
AWS Prescriptive Guidance

A tools catalog for accelerating migration with automation



AWS Prescriptive Guidance: A tools catalog for accelerating migration with automation

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A tools catalog for accelerating migration with automation

Vandana Kumbla, Software Development Manager, AWS Professional Services

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Enterprise IT modernization and transformation can be complex, with many variations and scenarios for each organization. Automated processes and migration tools help streamline the activities, accelerate the pace, and lower risk.

Amazon Web Services (AWS) customers use multiple tools to aid with migrations. Some tools are purpose-built for migrations, and others are adopted from general operations and change management processes. This guide discusses several automation options that are available to you as you plan and implement your AWS migrations.

To compare migration tools for Discovery and Planning and for TCO and Business Case Analysis from AWS and AWS Partners, see [Migration tool comparison](#).

Automation options

AWS and AWS Partner Network (APN) Partners have released many services and tools that are part of the options explored in this guide. Each phase of the migration journey may offer multiple tool options, and this guide offers information to help you understand your choices and select the tool that best fits your scenario.

Although some migration tools can help streamline the process from end to end, there are also different, disconnected tools that come into play. Some phases and scenarios of migration—for example, discovery, assessment, rehosting migration scenarios—are more automated than others; for example, application re-architecture typically requires manual, specialized resourcing.

The following table provides a summary of tool options for different phases of migration. Several tools can be combined to provide automation across processes, using built-in data transition capabilities. Available tools and tool capabilities from AWS and AWS Partners iterate frequently, and more processes are covered by automation each month. This guide will be refreshed regularly to reflect the changes.

The engagement model for obtaining these tools and services can differ. Some of the services—for example, AWS Application Discovery Service, AWS Migration Hub, AWS Database Migration Service (AWS DMS), AWS Server Migration Service (AWS SMS), and the AWS Snow family of services—are available through the AWS Management Console. Some of the tools (marked by an asterisk in the following table) are available free to AWS consultants and AWS Partners who are working with customers on migration. Tools from AWS Partners can be procured through [AWS Marketplace](#) and are also available directly from Partners.

Assess	Mobilize	Migrate
<ul style="list-style-type: none"> • AWS Application Discovery Service (p. 8) • AWS Migration Hub (p. 8) • AWS Migration Readiness Assessment* (p. 8) • Migration Evaluator (p. 9) • AWS Migration Portfolio Assessment* (p. 9) • BMC Helix Discovery** (p. 12) • Cloudamize** (p. 12) • CloudChomp** (p. 13) • CloudHealth** (p. 13) • Deloitte ATAVision** (p. 13) • modelizeIT** (p. 14) • RISC Networks CloudScape** (p. 15) • Turbonomic** (p. 15) 	<ul style="list-style-type: none"> • AWS Control Tower (p. 9) • AWS Quick Starts (p. 10) • AWS Migration Hub (p. 8) • AWS Migration Pattern Library* (p. 10) • AWS Migration Portfolio Assessment* (p. 9) • BMC Helix Discovery** (p. 12) • Dynatrace** (p. 14) • Deloitte ATAVision** (p. 13) • modelizeIT ** (p. 14) • RISC Networks CloudScape** (p. 15) • NewRelic** (p. 14) • AppDynamics** (p. 12) • DataDog** (p. 13) 	<ul style="list-style-type: none"> • AWS Server Migration Service (p. 11) • AWS Migration Hub (p. 8) • AWS Transfer for SFTP (p. 12) • AWS DataSync (p. 11) • AWS Snow family (p. 11) • Amazon S3 Transfer Acceleration (p. 11) • AWS Database Migration Service (p. 10) • AWS Managed Services • CloudEndure (p. 10) • Datadog** (p. 13) • Deloitte ATAMotion** (p. 13) • Dynatrace** (p. 14) • New Relic APM** (p. 14) • Qlik Replicate** (p. 14) • RiverMeadow SaaS** (p. 15) • VMware HCX** (p. 15) • CloudHealth** (p. 13)

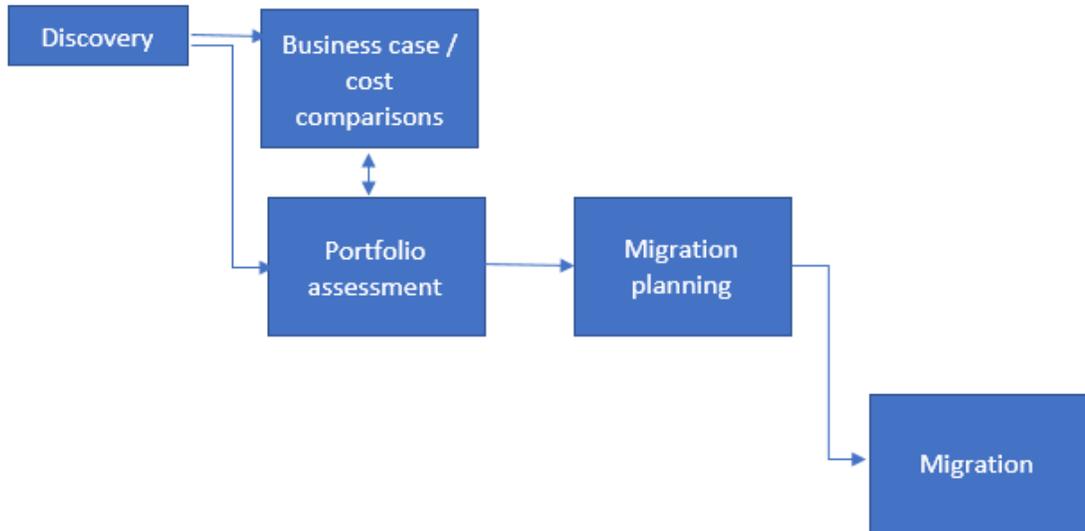
Assess	Mobilize	Migrate
<p>* Available free to AWS Consultants and AWS Partners working with you on your migration journey.</p> <p>** AWS ISV Partner solutions can be procured through AWS Marketplace. New tools and capabilities are added to AWS Marketplace on a regular basis.</p>		

To compare migration tools for Discovery and Planning and for TCO and Business Case Analysis from AWS and AWS Partners, see [Migration tool comparison](#).

Data flows

We recommend that you start the migration assessment process with an automated discovery and assessment of your current infrastructure. You can also complete early stage analysis by using available data from sources such as a configuration management database (CMDB) or other infrastructure and application catalogs that most enterprises already have.

The following diagram illustrates the data flow between tool capabilities.



Capability matrix

The following capability matrix lists AWS migration tools and the migration phases and sub-processes where they're used.

AWS services and tools (p. 8)										
Assess			Mobilize			Migrate and modernize			Operate and optimize	
Readiness	Portfolio discovery	Business case	Portfolio assessment	Plan application migration	Learn	Set up landing zone	Server	Database	Storage	Monitor usage
AWS Migration Readiness Assessment (p. 8)	✓									
AWS Migration Hub (p. 8)	✓		✓				✓			
AWS Application Discovery Service (p. 8)	✓									
Migration Evaluator (p. 9)	✓	✓								
AWS MPA and Application Migration Planning (p. 9)		✓	✓	✓						
AWS Control Tower (p. 9)						✓				
AWS Well-Architected (p. 9)					✓	✓				
AWS Quick Starts (p. 10)					✓	✓				
AWS Migration Pattern Library (p. 10)				✓	✓					
CloudEndure, an							✓			

AWS company (p. 10)				
AWS Server Migration Service (p. 11)		✓		
AWS Database Migration Service (p. 10)			✓	
AWS DataSync (p. 11)				✓
AWS Snow family (p. 11)				✓
Amazon S3 Transfer Acceleration (p. 11)				✓
AWS Transfer for SFTP (p. 12)				✓

The following capability matrix lists migration tools from AWS Partners, and the migration phases and sub-processes where they're used.

AWS Partner services and tools (p. 12)						
	Assess		Mobilize		Migrate and modernize	Operate and optimize
	Readiness discovery	Portfolio base	Portfolio assessment	Plan application migration	Learn Set up landing zone	Server Database Storage Monitor usage
AppDynamics (p. 12)						✓
BMC Helix Discovery (p. 12)	✓	✓	✓			
Cloudamize (p. 12)	✓	✓	✓	✓		✓
CloudChomp (p. 13)		✓	✓	✓		
CloudHealth (p. 13)		✓	✓	✓		✓
Datadog (p. 13)	✓		✓			✓
Deloitte ATAVision (p. 13)	✓	✓	✓			✓

Deloitte ATAMotion (p. 13)					✓		✓
Dynatrace (p. 14) ✓				✓			✓
modelizeIT (p. 14) ✓		✓		✓			✓
New Relic APM (p. 14)	✓						✓
Qlik Replicate (p. 14)						✓	
RiverMeadow SaaS (p. 15)							✓
RISC Networks CloudScape (p. 15)	✓	✓	✓	✓			
Turbonomic (p. 15) ✓		✓					✓
VMware HCX (p. 15)					✓		

To compare migration tools for Discovery and Planning and for TCO and Business Case Analysis from AWS and AWS Partners, see [Migration tool comparison](#).

Migration tools

This section provides brief descriptions of the tools listed in the [capability matrix \(p. 5\)](#), and links to more information about each tool.

- [AWS services and tools \(p. 8\)](#)
- [Partner tools and solutions \(p. 12\)](#)

To compare migration tools for Discovery and Planning and for TCO and Business Case Analysis from AWS and AWS Partners, see [Migration tool comparison](#).

AWS services and tools

AWS Migration Readiness Assessment (MRA)

Available with AWS Professional Services and AWS Partner services

AWS recommends a holistic assessment of a customer's transformation needs as part of the migration readiness assessment process. MRA consists of a series of questions against the AWS Cloud Adoption Framework (AWS CAF) perspectives. These questions are scored and help assess an organization's readiness for large-scale migration and digital transformation. The tool provides a detailed report of readiness, including a heat map and a scoring chart that help identify and plan opportunities for change. Guided by the tool, AWS Professional Services and some AWS Partners can conduct the detailed assessment in a short, direct engagement. You can use a preliminary self-assessment tool from AWS called Cloud Adoption Readiness Tool (CART) free of charge.

- [Product detail for CART](#)
- [Product detail for MRA](#) (requires login)

AWS Migration Hub

An AWS service

AWS Migration Hub provides a single location to track migration tasks across multiple AWS tools and partner solutions. With Migration Hub, you can choose the AWS and partner migration tools that best fit your needs while gaining visibility into the status of your migration projects. Migration Hub also provides key metrics and progress information for individual applications, regardless of which tools you use to migrate them.

- [Product information](#)
- [Product documentation](#)

AWS Application Discovery Service

An AWS service

AWS Application Discovery Service helps automate the discovery of servers and their dependencies. This service collects server specification information, performance data, and details of running processes

and network connections. Application Discovery Service offers both agent-based data collection and agentless collectors from VMware hosts.

- [Product information](#)
- [Product documentation](#)

Migration Evaluator

An AWS service

Migration Evaluator (formerly TSO Logic) discovers what a customer has on premises, how it's used, and how much it costs to operate—and then determines what the costs would be, with right-sizing, on AWS. Migration Evaluator accounts for physical and virtual servers as well as storage. It also analyzes Microsoft-specific workloads and makes suggestions for optimized Windows licensing strategies.

- [Product information](#)
- [Product documentation](#)

AWS Migration Portfolio Assessment (MPA)

Available with AWS Professional Services and AWS Partner services

Detailed portfolio assessment (server right-sizing, pricing, TCO comparisons, migration cost analysis) as well as migration planning (application data analysis and data collection, application grouping, migration prioritization, and wave planning) can be done online using Migration Portfolio Assessment. The service is available free of charge to all AWS consultants and AWS Partner consultants. Configuration management database (CMDB) and application portfolio data in varied formats can be imported into MPA with a web-based data ingestion process. MPA offers extensive configurability and enables experienced consultants to model customers' scenarios and generate data for business case analysis and migration planning.

- [Product access information](#) (requires login)

AWS Control Tower

An AWS service

AWS Control Tower helps set up and govern a secure, multi-account AWS environment based on AWS best practices. AWS Control Tower offers guardrails to enforce mandatory as well as recommended policies or to detect policy violations.

- [Product information](#)
- [Product documentation](#)

AWS Well-Architected

An AWS tool

AWS Well-Architected helps review the current state or proposed designs of your cloud architecture to ensure a high-performing and efficient application infrastructure. The review is performed across the five pillars of architecture: operational excellence, security, reliability, performance, and cost optimization.

- [Product information](#)
- [Product documentation](#)

AWS Quick Starts

An AWS resource

AWS Quick Starts provide AWS CloudFormation templates and step-by-step guides to help automate the setup of popular technologies and architecture patterns, and to ensure easy adoption of best practices.

- [Product access information](#)

AWS Migration Pattern Library

Available with AWS Professional Services and AWS Partner services

AWS Migration Pattern Library is a collection of migration patterns and AWS design patterns that can help you review and compare multiple migration options for different workloads.

- [Product access information](#)

CloudEndure

An AWS company

CloudEndure Migration simplifies, expedites, and reduces the cost of cloud migration by offering a highly automated lift-and-shift solution. CloudEndure Migration continually replicates your source machines into a staging area in your AWS account without causing downtime or impacting performance. When you're ready to launch the production machines, CloudEndure Migration automatically converts your machines from their source infrastructure into the AWS infrastructure so they can boot and run natively in AWS.

Important

CloudEndure Migration will be discontinued in all AWS Regions except for the AWS GovCloud (US), Mainland China (Beijing), and Mainland China (Ningxia) Regions on December 30, 2022.

[Learn more](#)

[AWS Application Migration Service](#) is the primary migration service recommended for lift-and-shift migrations to the AWS Cloud. Customers who currently use CloudEndure Migration or AWS Server Migration Service (AWS SMS) are encouraged to switch to Application Migration Service for future migrations.

AWS Database Migration Service (AWS DMS)

An AWS service

AWS DMS is a web service you can use to migrate data from your database that is on premises, on an Amazon Relational Database Service (Amazon RDS) DB instance, or in a database on an Amazon Elastic Compute Cloud (Amazon EC2) instance to a database on an AWS service. These services can include a database on Amazon RDS or a database on an EC2 instance. You can also migrate a database from an AWS service to an on-premises database. You can migrate data between heterogeneous or homogenous database engines.

- [Product information](#)

- [Product documentation](#)

AWS DataSync (DataSync)

An AWS service

DataSync is a data transfer service that automates moving data between on-premises storage and Amazon Simple Storage Service (Amazon S3) or Amazon Elastic File System (Amazon EFS). DataSync can transfer data at speeds up to 10 times faster than open-source tools and uses an on-premises software agent to connect to your existing storage or file systems using the Network File System (NFS) protocol. The service enables one-time data migrations, recurring data processing workflows, and automated replication for data protection and recovery. DataSync is a managed service, and you only pay for the data you transfer.

- [Product information](#)
- [Product documentation](#)

AWS Server Migration Service (AWS SMS)

An AWS service

AWS SMS combines data collection tools with automated server replication to speed the migration of on-premises servers to AWS. AWS SMS is an agentless service, which makes it easier and faster for you to migrate thousands of on-premises workloads to AWS. With AWS SMS you can automate, schedule, and track incremental replications of live server volumes, so you can coordinate large-scale server migrations.

- [Product information](#)
- [Product documentation](#)

Important

[AWS Application Migration Service](#) is the primary migration service recommended for lift-and-shift migrations to the AWS Cloud. Customers who currently use CloudEndure Migration or AWS Server Migration Service (AWS SMS) are encouraged to switch to Application Migration Service for future migrations.

AWS Snow family

AWS services

The AWS Snow family—AWS Snowball, AWS Snowball Edge, and AWS Snowmobile—transports large amounts of data physically at faster-than-internet rates to achieve successful migration of exabytes of data in a feasible timeframe. The snow devices are secured with AWS Key Management Service (AWS KMS) and are physically rugged containers that protect the data while in transit.

- [Product information](#)
- [Product documentation](#)

Amazon S3 Transfer Acceleration

An AWS service feature

Amazon S3 Transfer Acceleration enables fast, easy, and secure transfers of files over long distances between your client and an S3 bucket. Transfer Acceleration takes advantage of Amazon CloudFront's

globally distributed edge locations. As the data arrives at an edge location, it is routed to Amazon S3 over an optimized network path. When using Transfer Acceleration, additional data transfer charges may apply.

- [Product documentation](#)

AWS Transfer for SFTP (AWS SFTP)

An AWS service

AWS SFTP is a fully managed AWS service that enables you to transfer files over Secure File Transfer Protocol (SFTP), into and out of Amazon S3 storage. SFTP is also known as Secure Shell (SSH) File Transfer Protocol.

- [Product information](#)
- [Product documentation](#)

AWS Partner tools and solutions

AppDynamics

An AWS Partner solution

AppDynamics is an application intelligence platform with real-time insights into application performance, user experience, and business outcomes, as well as unified monitoring, troubleshooting, and analytics.

- [Product information](#)
- [Product access](#)

BMC Helix Discovery

An AWS Partner solution

BMC Helix Discovery uses a lightweight agentless method for discovery as well as integrations with a CMDB to create a dynamic, holistic view of data centers, cloud assets, and their relationships.

- [Product information](#)

Cloudfamize

An AWS Partner solution

The Cloudfamize analytics platform helps customers make data-driven cloud deployment decisions. Cloudfamize supports each phase of the cloud journey, from migration planning to ongoing cost/performance optimization, in order to maximize cloud ROI.

- [Product information](#)
- [Product access](#)

CloudChomp

An AWS Partner solution

CloudChomp's CC Analyzer is a decision-making tool that ensures IT infrastructure efficiency, establishes internal cost allocation procedures, and creates a blueprint for a successful cloud migration.

- [Product information](#)
- [Product access](#)

CloudHealth

An AWS Partner solution

CloudHealth Migration Assessment simplifies AWS migrations by analyzing workloads and making recommendations on cost, Amazon Elastic Compute Cloud (Amazon EC2) instance types, and reservations. When assets are in AWS, CloudHealth provides visibility, optimization, and governance of your cloud.

- [Product information](#)
- [Product access](#)

Datadog

An AWS Partner solution

Datadog is a monitoring service for large-scale applications that aggregates data across your entire stack. It includes over 200 integrations for troubleshooting, alerting, and graphing. Datadog offers an integrated view across legacy and cloud infrastructures.

- [Product information](#)
- [Product access](#)

Deloitte ATAVision

An AWS Partner solution

ATAVision is an automated discovery solution from Deloitte. It uses an agentless architecture to automate data collection, generate on-demand reports, and create deeper insights into your IT infrastructure, regardless of the platform. ATAVision also delivers application dependency mapping and affinity details for rapid IT transformation.

- [Product information](#)

Deloitte ATAMotion

An AWS Partner solution

ATAMotion is purpose-built for enterprise cloud migration with agentless deployment, automated transfer of live workloads to any target environment, and orchestrated infrastructure provisioning—all with minimal business disruption.

- [Product information](#)

DXC's Quick Transformation Engine (QTE)

An AWS Partner solution in mainframe modernization

DXC's QTE is a patented automatic code conversion tool that helps convert IBM mainframe (zSeries) and AS/400 (iSeries) languages such as COBOL, RPG, and JCL to Java. The code conversion guarantees functional equivalency without any changes to the generated code. There are no runtime licenses. DXC's mainframe modernization offering along with the QTE tool helps provide end-to-end services for an organization's application portfolio transformation, regardless of size, industry, or location, to the AWS Cloud.

- [Product information](#)

Dynatrace

An AWS Partner solution

Dynatrace artificial intelligence automatically learns how your application performs, visualizes all relevant data in real time, and understands the dependencies of your environment. You can use Dynatrace to get full operational insights into your stack.

- [Product information](#)
- [Product access](#)

modelizeIT

An AWS Partner solution

The modelizeIT solution discovers business applications and automatically maps the architecture of those applications in complex datacenters. This dramatically decreases migration risk, cost, and effort.

- [Product information](#)

New Relic APM

An AWS Partner solution

In a full or hybrid migration, New Relic application performance monitoring (APM) provides visibility into customer code and AWS services. This visibility is used to benchmark performance, troubleshoot, and see the impact of application and infrastructure changes.

- [Product information](#)

Qlik Replicate

An AWS Partner solution

Qlik (formerly Attunity) Replicate helps you automate bulk data loading from database sources such as Oracle, Microsoft SQL Server, and MySQL to Amazon Redshift, Amazon S3, Amazon EMR, Amazon RDS,

and Amazon EC2. Qlik enables you to avoid the heavy lifting of manually extracting data, transferring via API/script, chopping, staging, and importing.

- [Product information](#)
- [Product access](#)

RISC Networks CloudScape

An AWS Partner solution

CloudScape begins with agentless discovery that is designed to provide a complete view of your IT environment. This view contains network devices, routers, switches, Windows and Linux servers, and the relationships among these devices. CloudScape offers portfolio assessment and application migration planning capabilities that include automated dependency analysis and application grouping.

- [Product information](#)
- [Product access](#)

RiverMeadow SaaS

An AWS Partner solution

RiverMeadow SaaS uses AWS APIs and security features to provide high-performance, secure workload migrations into AWS. It offers an agentless, SaaS-delivered migration service for secure, efficient, and automated workload migrations.

- [Product information](#)
- [Product access](#)

Turbonomic

An AWS Partner solution

Turbonomic delivers workload automation for hybrid clouds by simultaneously optimizing performance, cost, and compliance in real time. Organizations can plan migrations, properly scale workloads, and migrate to AWS on time and on budget. Turbonomic is API-driven and runs as an agentless VM in AWS and on premises.

- [Product information](#)
- [Product access](#)

VMware HCX

An AWS Partner solution

[VMware Hybrid Cloud Extension \(HCX\)](#) enables you to migrate to AWS without having to retrofit your VMware infrastructure. It includes several migration methods that are detailed in the blog post, [Migrating Workloads to VMware Cloud on AWS with Hybrid Cloud Extension \(HCX\)](#). One of these methods, HCX vMotion, provides a live migration of a single VM with no downtime and high availability.

HCX is available free of charge to VMware Cloud on AWS customers.

- [Product information](#)

FAQ

This section provides answers to commonly raised questions about migration tools.

What does it cost to use migration tools?

AWS services that are purpose-built for migrations are currently offered free of charge. AWS Professional Services does not charge licensing fees for using AWS tools. AWS Partner tools are available directly from partners or from AWS Marketplace with licensing pricing. Most tools' pricing varies based on the size of the portfolio (for example, the number of servers) and the duration of use. For pricing information, see the product information and product access links for each tool listed in this guide.

How do I decide which tool best fits my scenario?

AWS and AWS Partners are innovating rapidly and building new tooling capabilities to address the many scenarios that come into play in migration, so tool selection can be challenging. This guide offers consolidated information that you can use to pick the right set of tools for your migration project. AWS Professional Services and AWS Partners have detailed hands-on experience with multiple tools and can offer assistance in your selection process.

To compare migration tools for Discovery and Planning and for TCO and Business Case Analysis from AWS and AWS Partners, see [Migration tool comparison](#).

How does AWS make it easier for me to access and use multiple tools?

[AWS Migration Hub](#) provides a single location for viewing and tracking your application migration. It integrates several AWS services and partner tools, and will continue to integrate additional tools to provide one-stop access to all migration automation. Migration tools from AWS and AWS Partners also offer data imports and data exports to ensure easy data flow between tools. For example, the [AWS Migration Portfolio Assessment \(MPA\) tool \(p. 9\)](#) (requires login) can directly access discovery data from ADS and can import CloudScape data easily with pre-mapped schema conversions.

AWS Prescriptive Guidance glossary

[AI and ML terms \(p. 18\)](#) | [Migration terms \(p. 19\)](#) | [Modernization terms \(p. 23\)](#)

AI and ML terms

The following are commonly used terms in artificial intelligence (AI) and machine learning (ML)-related strategies, guides, and patterns provided by AWS Prescriptive Guidance. To suggest entries, please use the **Provide feedback** link at the end of the glossary.

binary classification	A process that predicts a binary outcome (one of two possible classes). For example, your ML model might need to predict problems such as "Is this email spam or not spam?" or "Is this product a book or a car?"
classification	A categorization process that helps generate predictions. ML models for classification problems predict a discrete value. Discrete values are always distinct from one another. For example, a model might need to evaluate whether or not there is a car in an image.
data preprocessing	To transform raw data into a format that is easily parsed by your ML model. Preprocessing data can mean removing certain columns or rows and addressing missing, inconsistent, or duplicate values.
deep ensemble	To combine multiple deep learning models for prediction. You can use deep ensembles to obtain a more accurate prediction or for estimating uncertainty in predictions.
deep learning	An ML subfield that uses multiple layers of artificial neural networks to identify mapping between input data and target variables of interest.
exploratory data analysis (EDA)	The process of analyzing a dataset to understand its main characteristics. You collect or aggregate data and then perform initial investigations to find patterns, detect anomalies, and check assumptions. EDA is performed by calculating summary statistics and creating data visualizations.
features	The input data that you use to make a prediction. For example, in a manufacturing context, features could be images that are periodically captured from the manufacturing line.
feature importance	How significant a feature is for a model's predictions. This is usually expressed as a numerical score that can be calculated through various techniques, such as Shapley Additive Explanations (SHAP) and integrated gradients. For more information, see Machine learning model interpretability with AWS .

feature transformation	To optimize data for the ML process, including enriching data with additional sources, scaling values, or extracting multiple sets of information from a single data field. This enables the ML model to benefit from the data. For example, if you break down the "2021-05-27 00:15:37" date into "2021", "May", "Thu", and "15", you can help the learning algorithm learn nuanced patterns associated with different data components.
interpretability	A characteristic of a machine learning model that describes the degree to which a human can understand how the model's predictions depend on its inputs. For more information, see Machine learning model interpretability with AWS .
multiclass classification	A process that helps generate predictions for multiple classes (predicting one of more than two outcomes). For example, an ML model might ask "Is this product a book, car, or phone?" or "Which product category is most interesting to this customer?"
regression	An ML technique that predicts a numeric value. For example, to solve the problem of "What price will this house sell for?" an ML model could use a linear regression model to predict a house's sale price based on known facts about the house (for example, the square footage).
training	To provide data for your ML model to learn from. The training data must contain the correct answer. The learning algorithm finds patterns in the training data that map the input data attributes to the target (the answer that you want to predict). It outputs an ML model that captures these patterns. You can then use the ML model to make predictions on new data for which you don't know the target.
target variable	The value that you are trying to predict in supervised ML. This is also referred to as an <i>outcome variable</i> . For example, in a manufacturing setting the target variable could be a product defect.
tuning	To change aspects of your training process to improve the ML model's accuracy. For example, you can train the ML model by generating a labeling set, adding labels, and then repeating these steps several times under different settings to optimize the model.
uncertainty	A concept that refers to imprecise, incomplete, or unknown information that can undermine the reliability of predictive ML models. There are two types of uncertainty: <i>Epistemic uncertainty</i> is caused by limited, incomplete data, whereas <i>aleatoric uncertainty</i> is caused by the noise and randomness inherent in the data. For more information, see the Quantifying uncertainty in deep learning systems guide.

Migration terms

The following are commonly used terms in migration-related strategies, guides, and patterns provided by AWS Prescriptive Guidance. To suggest entries, please use the **Provide feedback** link at the end of the glossary.

7 Rs	<p>Seven common migration strategies for moving applications to the cloud. These strategies build upon the 5 Rs that Gartner identified in 2011 and consist of the following:</p> <ul style="list-style-type: none">• Refactor/re-architect – Move an application and modify its architecture by taking full advantage of cloud-native features to improve agility, performance, and scalability. This typically involves porting the operating system and database. Example: Migrate your on-premises Oracle database to the Amazon Aurora PostgreSQL-Compatible Edition.
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- Replatform (lift and reshape) – Move an application to the cloud, and introduce some level of optimization to take advantage of cloud capabilities. Example: Migrate your on-premises Oracle database to Amazon Relational Database Service (Amazon RDS) for Oracle in the AWS Cloud.
- Repurchase (drop and shop) – Switch to a different product, typically by moving from a traditional license to a SaaS model. Example: Migrate your customer relationship management (CRM) system to Salesforce.com.
- Rehost (lift and shift) – Move an application to the cloud without making any changes to take advantage of cloud capabilities. Example: Migrate your on-premises Oracle database to Oracle on an EC2 instance in the AWS Cloud.
- Relocate (hypervisor-level lift and shift) – Move infrastructure to the cloud without purchasing new hardware, rewriting applications, or modifying your existing operations. This migration scenario is specific to VMware Cloud on AWS, which supports virtual machine (VM) compatibility and workload portability between your on-premises environment and AWS. You can use the VMware Cloud Foundation technologies from your on-premises data centers when you migrate your infrastructure to VMware Cloud on AWS. Example: Relocate the hypervisor hosting your Oracle database to VMware Cloud on AWS.
- Retain (revisit) – Keep applications in your source environment. These might include applications that require major refactoring, and you want to postpone that work until a later time, and legacy applications that you want to retain, because there's no business justification for migrating them.
- Retire – Decommission or remove applications that are no longer needed in your source environment.

application portfolio

A collection of detailed information about each application used by an organization, including the cost to build and maintain the application, and its business value. This information is key to [the portfolio discovery and analysis process](#) and helps identify and prioritize the applications to be migrated, modernized, and optimized.

artificial intelligence operations (AIOps)

The process of using machine learning techniques to solve operational problems, reduce operational incidents and human intervention, and increase service quality. For more information about how AIOps is used in the AWS migration strategy, see the [operations integration guide](#).

AWS Cloud Adoption Framework (AWS CAF)

A framework of guidelines and best practices from AWS to help organizations develop an efficient and effective plan to move successfully to the cloud. AWS CAF organizes guidance into six focus areas called perspectives: business, people, governance, platform, security, and operations. The business, people, and governance perspectives focus on business skills and processes; the platform, security, and operations perspectives focus on technical skills and processes. For example, the people perspective targets stakeholders who handle human resources (HR), staffing functions, and people management. For this perspective, AWS CAF provides guidance for people development, training, and communications to help ready the organization for successful cloud adoption. For more information, see the [AWS CAF website](#) and the [AWS CAF whitepaper](#).

AWS landing zone

A landing zone is a well-architected, multi-account AWS environment that is scalable and secure. This is a starting point from which your organizations can quickly launch and deploy workloads and applications with confidence in their security and infrastructure environment. For more information about landing zones, see [Setting up a secure and scalable multi-account AWS environment](#).

AWS Workload Qualification Framework (AWS WQF)

A tool that evaluates database migration workloads, recommends migration strategies, and provides work estimates. AWS WQF is included with AWS Schema

	<p>Conversion Tool (AWS SCT). It analyzes database schemas and code objects, application code, dependencies, and performance characteristics, and provides assessment reports.</p>
business continuity planning (BCP)	<p>A plan that addresses the potential impact of a disruptive event, such as a large-scale migration, on operations and enables a business to resume operations quickly.</p>
Cloud Center of Excellence (CCoE)	<p>A multi-disciplinary team that drives cloud adoption efforts across an organization, including developing cloud best practices, mobilizing resources, establishing migration timelines, and leading the organization through large-scale transformations. For more information, see the CCoE posts on the AWS Cloud Enterprise Strategy Blog.</p>
cloud stages of adoption	<p>The four phases that organizations typically go through when they migrate to the AWS Cloud:</p> <ul style="list-style-type: none">• Project – Running a few cloud-related projects for proof of concept and learning purposes• Foundation – Making foundational investments to scale your cloud adoption (e.g., creating a landing zone, defining a CCoE, establishing an operations model)• Migration – Migrating individual applications• Re-invention – Optimizing products and services, and innovating in the cloud <p>These stages were defined by Stephen Orban in the blog post The Journey Toward Cloud-First & the Stages of Adoption on the AWS Cloud Enterprise Strategy blog. For information about how they relate to the AWS migration strategy, see the migration readiness guide.</p>
configuration management database (CMDB)	<p>A database that contains information about a company's hardware and software products, configurations, and inter-dependencies. You typically use data from a CMDB in the portfolio discovery and analysis stage of migration.</p>
epic	<p>In agile methodologies, functional categories that help organize and prioritize your work. Epics provide a high-level description of requirements and implementation tasks. For example, AWS CAF security epics include identity and access management, detective controls, infrastructure security, data protection, and incident response. For more information about epics in the AWS migration strategy, see the program implementation guide.</p>
heterogeneous database migration	<p>Migrating your source database to a target database that uses a different database engine (for example, Oracle to Amazon Aurora). Heterogeneous migration is typically part of a re-architecting effort, and converting the schema can be a complex task. AWS provides AWS SCT that helps with schema conversions.</p>
homogeneous database migration	<p>Migrating your source database to a target database that shares the same database engine (for example, Microsoft SQL Server to Amazon RDS for SQL Server). Homogeneous migration is typically part of a rehosting or replatforming effort. You can use native database utilities to migrate the schema.</p>
idle application	<p>An application that has an average CPU and memory usage between 5 and 20 percent over a period of 90 days. In a migration project, it is common to retire these applications or retain them on premises.</p>
IT information library (ITIL)	<p>A set of best practices for delivering IT services and aligning these services with business requirements. ITIL provides the foundation for ITSM.</p>

IT service management (ITSM)	Activities associated with designing, implementing, managing, and supporting IT services for an organization. For information about integrating cloud operations with ITSM tools, see the operations integration guide .
large migration	A migration of 300 or more servers.
Migration Acceleration Program (MAP)	An AWS program that provides consulting support, training, and services to help organizations build a strong operational foundation for moving to the cloud, and to help offset the initial cost of migrations. MAP includes a migration methodology for executing legacy migrations in a methodical way and a set of tools to automate and accelerate common migration scenarios.
Migration Portfolio Assessment (MPA)	An online tool that provides information for validating the business case for migrating to the AWS Cloud. MPA provides detailed portfolio assessment (server right-sizing, pricing, TCO comparisons, migration cost analysis) as well as migration planning (application data analysis and data collection, application grouping, migration prioritization, and wave planning). The MPA tool (requires login) is available free of charge to all AWS consultants and APN Partner consultants.
Migration Readiness Assessment (MRA)	The process of gaining insights about an organization's cloud readiness status, identifying strengths and weaknesses, and building an action plan to close identified gaps, using the AWS CAF. For more information, see the migration readiness guide . MRA is the first phase of the AWS migration strategy .
migration at scale	The process of moving the majority of the application portfolio to the cloud in waves, with more applications moved at a faster rate in each wave. This phase uses the best practices and lessons learned from the earlier phases to implement a <i>migration factory</i> of teams, tools, and processes to streamline the migration of workloads through automation and agile delivery. This is the third phase of the AWS migration strategy .
migration factory	Cross-functional teams that streamline the migration of workloads through automated, agile approaches. Migration factory teams typically include operations, business analysts and owners, migration engineers, developers, and DevOps professionals working in sprints. Between 20 and 50 percent of an enterprise application portfolio consists of repeated patterns that can be optimized by a factory approach. For more information, see the discussion of migration factories and the CloudEndure Migration Factory guide in this content set.
migration metadata	The information about the application and server that is needed to complete the migration. Each migration pattern requires a different set of migration metadata. Examples of migration metadata include the target subnet, security group, and AWS account.
migration pattern	A repeatable migration task that details the migration strategy, the migration destination, and the migration application or service used. Example: Rehost migration to Amazon EC2 with AWS Application Migration Service.
migration strategy	The approach used to migrate a workload to the AWS Cloud. For more information, see the 7 Rs (p. 19) entry in this glossary and see Mobilize your organization to accelerate large-scale migrations .
operational-level agreement (OLA)	An agreement that clarifies what functional IT groups promise to deliver to each other, to support a service-level agreement (SLA).
operations integration (OI)	The process of modernizing operations in the cloud, which involves readiness planning, automation, and integration. For more information, see the operations integration guide .

organizational change management (OCM)	A framework for managing major, disruptive business transformations from a people, culture, and leadership perspective. OCM helps organizations prepare for, and transition to, new systems and strategies by accelerating change adoption, addressing transitional issues, and driving cultural and organizational changes. In the AWS migration strategy, this framework is called <i>people acceleration</i> , because of the speed of change required in cloud adoption projects. For more information, see the OCM guide .
playbook	A set of predefined steps that capture the work associated with migrations, such as delivering core operations functions in the cloud. A playbook can take the form of scripts, automated runbooks, or a summary of processes or steps required to operate your modernized environment.
portfolio assessment	A process of discovering, analyzing, and prioritizing the application portfolio in order to plan the migration. For more information, see Evaluating migration readiness .
responsible, accountable, consulted, informed (RACI) matrix	A matrix that defines and assigns roles and responsibilities in a project. For example, you can create a RACI to define security control ownership or to identify roles and responsibilities for specific tasks in a migration project.
runbook	A set of manual or automated procedures required to perform a specific task. These are typically built to streamline repetitive operations or procedures with high error rates.
service-level agreement (SLA)	An agreement that clarifies what an IT team promises to deliver to their customers, such as service uptime and performance.
task list	A tool that is used to track progress through a runbook. A task list contains an overview of the runbook and a list of general tasks to be completed. For each general task, it includes the estimated amount of time required, the owner, and the progress.
workstream	Functional groups in a migration project that are responsible for a specific set of tasks. Each workstream is independent but supports the other workstreams in the project. For example, the portfolio workstream is responsible for prioritizing applications, wave planning, and collecting migration metadata. The portfolio workstream delivers these assets to the migration workstream, which then migrates the servers and applications.
zombie application	An application that has an average CPU and memory usage below 5 percent. In a migration project, it is common to retire these applications.

Modernization terms

The following are commonly used terms in modernization-related strategies, guides, and patterns provided by AWS Prescriptive Guidance. To suggest entries, please use the **Provide feedback** link at the end of the glossary.

business capability	What a business does to generate value (for example, sales, customer service, or marketing). Microservices architectures and development decisions can be driven by business capabilities. For more information, see the Organized around business capabilities section of the Running containerized microservices on AWS whitepaper.
domain-driven design	An approach to developing a complex software system by connecting its components to evolving domains, or core business goals, that each component serves. This concept was introduced by Eric Evans in his book, <i>Domain-Driven Design: Tackling Complexity in the Heart of Software</i> (Boston: Addison-Wesley

	<p>Professional, 2003). For information about how you can use domain-driven design with the strangler fig pattern, see Modernizing legacy Microsoft ASP.NET (ASMX) web services incrementally by using containers and Amazon API Gateway.</p>
microservice	<p>A small, independent service that communicates over well-defined APIs and is typically owned by small, self-contained teams. For example, an insurance system might include microservices that map to business capabilities, such as sales or marketing, or subdomains, such as purchasing, claims, or analytics. The benefits of microservices include agility, flexible scaling, easy deployment, reusable code, and resilience. For more information, see Integrating microservices by using AWS serverless services.</p>
microservices architecture	<p>An approach to building an application with independent components that run each application process as a microservice. These microservices communicate through a well-defined interface by using lightweight APIs. Each microservice in this architecture can be updated, deployed, and scaled to meet demand for specific functions of an application. For more information, see Implementing microservices on AWS.</p>
modernization	<p>Transforming an outdated (legacy or monolithic) application and its infrastructure into an agile, elastic, and highly available system in the cloud to reduce costs, gain efficiencies, and take advantage of innovations. For more information, see Strategy for modernizing applications in the AWS Cloud.</p>
modernization readiness assessment	<p>An evaluation that helps determine the modernization readiness of an organization's applications; identifies benefits, risks, and dependencies; and determines how well the organization can support the future state of those applications. The outcome of the assessment is a blueprint of the target architecture, a roadmap that details development phases and milestones for the modernization process, and an action plan for addressing identified gaps. For more information, see Evaluating modernization readiness for applications in the AWS Cloud.</p>
monolithic applications (monoliths)	<p>Applications that run as a single service with tightly coupled processes. Monolithic applications have several drawbacks. If one application feature experiences a spike in demand, the entire architecture must be scaled. Adding or improving a monolithic application's features also becomes more complex when the code base grows. To address these issues, you can use a microservices architecture. For more information, see Decomposing monoliths into microservices.</p>
polyglot persistence	<p>Independently choosing a microservice's data storage technology based on data access patterns and other requirements. If your microservices have the same data storage technology, they can encounter implementation challenges or experience poor performance. Microservices are more easily implemented and achieve better performance and scalability if they use the data store best adapted to their requirements. For more information, see Enabling data persistence in microservices.</p>
split-and-seed model	<p>A pattern for scaling and accelerating modernization projects. As new features and product releases are defined, the core team splits up to create new product teams. This helps scale your organization's capabilities and services, improves developer productivity, and supports rapid innovation. For more information, see Phased approach to modernizing applications in the AWS Cloud.</p>
strangler fig pattern	<p>An approach to modernizing monolithic systems by incrementally rewriting and replacing system functionality until the legacy system can be decommissioned. This pattern uses the analogy of a fig vine that grows into an established tree and eventually overcomes and replaces its host. The pattern was introduced by Martin Fowler as a way to manage risk when rewriting monolithic systems. For an</p>

two-pizza team

example of how to apply this pattern, see [Modernizing legacy Microsoft ASP.NET \(ASMX\) web services incrementally by using containers and Amazon API Gateway](#).

A small DevOps team that you can feed with two pizzas. A two-pizza team size ensures the best possible opportunity for collaboration in software development. For more information, see the [Two-pizza team](#) section of the [Introduction to DevOps on AWS](#) whitepaper.

Document history

The following table describes significant changes to this guide. If you want to be notified about future updates, you can subscribe to an [RSS feed](#).

update-history-change	update-history-description	update-history-date
Updated CloudEndure entry (p. 26)	Updated CloudEndure entry with more information about product availability.	May 9, 2022
Updated CloudEndure entry (p. 26)	Updated CloudEndure entry to recommend using AWS Application Migration Service instead of CloudEndure.	September 10, 2021
Updated tool name (p. 26)	TSO Logic is now Migration Evaluator.	November 6, 2020
Added new tool (p. 26)	We added DXC's QTE to the <i>AWS Partner tools and solutions</i> section.	August 7, 2020
Updated partner technologies (p. 26)	We updated the references to AWS Partner technologies in the Automation Options , Capability Matrix , and Tools sections.	February 28, 2020
Initial publication (p. 26)	—	August 5, 2019