions can maintain business continuity during migration. By keeping critical components on-premises while migrating non-essential workloads to AWS, companies can mitigate downtime risks.

Moreover, AWS offers tools like AWS DataSync and AWS Snowball to facilitate efficient data transfer, reducing the time data spends in transit during migration, thereby minimizing downtime.

Finally, thorough testing and validation of the migration plan are essential to identify potential issues before they impact production systems, ensuring a smoother transition with minimal disruption. Overall, minimizing downtime is a top priority in the migration process to AWS, enabling businesses to maintain operational efficiency throughout the migration journey.

Large data transfer challenges

Large data transfer poses a significant challenge in migrating on-premises workloads to AWS. When dealing with massive datasets, bandwidth limitations and time constraints become major concerns. AWS provides solutions to address these challenges.

For online data transfer, services like AWS DataSync employ optimized protocols to maximize data transfer speeds, reducing the time required to move data to the cloud. However, this method may still be insufficient for extremely large datasets or environments with limited bandwidth.

In such cases, offline data transfer methods, like AWS Snowcone and AWS Snowball, are invaluable. These physical devices enable organizations to transfer terabytes to exabytes of data securely. They are shipped to the organization, data is loaded onto them, and they are then returned to AWS for ingestion, overcoming bandwidth constraints.

Strategically combining these data transfer options helps organizations efficiently migrate large volumes of data to AWS while minimizing disruption to business operations and ensuring data integrity.

Database compatibility and heterogeneity

Database compatibility and heterogeneity present significant challenges during the migration of on-premises workloads to AWS. Organizations often rely on various database management systems, and ensuring seamless compatibility with AWS services is crucial.

AWS offers tools like AWS Database Migration Service (DMS) and AWS Schema Conversion Tool (SCT) to address these complexities. DMS supports the migration of a wide range of databases

to AWS, facilitating data replication with minimal downtime. SCT helps convert database schemas, ensuring they are compatible with AWS database services, which can vary in structure and behavior.

Additionally, AWS provides managed database services like Amazon RDS and Amazon Aurora, which are compatible with popular database engines, simplifying the migration process.

Nonetheless, organizations must carefully assess their database landscape, plan for potential incompatibilities, and choose the right AWS database service or conversion approach to maintain data integrity and functionality during migration.

File transfer workloads

Migrating file transfer workloads from on-premises environments to AWS requires thoughtful planning to ensure seamless data movement and continuity of operations. File transfer workloads often involve large volumes of critical data, which necessitates a well-executed strategy.

AWS offers services like AWS Transfer Family, which includes AWS Transfer for SFTP and AWS Transfer for FTPS, allowing organizations to easily migrate and manage file transfer workloads securely in the cloud. These services provide compatibility with existing file transfer protocols, reducing migration complexities.

Organizations may also leverage AWS DataSync for efficient, high-speed data transfers. It helps in synchronizing on-premises file systems with AWS storage services, minimizing downtime and ensuring data consistency.

Furthermore, optimizing network connectivity and bandwidth is crucial for maintaining file transfer performance during migration. AWS Direct Connect and AWS VPN solutions can help establish reliable connections between on-premises environments and AWS, addressing potential challenges related to latency and bandwidth limitations.

In summary, a well-structured plan, the right AWS services, and a focus on network optimization are key considerations to ensure a smooth migration of file transfer workloads to AWS, preserving data integrity and minimizing disruption.

Visibility and monitoring

Visibility and monitoring are crucial during migration to ensure a smooth transition of on-premises workloads to AWS. AWS Migration Hub plays a pivotal role in this regard by offering a centralized platform for tracking and managing the migration journey.

This tool provides organizations with real-time insights into the progress of their migration projects, allowing them to identify any bottlenecks or issues promptly. It offers visibility into the health and performance of migrated resources, ensuring that applications run smoothly in the cloud environment.

Furthermore, AWS Migration Hub enhances security by providing visibility into access control and auditing through AWS Identity and Access Management(IAM) and AWS CloudTrail. This ensures that security measures are maintained throughout the migration process.

In essence, AWS Migration Hub empowers organizations to make informed decisions, optimize their migration strategy, and maintain the integrity of their workloads. Its role in enhancing visibility and monitoring is instrumental in achieving a successful and secure migration to AWS.

Application capability

Ensuring that applications, especially legacy applications, are compatible with the cloud environment can be challenging. Ensuring that existing applications seamlessly function within the AWS Cloud environment is essential for a smooth transition. This often involves assessing and, if necessary, modifying applications to align with AWS services and infrastructure. AWS provides tools like the AWS Application Discovery Service and AWS Migration Hub to aid in this process.

Compatibility challenges may arise due to differences in operating systems, dependencies, or network configurations. Therefore, meticulous testing and validation are vital to identify and resolve any compatibility issues prior to migration. By addressing application compatibility proactively, organizations can minimize disruptions, maintain business continuity, and fully harness the benefits of the scalable and secure cloud infrastructure in AWS.

Dependency mapping

Dependency mapping, a crucial aspect of migrating on-premises workloads to AWS, involves identifying the intricate relationships and interdependencies between applications. These connections can be complex, encompassing data flows, service dependencies, and communication patterns.

AWS offers tools like the AWS Application Discovery Service and AWS Application Migration Service to assist in this process. These tools automatically discover, map, and document dependencies, providing organizations with a clear understanding of how different components interact.

By accurately mapping dependencies, organizations can make informed decisions about migration strategies, ensuring that all associated elements are moved together to maintain functionality. This reduces the risk of post-migration issues and helps organizations plan for the sequencing of migration activities, minimizing disruptions and downtime.

Performance optimization

Performance optimization is a vital consideration when migrating on-premises workloads to AWS. It involves assessing and enhancing the efficiency and speed of applications in the cloud environment. This process often starts with a thorough analysis of the existing application's performance characteristics, including resource utilization, latency, and scalability.

AWS provides various tools and services to aid in performance optimization, such as Amazon CloudWatch for monitoring, AWS Auto Scaling for dynamic resource allocation, and Elastic Load Balancing for distributing traffic. Additionally, AWS Trusted Advisor offers recommendations for cost optimization and performance improvement.

Security and compliance

Security and compliance are paramount when migrating on-premises workloads to AWS. Organizations must maintain data integrity, confidentiality, and compliance with industry regulations during and after migration. AWS offers a robust set of security services, including AWS Identity and Access Management (IAM), AWS Key Management Service (AWS KMS), and AWS Security Hub, to help organizations establish strong security postures.

Compliance with standards such as GDPR, HIPAA, and PCI DSS is simplified through AWS compliance programs and extensive documentation. AWS Artifact provides access to compliance reports, while AWS Config helps monitor and maintain compliance.

Furthermore, AWS provides tools like AWS Identity and Access Management (IAM) and AWS Key Management Service (AWS KMS) for fine-grained control over access and encryption of data. Implementing security best practices and conducting regular audits are essential to safeguard workloads during migration and beyond, ensuring a secure and compliant environment in AWS.

Testing and validation

Thorough testing is essential to validate that migrated applications function as expected in the new cloud environment. This includes performance testing, functionality testing, and security testing to identify and address any issues or discrepancies.

AWS offers a range of tools and services, such as AWS CodeBuild and AWS CodeDeploy, for automated testing and deployment of applications in the cloud.

Comprehensive testing and validation not only mitigate potential risks but also provide the confidence that the migrated workloads will perform as expected, minimizing disruptions and ensuring a successful transition to AWS. Regular testing and ongoing validation post-migration are also essential to adapt to changing business needs and maintain optimal performance and security.

Cost management

Managing costs effectively during and after migration is crucial for budget considerations. Organizations must carefully plan and optimize their cloud spending to maximize cost efficiency. AWS offers tools like AWS Cost Explorer and AWS Budgets to monitor and forecast expenses.

Cost management involves selecting the right AWS pricing models, such as On-Demand, Reserved Instances, or Savings Plans, based on workload usage patterns. Right-sizing resources and leveraging auto-scaling capabilities can help align costs with actual demand, avoiding overprovisioning.

Additionally, AWS Trusted Advisor provides recommendations for cost optimization, and AWS Cost Anomaly Detection can identify unusual spending patterns.

By proactively managing costs, organizations can harness the benefits of the scalability and flexibility in AWS while ensuring that their migration remains within budgetary constraints, optimizing return on investment in the cloud. Cost management is an ongoing process, and regular monitoring and adjustment are essential to control and optimize cloud expenditure over time.

Choose

Now that you have reviewed the key criteria to consider in your migration to AWS you are ready to start planning your migration and choosing the appropriate AWS services to assist in your migration:

- You will need to assess your existing infrastructure and create an inventory of assets to mobilize resources effectively.
- Will you be choosing a lift-and-shift strategy, re-platforming (that is, on-premises database to Amazon RDS), or modernizing your workloads by re-architecting?
- Will you operate in a hybrid mode, with some workloads remaining on-premises?
- What are your data transfer needs?

The following table will walk you through the relevant services on AWS that will help you to achieve a successful migration.

Migration category	What is it optimized for?	Migration services
Assess and mobilize	These services are optimized to accelerate decision-making and discover on-premises assets to plan your AWS migration.	AWS Migration Evaluator AWS Migration Hub AWS Application Discovery Service Optimization and Licensing Assessment
Migrate your applications	These services are optimized to simplify and expedite the migration on on-premises servers and databases to AWS.	AWS Application Migration Service AWS Database Migration Service AWS Migration Hub AWS Schema Conversion Tool
Hybrid cloud storage	These services are optimized for on-premises applications that require low-latency data access or rapid data transfer to the cloud.	AWS Storage Gateway AWS Direct Connect
Online data transfer	These services are optimized to make it simple and easy to transfer your data into and out of AWS via online methods.	AWS DataSync AWS Transfer Family Amazon S3 Transfer Acceleration
Offline data transfer	These services are optimized for transferring large (petabytes) of data to AWS	AWS Snowball

Migration category	What is it optimized for?	Migration services
	via offline methods when online methods wouldn't be feasible.	

Use

To explore how to use and learn more about each of the available AWS migration and transfer services, we have provided a pathway to explore how each of the services work. The following sections provide links to in-depth documentation, hands-on tutorials, and resources to get you started.

AWS Application Discovery Service

Setting up AWS Application Discovery Service

This guide will walk you through the steps to set up the Application Discovery Service for the first time.

Read the guide

Installing AWS Application Discovery Agent

This guide will show you how to install the Application Discovery Agent on your on-premises servers and VMs targeted for discovery and migration.

Get started with the guide

Getting started with Agentless Collector

This guide will show you how to get started with the Agentless Collector.

Get started with the guide

AWS Application Migration Service

Introduction to AWS Application Migration Service

This short video (1:35) gives a brief introduct ion to the AWS Application Migration Service

Watch the video

Getting started with AWS Application Migration Service

This guide will help you get started with the Application Migration Service including how to use it with the AWS Migration Hub.

Explore the guide

How to use the AWS Application Migration Service for lift-and-shift migrations

This blog posts shows you how to simplify your lift-and-shift migration using the AWS Application Migration Service.

Read the blog post

Automate setup of AWS Application Migration Service and Elastic Disaster Recovery

This blog post discusses how to combine the AWS Application Migration Service and the AWS Elastic Disaster Recovery Service to increase the resilience of your migrated workloads.

Read the blog post

AWS Application Migration Service best practices

This blog post shares best practices for accelerating and successfully implementing your migration using a highly automated

list-and-shift solution, AWS Application Migration Service.

Read the blog post

AWS Database Migration Service

Getting started with AWS Database Migration Service

In this guide, you will learn how to perform a database migration with the AWS DMS.

Explore the guide

Getting started with DMS Schema Conversion

In this tutorial, you will learn how to set up DMS Schema Conversion, create a migration project and connect to your data providers.

Explore the guide

Database migration Step-by-Step Walkthroughs

In this guide, you can find step-by-step walkthroughs that go through the process of schema conversion and data migration eight different source databases supported by the AWS Database Migration Service.

Explore the guide

How to migrate from Oracle to Amazon Aurora

In this hands-on lesson, you will migrate a legacy Oracle database to a cloud-native database with Amazon Aurora.

Start the lesson

AWS DataSync

Getting started with AWS DataSync

This guide focuses on getting started with DataSync using the AWS Management Console.

Explore the guide

Tutorial: Transferring data from on-premises storage to Amazon S3 in a different AWS account

In this tutorial, you will learn how to transfer data to from on-premises storage to an S3 bucket in a different account from the DataSync agent.

Start the tutorial

Tutorial: Transferring data from Amazon S3 to Amazon S3 in a different AWS account

In this tutorial, you will learn how to use DataSync to transfer data from an S3 bucket in one account to a another S3 bucket in a different account.

Start the tutorial

AWS Direct Connect

Using the AWS Direct Connect Resiliency Toolkit to get started

This guide discusses how to use the Direct Connect Resiliency Toolkit to help you determine and then place your order for the number of dedicated connections to achieve your SLA objective.

Read the guide

Continuous on-premises data migration with AWS Direct Connect

This guide discusses using AWS Direct Connect as part of an on-going data migration in a hybrid cloud deployment.

Read the guide

Working with Direct Connect Gateways

This guide shows how to use AWS Direct Connect gateway to connect your VPCs using either a transit gateway or a virtual private gateway.

Read the guide

AWS Migration Hub

Getting Started with AWS Migration Hub

This guide provides the information you need to get started with Migration Hub.

Explore the guide

Viewing network connections in Migration Hub

This tutorial shows you how to view network connections in Migration Hub to visualize a server's dependencies. The visualization of these dependencies helps you verify all of the resources required to successfully

migrate each of your applications to Amazon Web Services.

Start the tutorial

Analyze modernization incompatibilities using AWS Migration Hub Strategy Recommendations

This blog post explores in depth how AWS Migration Hub Strategy Recommendations analyzes your environment, what aspects it analyzes, and how to get the most of of the resulting anti-pattern reports.

Read the blog post

Migration Evaluator

Migration Evaluator Overview

This 30 minute AWS Skill Builder course explains how to use Migration Evaluator.

Take the training

Technical overview of Migration Evaluator

This guide outlines the types of data collected by the Migration Evaluator Agentless Collector.

Explore the guide

Collector installation guide

The guide is intended for system administrators, IT managers and/or technical staff to help install the agentless Migration Evaluator Collector.

Explore the guide

Amazon S3 Transfer Acceleration

Getting started with Amazon S3 Transfer Acceleration

This guide will demonstrate how to enable Transfer Acceleration on an S3 bucket and transfer data to and from the acceleration-enabled bucket.

Explore the guide

Amazon S3 Transfer Acceleration speed comparison tool

This guide will demonstrate how to enable Transfer Acceleration on an S3 bucket and transfer data to and from the acceleration-enabled bucket.

Explore the guide

Uploading large objects to Amazon S3 using multipart upload and transfer acceleration

This tool allows you to compare the speed of multi-part file uploads for various Amazon S3 regions with and without the use of Amazon S3 Transfer Acceleration.

Go to the tool

AWS Schema Conversion Tool

Getting started with AWS Schema Conversion Tool

This guide will show you how to convert a schema for a source database to a schema for any supported database hosted by AWS.

Explore the guide

Best Practices for AWS Schema Conversion Tool

This guide provides best practices and options for using the AWS Schema Conversio n Tool.

Explore the guide

Convert database schemas and applicati on SQL using the AWS Schema Conversion Tool CLI

This post demonstrates how to use the AWS SCT CLI to convert database schema object code and application SQL and PL/SQL code into PSQL in application files, as part of the migration process from an Oracle database hosted on Amazon Elastic Compute Cloud (Amazon EC2) to Amazon Aurora PostgreSQ L-Compatible-Compatible Edition.

Read the blog post

AWS Snow Family

Getting started with AWS Snowball Edge

This guide provides instructions for creating and completing your first AWS Snowball Edge device job in the AWS Snow Family Management Console.

Explore the guide

Best practices for accelerating data migrations using AWS Snowball Edge

This blog post discusses techniques and provides examples on how to speed up your data migration using one or more AWS Snowball Edge devices.

Read the blog post

AWS Storage Gateway

Getting started with AWS Storage Gateway (Amazon S3 File Gateway)

This guide provides instructions setting up S3 File Gateway and accessing it with Storage Gateway.

Get started with the tutorial

Getting started with AWS Storage Gateway (Amazon FSx File Gateway)

This guide provides instructions setting up FSx File Gateway and accessing it with Storage Gateway.

Get started with the tutorial

Data migration and cost saving at scale with Amazon S3 File Gateway

This blog walks through how Amazon S3 File Gateway helps migrate your data to the cloud while keeping metadata attributes intact, optimizing storage cost, and providing access to data in the cloud from on-premises application using standard SMB (Server Message Block) and NFS (Network File System) file protocols.

Read the blog post

AWS Transfer Family

What is AWS Transfer Family?

This guide provides an overview of the Transfer Family service.

Read the guide

Tutorial: Getting started with AWS Transfer Family server endpoints

Use this tutorial to get started with Transfer Family. You'll learn how to create an SFTP-enabled server with publicly accessible endpoint using Amazon S3 storage, add a user with service-managed authentication, and transfer a file with Cyberduck.

Get started with the tutorial

Tutorial: Setting up a managed workflow for decrypting a file

This tutorial illustrates how to set up a managed workflow that contains a decrypt

step. The tutorial also shows how to upload an encrypted file to an Amazon S3 bucket and then view the decrypted file in that same bucket. Get started with the tutorial	

Explore

Architecture diagrams

Explore reference architecture diagrams to help you develop your migration and transfer solutions on AWS.

Explore architecture diagrams

Whitepapers

Explore whitepapers to help you get started, learn best practices, and understand your migration and transfer options.

Explore whitepapers

Videos, patterns, AWS Solutions, and guidance

Explore additional architect ural guidance for common use cases for migration and transfer services.

Explore additional assets

Document history

The following table describes the important changes to this decision guide. For notifications about updates to this guide, you can subscribe to an RSS feed.

Change	Description	Date
Initial publication	Guide first published.	December 29, 2023