Migration playbook for AWS large migrations

AWS Prescriptive Guidance

AWS Prescriptive Guidance: Migration playbook for AWS large migrations

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In a large migration, the migration workstream uses the wave plans and migration metadata supplied by the portfolio workstream in order to migrate workloads to the AWS Cloud. The migration workstream is responsible for submitting any change requests, migrating the application, coordinating application testing with the application owners, performing cutover, and monitoring the application through the hypercare period. In the first stage, initializing a large migration, you create the runbooks that the migration workstream uses to migrate the applications and servers. In the second stage, implementing a large migration, the migration workstream plans sprints and uses the migration runbooks in order to migrate and cutover the applications. For more information about core and supporting workstreams, see Workstreams in a large migration in the *Foundation playbook for AWS large migrations*.

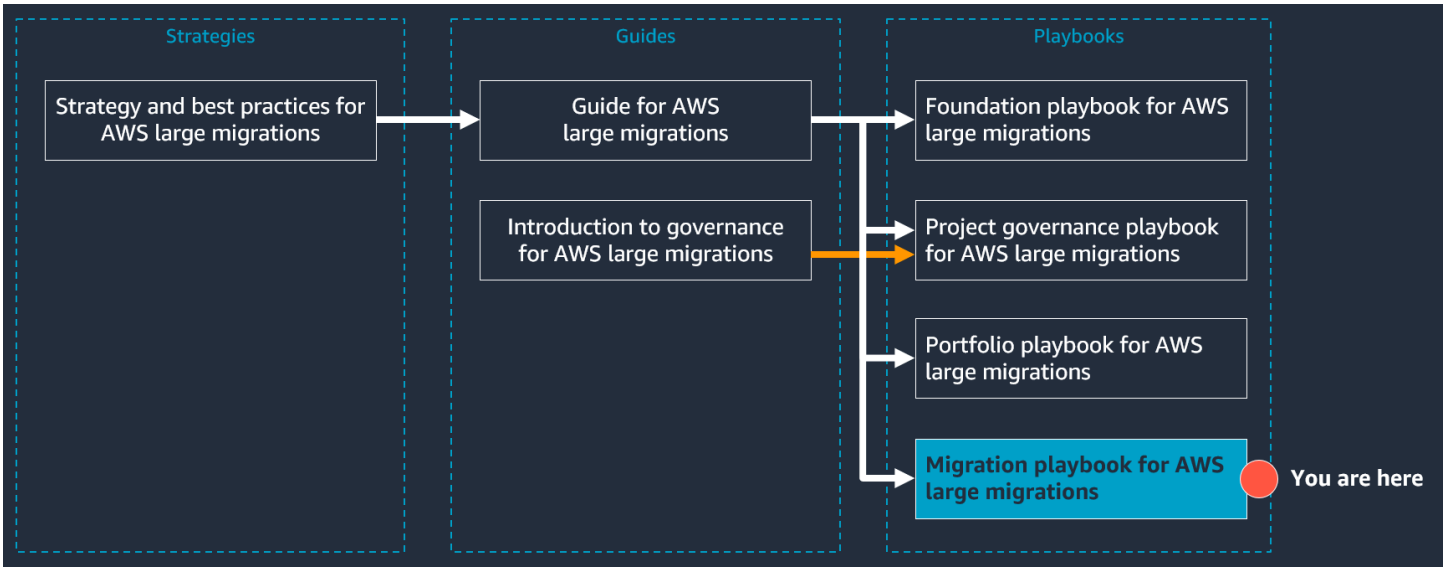
This migration playbook outlines the tasks of the migration workstream, which spans both stages of a large migration, initialization and implementation:

- In stage 1, *initialize*, you draft, test, and refine the runbooks, and then you automate manual tasks for each migration pattern.
- In stage 2, *implement*, you perform the migration with the predefined runbooks built in stage 1.

Guidance for large migrations

Migrating 300 or more servers is considered a large migration. The people, process, and technology challenges of a large migration project are typically new to most enterprises. This document is part of an AWS Prescriptive Guidance series about large migrations to the AWS Cloud. This series is designed to help you apply the correct strategy and best practices from the outset, to streamline your journey to the cloud.

The following figure shows the other documents in this series. Review the strategy first, then the guides, and then proceed to the playbooks. To access the complete series, see Large migrations to the AWS Cloud.



About the runbooks, tools, and templates

We recommend using the migration playbook templates and then customizing them for your portfolio, processes, and environment. The provided templates include standard processes, typical cutover processes, and placeholders for processes that are unique to your environment. The instructions in this playbook tell you when and how to customize each of these templates. This playbook includes the following templates:

- Rehost migration runbook template
- Rehost migration task list template

For migration patterns, from which you can build your own runbooks, see AWS Prescriptive Guidance migration patterns.

Migration runbooks require varying levels of detail:

- **Detailed runbooks** – Detailed runbooks are best suited for migration patterns that you will repeat many times. For these patterns, we recommend starting with the *Rehost migration runbook template* (Microsoft Word format). This template captures as many details as possible, including screenshots and step-by-step instructions, and it is designed to help multiple people perform the same task consistently.
- **Task List** – For migration patterns that are one-off or very simple, a short task list is a better option. For these patterns, we recommend starting with the *Rehost migration task list* template (Microsoft Excel format). This template contains a high-level task list and is typically used for

tracking and managing ownership of tasks. You can also use a task list to track the status of tasks that are documented in a runbook.

Whether you are using a detailed runbook or a short task list, verify that your runbook describes the tasks in sequence. For complex tasks, you can provide links to external documentation.

Stage 1: Initializing a large migration

In the initialize stage, the goal is to define standard operating procedures (SOPs) for the large migration, also known as *runbooks*. You build custom runbooks based on your company's policies and processes. If another team member is responsible for defining the runbooks in your large migration project, skip to Stage2: Implementing a large migration, where you will use the runbooks to prioritize applications and perform wave planning. Stage 1 consists of the following tasks and steps:

- Task 1: Validating the migration patterns and metadata
  - Step 1: Validate the migration patterns
  - Step 2: Validate the migration metadata and wave plan
- Task 2: Creating drafts of the migration runbooks
  - Step 1: Create a migration runbook draft for each pattern
  - Step 2: Update the migration runbooks with your policies and processes
- Task 3: Analyzing and testing your migration runbooks
  - Step 1: Conduct a walkthrough of each runbook
  - Step 2: Conduct a POC that tests each migration pattern
  - Step 3: Review and identify the gaps in the current migration runbook drafts
- Task 4: Improving your migration runbooks
  - Step 1: Update the migration runbooks and repeat the testing
  - Step 2: Automate repetitive tasks
  - Step 3: Build a migration task list

With the migration runbooks in place, in stage 2, the migration teams follow the procedures and perform large migrations that have predictable and measurable outcomes.

Task 1: Validating the migration patterns and metadata

In this task, you validate the migration patterns identified in the assessment and wave planning activities in the portfolio workstream, and then you validate the migration metadata source. The goal is to verify that sufficient data has been collected to support each migration pattern.

This task consists of the following steps:

Step 1: Validate the migration patterns

In the portfolio workstream, you performed an initial assessment of the application portfolio, selected migration strategies, and identified migration patterns for each strategy. This information should be contained in your portfolio assessment runbook. For more information, see the Portfolio playbook for AWS large migrations.

In this step, you review the migration strategies, verify that you have identified all migration patterns, and confirm that you are ready to draft migration runbooks. You might repeat this task throughout the project, and as your understanding of the portfolio matures, it is likely you will identify additional migration patterns in later stages of the migration.

1. **Review the migration strategies for the portfolio**

   A *migration strategy* is the approach used to migrate an on-premises application to the AWS Cloud. There are seven migration strategies for moving applications to the cloud, known as the *7 Rs*. Common strategies for large migrations include rehost, replatform, relocate, and retire. Refactor is not recommended for large migrations because it involves modernizing the application during the migration. This is the most complex of the migration strategies, and it can be complicated to manage for a large number of applications. Instead, we recommend rehosting, relocating, or replatforming the application and then modernizing the application after the migration is complete. For more information about the 7 Rs, see the Guide for AWS large migrations.

   Based on the output of the initial portfolio assessment, you have a list of all the required migration strategies for the portfolio and determined how much of the portfolio is allocated to each strategy. For example:

   - Rehost – 70%
   - Replatform – 20%
   - Retire – 10%

2. **Verify that the migration patterns for the portfolio**

   A *migration pattern* is a repeatable migration task that details the strategy, the destination, and the application or service used. In this step, you verify that the migration patterns include

detailed information, such as which tools to use and which AWS services are targeted. For example:

- Rehost to Amazon Elastic Compute Cloud (Amazon EC2) by using AWS Application Migration Service (AWS MGN) or Cloud Migration Factory
- Replatform to Amazon EC2 by using AWS CloudFormation templates to build new infrastructure in the AWS Cloud
- Replatform to Amazon Relational Database Service (Amazon RDS) by using AWS Database Migration Service (AWS DMS) or a native database technology

In the Portfolio playbook for AWS large migrations, you map each migration pattern to its migration strategy and document the results in a table like the following example.

Strategy	Pattern
Rehost	Rehost to Amazon EC2 by using Application Migration Service or Cloud Migration Factory
Replatform	Replatform to Amazon RDS by using AWS DMS or a native database technology
Replatform	Replatform to Amazon EC2 by using CloudFormation templates to build new infrastructure in the AWS Cloud

Step 2: Validate the migration metadata and wave plan

In this step, you validate the source location of the migration metadata. You check that the data structure, such as the available columns in an Excel document, is suitable to hold the required metadata, and you check that all the metadata is available.

1. **Validate the migration metadata for your migration patterns**

   Each migration pattern needs a different set of migration metadata in order to migrate the servers and apps. For example, a rehost migration to Amazon EC2 requires that you provide specifications for the target instance, such as the VPC subnet, security group, and instance type information. However, a storage migration, database migration, or replatform migration requires

a different set of migration metadata. You typically define migration metadata requirements in the portfolio assessment runbook, but you need to make sure that you have sufficient metadata to support each of your migration patterns. For more information about metadata identification and collection, see the Portfolio playbook for AWS large migrations.

2. **Validate the source location of the migration metadata and the wave plan**

   You typically document the source location of the migration metadata in your metadata management runbook. Ideally, the location acts as a single source of truth, such as a wave-planning spreadsheet. It is also possible that the metadata is still in multiple places, including the following common locations:

   Validate the following for the metadata source location:

   - Discovery tool
   - Configuration management database (CMDB)
   - App owner questionnaire
   - Migration wave-planning spreadsheet

   Validate the following for the metadata source location:

   a. Is the source catalog being maintained with locations of all metadata sources and owners?

   b. Does the source location (for example, wave-planning spreadsheet) have all the required migration metadata?

   c. Are there clear instructions for accessing each metadata source?

   d. If there is no single source, is each metadata source clearly mapped to its attributes?

   e. Is there a clear wave plan for the servers and apps, and are at least five waves ready for the migration workstream?

   f. Is there a process to update the sources? If so, what is the frequency and notification process?

Task exit criteria

When you have met the following exit criteria, proceed to the next task:

- You have validated the list of clearly defined migration patterns.
- The source location of the migration metadata has all the required metadata for each pattern, or a process is in place to capture any missing metadata.

- You have validated the wave plan and migration metadata for at least five waves, and you have defined a process for notifications and updates.

Task 2: Creating drafts of the migration runbooks

In this task, you draft and review migration runbooks for each migration pattern. For example, you draft a migration runbook for rehost to Amazon EC2 and another runbook for replatform to Amazon RDS. You repeat this task until you have drafted a migration runbook for every migration pattern identified in the previous task.

You can use the provided runbook templates available in the migration playbook templates and customize them for your environment. For migration patterns that are repeated frequently, we recommend using the *Rehost migration runbook template* (Microsoft Word format), and for patterns that are one-off or very simple, we recommend the *Rehost migration task list template* (Microsoft Excel format). You can also use a task list to track the status of tasks that are documented in a runbook. For more information, see About the runbooks, tools, and templates.

This task consists of the following steps:

- Step 1: Create a migration runbook draft for each pattern
- Step 2: Update the migration runbooks with your policies and processes

Step 1: Create a migration runbook draft for each pattern

In this step, you draft runbooks for each of your migration patterns. A complete migration runbook typically contains instructions for how to use the selected migration service or tool, any tasks that are unique to your environment, and cutover instructions.

1. Open the *Rehost migration runbook template* (Microsoft Word format), available in the migration playbook templates.
2. Update the *Premigration tasks* section, *Migration tasks* section, and *Cutover tasks* section with instructions that are specific to your migration pattern. Depending on your use case, you might need to update all three sections. Include the following when customizing your tasks:
   - **Standard migration instructions for the selected service** – You can typically find the information needed to complete your template in AWS documentation. For example, see the following:
     - How to use the new AWS Application Migration Service for lift-and-shift migrations

  - Getting started with AWS DataSync
  - AWS Database Migration Service step-by-step walkthroughs
- **Tasks that are unique to your IT environment** – Record the tasks that are unique to your IT operations and environment. The goal is that a new person joining your migration teams can follow the runbook with minimal learning curve. For example, what monitoring software do you need to install on the target machine after cutover? Which Domain Name System (DNS) server do you use for that subnet? How do you submit a request for change (RFC)?
- **Cutover tasks** – Every environment has a slightly different cutover process. It is important to document all the steps for cutover in your environment because you want everyone to follow the same process. Documenting these steps minimizes time spent in the cutover window and helps you plan the amount of time needed to complete the cutover.

Step 2: Update the migration runbooks with your policies and processes

Runbook and task list templates cover the majority of the migration tasks, or the portion of the process that is standard. The remaining tasks are unique to your environment, and you must customize the runbook accordingly. For example, consider whether your runbooks should contain custom tasks for the following processes in your environment.

Connectivity

- How to connect to a VMware environment
- How to connect to a DNS server and update DNS records
- How to connect to the migration automation server
- How to connect to the source environment
- How to connect to a document repository, such as SharePoint or Confluence

Permissions and change management

- How to submit an RFC in your environment

- How to review the status of the RFC for each wave
- How to grant access for a new migration engineer
- How to request permissions to the source servers
- How to request permissions to the target AWS account
- Who has permission to connect to the target server after the cutover

Migration implementation and cutover

- Which software to install or uninstall on the target server
- How to change infrastructure settings, such as firewall, routing, and load balancer settings
- Who can change infrastructure settings
- How to change the application configuration during cutover
- How to conduct application testing
- How to complete a cutover and go-live
- How to complete tasks that occur after cutover, such as configuring monitoring or backups

Some of these tasks might sound trivial, but knowledge and permissions vary in any environment. It is important to document these tasks in the same migration runbook.

Tip

We highly recommend using automation to accelerate your large migration. Using a migration factory model simplifies and reduces the number of issues with repetitive tasks, especially for rehost and replatform migration patterns.
AWS Cloud Migration Factory Solution was designed to help customers migrate at scale with automation. You can deploy the solution and use predefined automation scripts in your runbook.

Task exit criteria

Repeat this task as necessary, and when you have met the following exit criteria, proceed to the next task:

- You have drafted a runbook for each migration pattern.
- Each runbook draft contains three main sections: pre-migration tasks, migration tasks, and cutover tasks.
- Your runbook drafts include tasks that are unique to your environment.
- Your detailed runbook drafts include step-by-step guidance and screenshots.

Task 3: Analyzing and testing your migration runbooks

In this task, you walk through each runbook that you built in the previous task, analyze any identified gaps, conduct a migration proof of concept (POC), and review the notes and feedback.

This task consists of the following steps:

- Step 1: Conduct a walkthrough of each runbook
- Step 2: Conduct a POC that tests each migration pattern
- Step 3: Review and identify the gaps in the current migration runbook drafts

Step 1: Conduct a walkthrough of each runbook

In this step, the migration teams assess the runbook and task sequence as though they were performing it for real. The migration teams meet and review each step, and the team members

ask questions and share their feedback. This walkthrough process helps the teams identify missing steps and sequence issues. Complete the walkthrough as follows:

1. Gather the migration teams that are responsible for completing the tasks in the runbook.
2. Walk through the steps in the runbook one by one, as if this was a live migration. As you go, identify and make note of any gaps or issues. Do not perform the migration or tasks as part of the walkthrough.
3. Update the runbook draft to address any gaps or issues identified in the walkthrough.

Step 2: Conduct a POC that tests each migration pattern

1. Select a POC candidate from the already prepared waves.
2. Open the migration runbook draft.
3. Complete the runbook step by step in order to migrate the POC candidate as follows:
   - Follow every step in the runbook. Do not make assumptions or make your own decisions.
   - Assume the person using the runbook has no prior knowledge about migration or your environment.
   - If a step is not clear but you can continue, make note of the step and continue.
   - If a step is missing and you can’t continue, stop, and highlight the section from which you could not proceed. Work with the runbook owner to clarify the missing step so that you can continue and complete the POC.

Step 3: Review and identify the gaps in the current migration runbook drafts

1. Review any issues or gaps identified in the previous steps.
2. Analyze the gaps and consider the following questions:
   - Does the runbook have the steps needed to complete a migration and cutover, from end to end?
   - Does the runbook contain reference links for the tasks that are predefined in your environment?
   - Does the runbook clearly defined who, what, when, and how to complete a task?

Task exit criteria

When you have met the following exit criteria, proceed to the next task:

- You have reviewed and tested each migration runbook.
- For each runbook, you have completed a migration POC for at least one application and for more than two operating system (OS) variants.
- You have identified and documented the identified gaps and issues in each runbook.

Task 4: Improving your migration runbooks

In this task, you improve the runbooks by repeating the POC multiple times. With each wave, the POC test and *retrospective*, a meeting in which the team reviews the completed wave, provide opportunity to improve the runbooks. You also improve your runbooks by automating repetitive tasks, which increases the velocity of the migration and reduces the risk of manual configuration errors.

This task consists of the following steps:

- Step 1: Update the migration runbooks and repeat the testing
- Step 2: Automate repetitive tasks
- Step 3: Build a migration task list

Step 1: Update the migration runbooks and repeat the testing

1. For the issues and gaps identified in the previous task, update the runbooks with detailed instructions. For example:
   - If a step is missing, add step-by-step instructions
   - If a step is not clear, consider updating the text, adding a screenshot, or adding reference links
2. Repeat the previous task until you are satisfied that the instructions are complete and clear.
3. Test the final draft of each runbook by asking a new migration team member, one who has not tested this runbook before, to perform a POC and complete the runbook.

Step 2: Automate repetitive tasks

1. Review each runbook and identify areas of automation for manual tasks. Consider the following probing questions:
   - Are there any repetitive, manual tasks for each server or app in the runbook?
   - Are there any actions that you perform on every server or application?
   - Do you need to install or uninstall software on the target server?
   - Do you need to change network or infrastructure settings one by one for each server?
   - Do you need to manually copy and paste any data?
2. Build automation scripts and update the runbooks.
3. Repeat task 3 and task 4 until you have documented the runbooks with clear and complete information and automated repetitive migration tasks.

> **Note**
>
> For automating migration tasks, we highly recommend that you build new scripts or customize existing scripts in AWS Cloud Migration Factory Solution.

Step 3: Build a migration task list

A migration task list can help you manage the status and owners of tasks. You build a task list for each migration runbook, and you include the high-level information from the runbook without including the details. A task list typically contains the following information, and you can add more attributes as needed:

- Descriptive name, such as:
  - Check server OS version
  - Install an agent
  - Restart a server
  - Update the DNS
- Dependencies
- Sequence of tasks
- Owner

- Estimation of time required to complete each task
- Status

There are many tools available for creating and managing task lists. You can use the provided *Rehost migration task list template* (Microsoft Excel format) available in the migration playbook templates. You can also use project management tools, such as Jira or a Kanban board.

> **Note**
>
> We also recommend using the Excel task list template to document small, well-understood, or non-repetitive tasks, such as restarting a server or getting an IP address. These tasks should be captured and tracked but don't require the detailed steps of the Word runbook template.

Task exit criteria

Repeat this task as necessary, and when you have met the following exit criteria, proceed to the next task:

- You have identified opportunities for automation and have either developed automation scripts or have a plan to do so.
- Three or more people have peer-reviewed each runbook.
- Two or more people who were not on the development team for the runbook have tested it end-to-end.
- Using the most up-to-date runbook, you have migrated 20 or more servers to more than one AWS account.
- You have developed a task list to help track and manage the progress of the migration.

Stage2: Implementing a large migration

In stage 1, you developed migration runbooks for each migration pattern. In stage 2, you use these runbooks to migrate servers and then improve the runbooks in order to accelerate the velocity of the migration. Building and updating runbooks is not a one-off task. You might need to do that throughout your large migration journey. For example, you might need to create new runbooks if the scope increases and you identify new migration patterns, or you might need to improve the existing runbooks if the migration velocity is below the target and introducing more automation would reduce the number of manual tasks and accelerate the migration.

> **Note**
>
> The wave plan developed in the portfolio workstream determines the activities in the migration workstream. Before starting stage 2, verify that you have validated your wave plan. For instructions and more information about the wave plan, see Portfolio playbook for AWS large migrations.

Stage 2 consists of the following tasks and steps:

- Task 1: Performing sprint planning for scheduled waves
  - Step 1: Review the backlog for the scheduled waves
  - Step 2: Assign tasks and establish due dates
- Task 2: Performing pre-migration and migration tasks
- Task 3: Performing cutover tasks
- Task 4: Reviewing and improving the migration runbooks
  - Step 1: Review the completed waves and identify gaps in the current migration runbook
  - Step 2: Update the migration runbooks and complete testing

Task 1: Performing sprint planning for scheduled waves

In this task, you assign waves to *sprints*, which is a fixed period of time in which the migration team works on all waves within that sprint. If each sprint is 2 weeks in duration, each wave spans at least two sprints. *Sprint planning* refers to the process of assigning owners and due dates to all of the tasks within that sprint.

This task consists of the following steps:

- Step 1: Review the backlog for the scheduled waves
- Step 2: Assign tasks and establish due dates

Step 1: Review the backlog for the scheduled waves

In this step, you review existing *backlogs*, or current and pending tasks, for all the concurrent waves, and you use the recommended tools and mechanisms to manage the wave. For example, you might use a Kanban board with a swimlane for each wave, or you might use Jira and track waves with stories and epics. For more information, see the Project governance playbook for AWS large migrations.

Step 2: Assign tasks and establish due dates

In this step, for all waves in this sprint, you assign owners to each task and set a due date accordingly. You can use the migration task list spreadsheet you created in stage 1 to manage your wave progress, task ownership, and due dates, and the tasks are defined in detail in the migration runbook for each pattern. Because waves typically overlap, it is common to manage many concurrent tasks from different waves at the same time. In addition, each wave can range from 3-6 weeks, depending on your internal process. For an example of a wave schedule, see the Stage 2: Implement a large migration section of the *Guide for AWS large migrations*.

> **Important**
>
> Do not add tasks to the sprint without updating the runbook or task list. These documents that you built in stage 1 should be a source of truth for all your migration activities. If any step is missing or incorrect, update and validate the runbook before adding tasks to the sprint.

Task 2: Performing pre-migration and migration tasks

Now you perform pre-migration and migration tasks and adhere to a schedule based on your sprint planning outcome. A sprint backlog contains a list of all tasks in the migration, for all waves in the current sprint, and organizes the tasks by week. For a list of tasks, see your migration runbooks for each migration pattern, which were created in stage 1 of this playbook. For the wave schedule, see

your project management tools, which were established in the Project governance playbook for AWS large migrations. Perform the tasks in the scheduled weeks. The following is an example of a rehost migration task schedule in which there are migration tasks for different waves in the same week.

Task name	Wave	Category	Owner
Verify prerequisites	Wave 1	Build	Jane Doe
Install replication agent	Wave 1	Build	Jane Doe
Validate launch template	Wave 2	Validate	Jane Doe
Launch test instances	Wave 3	Boot-up testing	Jane Doe

Task 3: Performing cutover tasks

At this point, you have completed the migration tasks and tested all of the servers and apps, and you are ready for cutover. Use the RACI matrices you created in the Foundation playbook for AWS large migrations to manage the tasks and ownership of each cutover task, and use your migration runbook for each pattern to perform the cutover activities. The following table is an example of how you might track and manage cutover progress. It is common to have multiple migration patterns in the same wave for different applications.

Task name	Wave	Migration runbook	Owner	Status
Check replicati on	Wave 1	Rehost to Amazon EC2	Jane Doe	Completed
Launch cutover EC2 instance	Wave 1	Rehost to Amazon EC2	Jane Doe	Completed
Validate EC2 instance status	Wave 1	Rehost to Amazon EC2	Jane Doe	In progress

Task name	Wave	Migration runbook	Owner	Status
Launch databases in Amazon RDS	Wave 1	Replatform to Amazon RDS	John Smith	In progress
Complete storage data transfer	Wave 1	Replatform to Amazon Elastic File System (Amazon EFS)	John Smith	Not started
Perform app testing	Wave 1	All	Jane Doe	Not started
App acceptance decision	Wave 1	All	Jane Doe	Not started

Task 4: Reviewing and improving the migration runbooks

This task consists of the following steps:

- Step 1: Review the completed waves and identify gaps in the current migration runbook
- Step 2: Update the migration runbooks and complete testing

Step 1: Review the completed waves and identify gaps in the current migration runbook

Fail fast is a philosophy that uses frequent and incremental testing to reduce the development lifecycle, and it is a critical part of an agile approach to a large migration. After each cutover, schedule a retrospective meeting to review each task with the migration teams. Ask the following probing sample questions. You can also add your own questions:

- Was the cutover successful? If not, what was the issue?
- Does the migration runbook cover all of the tasks to perform the migration and cutover?

- Do any of the tasks take longer than expected?
- Are you aware of any technical issues with any tasks in the runbook?
- Are there any manual tasks that can be automated?
- Are there any process-related issues with the runbook or cutover?

Step 2: Update the migration runbooks and complete testing

After collecting data from the retrospective meeting, update the migration runbooks as follows:

- Add detailed instructions for any missing steps.
- Fix or update any steps as needed.
- Perform an end-to-end migration test with at least one Windows and one Linux server.
- Send the updated runbook to the migration teams for use in the next wave.

Resources

AWS large migrations

To access the complete AWS Prescriptive Guidance series for large migrations, see Large migrations to the AWS Cloud.

Additional references

- AWS Cloud Migration Factory Solution
- AWS Prescriptive Guidance migration patterns

Contributors

The following individuals contributed to this document:

- Chris Baker, Senior Migration Consultant, Amazon Web Services
- Wally Lu, Principal Consultant, Amazon Web Services

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.

Change	Description	Date
Updated name of AWS solution	We updated the name of the referenced AWS solution from *CloudEndure Migration Factory* to *Cloud Migration Factory*.	May 2, 2022
Initial publication	—	February 28, 2022

AWS Prescriptive Guidance glossary

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

Numbers

7 Rs

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:

- 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.
- 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. You migrate servers from an on-premises platform to a cloud service for the same platform. Example: Migrate a Microsoft Hyper-V application to 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.

A

A2A (Agent-to-Agent)

A stateful protocol for agent-to-agent collaboration supporting task delegation and state transfer.

ABAC

See attribute-based access control.

abstracted services

See managed services.

ACID

See atomicity, consistency, isolation, durability.

active-active migration

A database migration method in which the source and target databases are kept in sync (by using a bidirectional replication tool or dual write operations), and both databases handle transactions from connecting applications during migration. This method supports migration in small, controlled batches instead of requiring a one-time cutover. It's more flexible but requires more work than active-passive migration.

active-passive migration

A database migration method in which the source and target databases are kept in sync, but only the source database handles transactions from connecting applications while data is replicated to the target database. The target database doesn't accept any transactions during migration.

Agent

An AI system that can autonomously reason, plan, and take actions using tools to achieve goals.

Agent Ops

Operational practices for building, testing, deploying, and running AI agents in production at scale.

aggregate function

A SQL function that operates on a group of rows and calculates a single return value for the group. Examples of aggregate functions include `SUM` and `MAX`.

AI

See artificial intelligence.

AIOps

See artificial intelligence operations.

anonymization

The process of permanently deleting personal information in a dataset. Anonymization can help protect personal privacy. Anonymized data is no longer considered to be personal data.

anti-pattern

A frequently used solution for a recurring issue where the solution is counter-productive, ineffective, or less effective than an alternative.

application control

A security approach that allows the use of only approved applications in order to help protect a system from malware.

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 (AI)

The field of computer science that is dedicated to using computing technologies to perform cognitive functions that are typically associated with humans, such as learning, solving problems, and recognizing patterns. For more information, see What is Artificial Intelligence?

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.

asymmetric encryption

An encryption algorithm that uses a pair of keys, a public key for encryption and a private key for decryption. You can share the public key because it isn't used for decryption, but access to the private key should be highly restricted.

atomicity, consistency, isolation, durability (ACID)

A set of software properties that guarantee the data validity and operational reliability of a database, even in the case of errors, power failures, or other problems.

attribute-based access control (ABAC)

The practice of creating fine-grained permissions based on user attributes, such as department, job role, and team name. For more information, see ABAC for AWS in the AWS Identity and Access Management (IAM) documentation.

authoritative data source

A location where you store the primary version of data, which is considered to be the most reliable source of information. You can copy data from the authoritative data source to other locations for the purposes of processing or modifying the data, such as anonymizing, redacting, or pseudonymizing it.

Availability Zone

A distinct location within an AWS Region that is insulated from failures in other Availability Zones and provides inexpensive, low-latency network connectivity to other Availability Zones in the same Region.

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 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 Conversion Tool (AWS SCT). It analyzes database schemas and code objects, application code, dependencies, and performance characteristics, and provides assessment reports.

B

bad bot

A bot that is intended to disrupt or cause harm to individuals or organizations.

BCP

See business continuity planning.

behavior graph

A unified, interactive view of resource behavior and interactions over time. You can use a behavior graph with Amazon Detective to examine failed logon attempts, suspicious API calls, and similar actions. For more information, see Data in a behavior graph in the Detective documentation.

big-endian system

A system that stores the most significant byte first. See also endianness.

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?"

bloom filter

A probabilistic, memory-efficient data structure that is used to test whether an element is a member of a set.

blue/green deployment

A deployment strategy where you create two separate but identical environments. You run the current application version in one environment (blue) and the new application version in the other environment (green). This strategy helps you quickly roll back with minimal impact.

bot

A software application that runs automated tasks over the internet and simulates human activity or interaction. Some bots are useful or beneficial, such as web crawlers that index information on the internet. Some other bots, known as *bad bots*, are intended to disrupt or cause harm to individuals or organizations.

botnet

Networks of bots that are infected by malware and are under the control of a single party, known as a *bot herder* or *bot operator*. Botnets are the best-known mechanism to scale bots and their impact.

branch

A contained area of a code repository. The first branch created in a repository is the *main branch*. You can create a new branch from an existing branch, and you can then develop features or fix bugs in the new branch. A branch you create to build a feature is commonly referred to as a *feature branch*. When the feature is ready for release, you merge the feature branch back into the main branch. For more information, see About branches (GitHub documentation).

break-glass access

In exceptional circumstances and through an approved process, a quick means for a user to gain access to an AWS account that they don't typically have permissions to access. For more information, see the Implement break-glass procedures indicator in the AWS Well-Architected guidance.

brownfield strategy

The existing infrastructure in your environment. When adopting a brownfield strategy for a system architecture, you design the architecture around the constraints of the current systems and infrastructure. If you are expanding the existing infrastructure, you might blend brownfield and greenfield strategies.

buffer cache

The memory area where the most frequently accessed data is stored.

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.

business continuity planning (BCP)

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.

C

CAF

See AWS Cloud Adoption Framework.

canary deployment

The slow and incremental release of a version to end users. When you are confident, you deploy the new version and replace the current version in its entirety.

CCoE

See Cloud Center of Excellence.

CDC

See change data capture.

change data capture (CDC)

The process of tracking changes to a data source, such as a database table, and recording metadata about the change. You can use CDC for various purposes, such as auditing or replicating changes in a target system to maintain synchronization.

chaos engineering

Intentionally introducing failures or disruptive events to test a system's resilience. You can use AWS Fault Injection Service (AWS FIS) to perform experiments that stress your AWS workloads and evaluate their response.

CI/CD

See continuous integration and continuous delivery.

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.

Citizen Developer

A business user who creates AI applications using no-code/low-code platforms without specialized technical skills.

client-side encryption

Encryption of data locally, before the target AWS service receives it.

Cloud Center of Excellence (CCoE)

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.

cloud computing

The cloud technology that is typically used for remote data storage and IoT device management. Cloud computing is commonly connected to edge computing technology.

cloud operating model

In an IT organization, the operating model that is used to build, mature, and optimize one or more cloud environments. For more information, see Building your Cloud Operating Model.

cloud stages of adoption

The four phases that organizations typically go through when they migrate to the AWS Cloud:

- 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

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.

CMDB

See configuration management database.

code repository

A location where source code and other assets, such as documentation, samples, and scripts, are stored and updated through version control processes. Common cloud repositories include GitHub or Bitbucket Cloud. Each version of the code is called a *branch*. In a microservice structure, each repository is devoted to a single piece of functionality. A single CI/CD pipeline can use multiple repositories.

cold cache

A buffer cache that is empty, not well populated, or contains stale or irrelevant data. This affects performance because the database instance must read from the main memory or disk, which is slower than reading from the buffer cache.

cold data

Data that is rarely accessed and is typically historical. When querying this kind of data, slow queries are typically acceptable. Moving this data to lower-performing and less expensive storage tiers or classes can reduce costs.

computer vision (CV)

A field of AI that uses machine learning to analyze and extract information from visual formats such as digital images and videos. For example, Amazon SageMaker AI provides image processing algorithms for CV.

configuration drift

For a workload, a configuration change from the expected state. It might cause the workload to become noncompliant, and it's typically gradual and unintentional.

configuration management database (CMDB)

A repository that stores and manages information about a database and its IT environment, including both hardware and software components and their configurations. You typically use data from a CMDB in the portfolio discovery and analysis stage of migration.

conformance pack

A collection of AWS Config rules and remediation actions that you can assemble to customize your compliance and security checks. You can deploy a conformance pack as a single entity in

an AWS account and Region, or across an organization, by using a YAML template. For more information, see Conformance packs in the AWS Config documentation.

continuous integration and continuous delivery (CI/CD)

The process of automating the source, build, test, staging, and production stages of the software release process. CI/CD is commonly described as a pipeline. CI/CD can help you automate processes, improve productivity, improve code quality, and deliver faster. For more information, see Benefits of continuous delivery. CD can also stand for *continuous deployment*. For more information, see Continuous Delivery vs. Continuous Deployment.

CV

See computer vision.

D

data at rest

Data that is stationary in your network, such as data that is in storage.

data classification

A process for identifying and categorizing the data in your network based on its criticality and sensitivity. It is a critical component of any cybersecurity risk management strategy because it helps you determine the appropriate protection and retention controls for the data. Data classification is a component of the security pillar in the AWS Well-Architected Framework. For more information, see Data classification.

data drift

A meaningful variation between the production data and the data that was used to train an ML model, or a meaningful change in the input data over time. Data drift can reduce the overall quality, accuracy, and fairness in ML model predictions.

data in transit

Data that is actively moving through your network, such as between network resources.

data mesh

An architectural framework that provides distributed, decentralized data ownership with centralized management and governance.

data minimization

The principle of collecting and processing only the data that is strictly necessary. Practicing data minimization in the AWS Cloud can reduce privacy risks, costs, and your analytics carbon footprint.

data perimeter

A set of preventive guardrails in your AWS environment that help make sure that only trusted identities are accessing trusted resources from expected networks. For more information, see Building a data perimeter on AWS.

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.

data provenance

The process of tracking the origin and history of data throughout its lifecycle, such as how the data was generated, transmitted, and stored.

data subject

An individual whose data is being collected and processed.

data warehouse

A data management system that supports business intelligence, such as analytics. Data warehouses commonly contain large amounts of historical data, and they are typically used for queries and analysis.

database definition language (DDL)

Statements or commands for creating or modifying the structure of tables and objects in a database.

database manipulation language (DML)

Statements or commands for modifying (inserting, updating, and deleting) information in a database.

DDL

See database definition language.

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.

defense-in-depth

An information security approach in which a series of security mechanisms and controls are thoughtfully layered throughout a computer network to protect the confidentiality, integrity, and availability of the network and the data within. When you adopt this strategy on AWS, you add multiple controls at different layers of the AWS Organizations structure to help secure resources. For example, a defense-in-depth approach might combine multi-factor authentication, network segmentation, and encryption.

delegated administrator

In AWS Organizations, a compatible service can register an AWS member account to administer the organization's accounts and manage permissions for that service. This account is called the *delegated administrator* for that service. For more information and a list of compatible services, see Services that work with AWS Organizations in the AWS Organizations documentation.

deployment

The process of making an application, new features, or code fixes available in the target environment. Deployment involves implementing changes in a code base and then building and running that code base in the application's environments.

development environment

See environment.

detective control

A security control that is designed to detect, log, and alert after an event has occurred. These controls are a second line of defense, alerting you to security events that bypassed the preventative controls in place. For more information, see Detective controls in *Implementing security controls on AWS*.

development value stream mapping (DVSM)

A process used to identify and prioritize constraints that adversely affect speed and quality in a software development lifecycle. DVSM extends the value stream mapping process originally designed for lean manufacturing practices. It focuses on the steps and teams required to create and move value through the software development process.

digital twin

A virtual representation of a real-world system, such as a building, factory, industrial equipment, or production line. Digital twins support predictive maintenance, remote monitoring, and production optimization.

dimension table

In a star schema, a smaller table that contains data attributes about quantitative data in a fact table. Dimension table attributes are typically text fields or discrete numbers that behave like text. These attributes are commonly used for query constraining, filtering, and result set labeling.

disaster

An event that prevents a workload or system from fulfilling its business objectives in its primary deployed location. These events can be natural disasters, technical failures, or the result of human actions, such as unintentional misconfiguration or a malware attack.

disaster recovery (DR)

The strategy and process you use to minimize downtime and data loss caused by a disaster. For more information, see Disaster Recovery of Workloads on AWS: Recovery in the Cloud in the AWS Well-Architected Framework.

DML

See database manipulation language.

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, *Domain-Driven Design: Tackling Complexity in the Heart of Software* (Boston: Addison-Wesley 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.

DR

See disaster recovery.

drift detection

Tracking deviations from a baselined configuration. For example, you can use AWS CloudFormation to detect drift in system resources, or you can use AWS Control Tower to detect changes in your landing zone that might affect compliance with governance requirements.

DVSM

See development value stream mapping.

E

EDA

See exploratory data analysis.

EDI

See electronic data interchange.

edge computing

The technology that increases the computing power for smart devices at the edges of an IoT network. When compared with cloud computing, edge computing can reduce communication latency and improve response time.

electronic data interchange (EDI)

The automated exchange of business documents between organizations. For more information, see What is Electronic Data Interchange.

encryption

A computing process that transforms plaintext data, which is human-readable, into ciphertext.

encryption key

A cryptographic string of randomized bits that is generated by an encryption algorithm. Keys can vary in length, and each key is designed to be unpredictable and unique.

endianness

The order in which bytes are stored in computer memory. Big-endian systems store the most significant byte first. Little-endian systems store the least significant byte first.

endpoint

See service endpoint.

endpoint service

A service that you can host in a virtual private cloud (VPC) to share with other users. You can create an endpoint service with AWS PrivateLink and grant permissions to other AWS accounts or to AWS Identity and Access Management (IAM) principals. These accounts or principals can connect to your endpoint service privately by creating interface VPC endpoints. For more information, see Create an endpoint service in the Amazon Virtual Private Cloud (Amazon VPC) documentation.

enterprise resource planning (ERP)

A system that automates and manages key business processes (such as accounting, MES, and project management) for an enterprise.

envelope encryption

The process of encrypting an encryption key with another encryption key. For more information, see Envelope encryption in the AWS Key Management Service (AWS KMS) documentation.

environment

An instance of a running application. The following are common types of environments in cloud computing:

- development environment – An instance of a running application that is available only to the core team responsible for maintaining the application. Development environments are used to test changes before promoting them to upper environments. This type of environment is sometimes referred to as a *test environment*.
- lower environments – All development environments for an application, such as those used for initial builds and tests.
- production environment – An instance of a running application that end users can access. In a CI/CD pipeline, the production environment is the last deployment environment.

- upper environments – All environments that can be accessed by users other than the core development team. This can include a production environment, preproduction environments, and environments for user acceptance testing.

epic

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.

ERP

See enterprise resource planning.

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.

F

fact table

The central table in a star schema. It stores quantitative data about business operations. Typically, a fact table contains two types of columns: those that contain measures and those that contain a foreign key to a dimension table.

fail fast

A philosophy that uses frequent and incremental testing to reduce the development lifecycle. It is a critical part of an agile approach.

fault isolation boundary

In the AWS Cloud, a boundary such as an Availability Zone, AWS Region, control plane, or data plane that limits the effect of a failure and helps improve the resilience of workloads. For more information, see AWS Fault Isolation Boundaries.

feature branch

See branch.

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.

few-shot prompting

Providing an LLM with a small number of examples that demonstrate the task and desired output before asking it to perform a similar task. This technique is an application of in-context learning, where models learn from examples (*shots*) that are embedded in prompts. Few-shot prompting can be effective for tasks that require specific formatting, reasoning, or domain knowledge. See also zero-shot prompting.

FGAC

See fine-grained access control.

fine-grained access control (FGAC)

The use of multiple conditions to allow or deny an access request.

flash-cut migration

A database migration method that uses continuous data replication through change data capture to migrate data in the shortest time possible, instead of using a phased approach. The objective is to keep downtime to a minimum.

FM

See foundation model.

foundation model (FM)

A large deep-learning neural network that has been training on massive datasets of generalized and unlabeled data. FMs are capable of performing a wide variety of general tasks, such as understanding language, generating text and images, and conversing in natural language. For more information, see What are Foundation Models.

FM gateway

A centralized intermediary that controls and normalizes access to foundation models. Also known as an *LLM gateway*.

G

generative AI

A subset of AI models that have been trained on large amounts of data and that can use a simple text prompt to create new content and artifacts, such as images, videos, text, and audio. For more information, see What is Generative AI.

geo blocking

See geographic restrictions.

geographic restrictions (geo blocking)

In Amazon CloudFront, an option to prevent users in specific countries from accessing content distributions. You can use an allow list or block list to specify approved and banned countries. For more information, see Restricting the geographic distribution of your content in the CloudFront documentation.

Gitflow workflow

An approach in which lower and upper environments use different branches in a source code repository. The Gitflow workflow is considered legacy, and the trunk-based workflow is the modern, preferred approach.

golden image

A snapshot of a system or software that is used as a template to deploy new instances of that system or software. For example, in manufacturing, a golden image can be used to provision

software on multiple devices and helps improve speed, scalability, and productivity in device manufacturing operations.

greenfield strategy

The absence of existing infrastructure in a new environment. When adopting a greenfield strategy for a system architecture, you can select all new technologies without the restriction of compatibility with existing infrastructure, also known as brownfield. If you are expanding the existing infrastructure, you might blend brownfield and greenfield strategies.

guardrail

A high-level rule that helps govern resources, policies, and compliance across organizational units (OUs). *Preventive guardrails* enforce policies to ensure alignment to compliance standards. They are implemented by using service control policies and IAM permissions boundaries. *Detective guardrails* detect policy violations and compliance issues, and generate alerts for remediation. They are implemented by using AWS Config, AWS Security Hub CSPM, Amazon GuardDuty, AWS Trusted Advisor, Amazon Inspector, and custom AWS Lambda checks.

guardrails (AI)

Safety mechanisms that filter, validate, and constrain agent inputs and outputs to help ensure responsible and safe AI behavior.

H

HA

See high availability.

heterogeneous database migration

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.

high availability (HA)

The ability of a workload to operate continuously, without intervention, in the event of challenges or disasters. HA systems are designed to automatically fail over, consistently deliver

high-quality performance, and handle different loads and failures with minimal performance impact.

historian modernization

An approach used to modernize and upgrade operational technology (OT) systems to better serve the needs of the manufacturing industry. A *historian* is a type of database that is used to collect and store data from various sources in a factory.

holdout data

A portion of historical, labeled data that is withheld from a dataset that is used to train a machine learning model. You can use holdout data to evaluate the model performance by comparing the model predictions against the holdout data.

human-in-the-loop (HitL)

A workflow pattern where agent execution pauses for human review and approval at critical decision points.

homogeneous database migration

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.

hot data

Data that is frequently accessed, such as real-time data or recent translational data. This data typically requires a high-performance storage tier or class to provide fast query responses.

hotfix

An urgent fix for a critical issue in a production environment. Due to its urgency, a hotfix is usually made outside of the typical DevOps release workflow.

hypercare period

Immediately following cutover, the period of time when a migration team manages and monitors the migrated applications in the cloud in order to address any issues. Typically, this period is 1–4 days in length. At the end of the hypercare period, the migration team typically transfers responsibility for the applications to the cloud operations team.

I

IaC

See infrastructure as code.

identity-based policy

A policy attached to one or more IAM principals that defines their permissions within the AWS Cloud environment.

idle application

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.

IIoT

See industrial Internet of Things.

immutable infrastructure

A model that deploys new infrastructure for production workloads instead of updating, patching, or modifying the existing infrastructure. Immutable infrastructures are inherently more consistent, reliable, and predictable than mutable infrastructure. For more information, see the Deploy using immutable infrastructure best practice in the AWS Well-Architected Framework.

inbound (ingress) VPC

In an AWS multi-account architecture, a VPC that accepts, inspects, and routes network connections from outside an application. The AWS Security Reference Architecture recommends setting up your Network account with inbound, outbound, and inspection VPCs to protect the two-way interface between your application and the broader internet.

incremental migration

A cutover strategy in which you migrate your application in small parts instead of performing a single, full cutover. For example, you might move only a few microservices or users to the new system initially. After you verify that everything is working properly, you can incrementally move additional microservices or users until you can decommission your legacy system. This strategy reduces the risks associated with large migrations.

Industry 4.0

A term that was introduced by Klaus Schwab in 2016 to refer to the modernization of manufacturing processes through advances in connectivity, real-time data, automation, analytics, and AI/ML.

infrastructure

All of the resources and assets contained within an application's environment.

infrastructure as code (IaC)

The process of provisioning and managing an application's infrastructure through a set of configuration files. IaC is designed to help you centralize infrastructure management, standardize resources, and scale quickly so that new environments are repeatable, reliable, and consistent.

industrial Internet of Things (IIoT)

The use of internet-connected sensors and devices in the industrial sectors, such as manufacturing, energy, automotive, healthcare, life sciences, and agriculture. For more information, see Building an industrial Internet of Things (IIoT) digital transformation strategy.

inspection VPC

In an AWS multi-account architecture, a centralized VPC that manages inspections of network traffic between VPCs (in the same or different AWS Regions), the internet, and on-premises networks. The AWS Security Reference Architecture recommends setting up your Network account with inbound, outbound, and inspection VPCs to protect the two-way interface between your application and the broader internet.

Internet of Things (IoT)

The network of connected physical objects with embedded sensors or processors that communicate with other devices and systems through the internet or over a local communication network. For more information, see What is IoT?

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.

IoT

See Internet of Things.

IT information library (ITIL)

A set of best practices for delivering IT services and aligning these services with business requirements. ITIL provides the foundation for ITSM.

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.

ITIL

See IT information library.

ITSM

See IT service management.

L

label-based access control (LBAC)

An implementation of mandatory access control (MAC) where the users and the data itself are each explicitly assigned a security label value. The intersection between the user security label and data security label determines which rows and columns can be seen by the user.

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.

large language model (LLM)

A deep learning AI model that is pretrained on a vast amount of data. An LLM can perform multiple tasks, such as answering questions, summarizing documents, translating text into other languages, and completing sentences. For more information, see What are LLMs.

large migration

A migration of 300 or more servers.

LBAC

See label-based access control.

least privilege

The security best practice of granting the minimum permissions required to perform a task. For more information, see Apply least-privilege permissions in the IAM documentation.

lift and shift

See 7 Rs.

little-endian system

A system that stores the least significant byte first. See also endianness.

LLM

See large language model.

lower environments

See environment.

M

machine learning (ML)

A type of artificial intelligence that uses algorithms and techniques for pattern recognition and learning. ML analyzes and learns from recorded data, such as Internet of Things (IoT) data, to generate a statistical model based on patterns. For more information, see Machine Learning.

main branch

See branch.

malware

Software that is designed to compromise computer security or privacy. Malware might disrupt computer systems, leak sensitive information, or gain unauthorized access. Examples of malware include viruses, worms, ransomware, Trojan horses, spyware, and keyloggers.

managed services

AWS services for which AWS operates the infrastructure layer, the operating system, and platforms, and you access the endpoints to store and retrieve data. Amazon Simple Storage

Service (Amazon S3) and Amazon DynamoDB are examples of managed services. These are also known as *abstracted services*.

manufacturing execution system (MES)

A software system for tracking, monitoring, documenting, and controlling production processes that convert raw materials to finished products on the shop floor.

MAP

See Migration Acceleration Program.

MCP

See Model Context Protocol.

Model Context Protocol (MCP)

A stateless protocol for agent-to-tool communication.

MCP server

A service that exposes one or more tools through the Model Context Protocol.

mechanism

A complete process in which you create a tool, drive adoption of the tool, and then inspect the results in order to make adjustments. A mechanism is a cycle that reinforces and improves itself as it operates. For more information, see Building mechanisms in the AWS Well-Architected Framework.

member account

All AWS accounts other than the management account that are part of an organization in AWS Organizations. An account can be a member of only one organization at a time.

MES

See manufacturing execution system.

Message Queuing Telemetry Transport (MQTT)

A lightweight, machine-to-machine (M2M) communication protocol, based on the publish/subscribe pattern, for resource-constrained IoT devices.

microservice

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.

microservices architecture

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.

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 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 *migration factory* 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 Cloud 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 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 strategy

The approach used to migrate a workload to the AWS Cloud. For more information, see the 7 Rs entry in this glossary and see Mobilize your organization to accelerate large-scale migrations.

ML

See machine learning.

modernization

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.

modernization readiness assessment

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.

monolithic applications (monoliths)

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.

MPA

See Migration Portfolio Assessment.

MQTT

See Message Queuing Telemetry Transport.

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?"

mutable infrastructure

A model that updates and modifies the existing infrastructure for production workloads. For improved consistency, reliability, and predictability, the AWS Well-Architected Framework recommends the use of immutable infrastructure as a best practice.

O

OAC

See origin access control.

OAI

See origin access identity.

OCM

See organizational change management.

offline migration

A migration method in which the source workload is taken down during the migration process. This method involves extended downtime and is typically used for small, non-critical workloads.

OI

See operations integration.

OLA

See operational-level agreement.

online migration

A migration method in which the source workload is copied to the target system without being taken offline. Applications that are connected to the workload can continue to function during the migration. This method involves zero to minimal downtime and is typically used for critical production workloads.

OPC-UA

See Open Process Communications - Unified Architecture.

Open Process Communications - Unified Architecture (OPC-UA)

A machine-to-machine (M2M) communication protocol for industrial automation. OPC-UA provides an interoperability standard with data encryption, authentication, and authorization schemes.

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).

operational readiness review (ORR)

A checklist of questions and associated best practices that help you understand, evaluate, prevent, or reduce the scope of incidents and possible failures. For more information, see Operational Readiness Reviews (ORR) in the AWS Well-Architected Framework.

operational technology (OT)

Hardware and software systems that work with the physical environment to control industrial operations, equipment, and infrastructure. In manufacturing, the integration of OT and information technology (IT) systems is a key focus for Industry 4.0 transformations.

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.

organization trail

A trail that's created by AWS CloudTrail that logs all events for all AWS accounts in an organization in AWS Organizations. This trail is created in each AWS account that's part of the organization and tracks the activity in each account. For more information, see Creating a trail for an organization in the CloudTrail documentation.

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 *people acceleration*, because of the speed of change required in cloud adoption projects. For more information, see the OCM guide.

origin access control (OAC)

In CloudFront, an enhanced option for restricting access to secure your Amazon Simple Storage Service (Amazon S3) content. OAC supports all S3 buckets in all AWS Regions, server-side encryption with AWS KMS (SSE-KMS), and dynamic `PUT` and `DELETE` requests to the S3 bucket.

origin access identity (OAI)

In CloudFront, an option for restricting access to secure your Amazon S3 content. When you use OAI, CloudFront creates a principal that Amazon S3 can authenticate with. Authenticated principals can access content in an S3 bucket only through a specific CloudFront distribution. See also OAC, which provides more granular and enhanced access control.

ORR

See operational readiness review.

OT

See operational technology.

outbound (egress) VPC

In an AWS multi-account architecture, a VPC that handles network connections that are initiated from within an application. The AWS Security Reference Architecture recommends

setting up your Network account with inbound, outbound, and inspection VPCs to protect the two-way interface between your application and the broader internet.

P

permissions boundary

An IAM management policy that is attached to IAM principals to set the maximum permissions that the user or role can have. For more information, see Permissions boundaries in the IAM documentation.

personally identifiable information (PII)

Information that, when viewed directly or paired with other related data, can be used to reasonably infer the identity of an individual. Examples of PII include names, addresses, and contact information.

PII

See personally identifiable information.

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.

PLC

See programmable logic controller.

PLM

See product lifecycle management.

policy

An object that can define permissions (see identity-based policy), specify access conditions (see resource-based policy), or define the maximum permissions for all accounts in an organization in AWS Organizations (see service control policy).

polyglot persistence

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.

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.

predicate

A query condition that returns `true` or `false`, commonly located in a `WHERE` clause.

predicate pushdown

A database query optimization technique that filters the data in the query before transfer. This reduces the amount of data that must be retrieved and processed from the relational database, and it improves query performance.

preventative control

A security control that is designed to prevent an event from occurring. These controls are a first line of defense to help prevent unauthorized access or unwanted changes to your network. For more information, see Preventative controls in *Implementing security controls on AWS*.

principal

An entity in AWS that can perform actions and access resources. This entity is typically a root user for an AWS account, an IAM role, or a user. For more information, see *Principal* in Roles terms and concepts in the IAM documentation.

privacy by design

A system engineering approach that takes privacy into account through the whole development process.

private hosted zones

A container that holds information about how you want Amazon Route 53 to respond to DNS queries for a domain and its subdomains within one or more VPCs. For more information, see Working with private hosted zones in the Route 53 documentation.

proactive control

A security control designed to prevent the deployment of noncompliant resources. These controls scan resources before they are provisioned. If the resource is not compliant with the control, then it isn't provisioned. For more information, see the Controls reference guide in the AWS Control Tower documentation and see Proactive controls in *Implementing security controls on AWS*.

product lifecycle management (PLM)

The management of data and processes for a product throughout its entire lifecycle, from design, development, and launch, through growth and maturity, to decline and removal.

production environment

See environment.

programmable logic controller (PLC)

In manufacturing, a highly reliable, adaptable computer that monitors machines and automates manufacturing processes.

prompt chaining

Using the output of one LLM prompt as the input for the next prompt to generate better responses. This technique is used to break down a complex task into subtasks, or to iteratively refine or expand a preliminary response. It helps improve the accuracy and relevance of a model's responses and allows for more granular, personalized results.

pseudonymization

The process of replacing personal identifiers in a dataset with placeholder values. Pseudonymization can help protect personal privacy. Pseudonymized data is still considered to be personal data.

publish/subscribe (pub/sub)

A pattern that enables asynchronous communications among microservices to improve scalability and responsiveness. For example, in a microservices-based MES, a microservice can publish event messages to a channel that other microservices can subscribe to. The system can add new microservices without changing the publishing service.

Q

query plan

A series of steps, like instructions, that are used to access the data in a SQL relational database system.

query plan regression

When a database service optimizer chooses a less optimal plan than it did before a given change to the database environment. This can be caused by changes to statistics, constraints, environment settings, query parameter bindings, and updates to the database engine.

R

RACI matrix

See responsible, accountable, consulted, informed (RACI).

RAG

See Retrieval Augmented Generation.

ransomware

A malicious software that is designed to block access to a computer system or data until a payment is made.

RASCI matrix

See responsible, accountable, consulted, informed (RACI).

RCAC

See row and column access control.

read replica

A copy of a database that's used for read-only purposes. You can route queries to the read replica to reduce the load on your primary database.

re-architect

See 7 Rs.

recovery point objective (RPO)

The maximum acceptable amount of time since the last data recovery point. This determines what is considered an acceptable loss of data between the last recovery point and the interruption of service.

recovery time objective (RTO)

The maximum acceptable delay between the interruption of service and restoration of service.

refactor

See 7 Rs.

Region

A collection of AWS resources in a geographic area. Each AWS Region is isolated and independent of the others to provide fault tolerance, stability, and resilience. For more information, see Specify which AWS Regions your account can use.

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).

rehost

See 7 Rs.

release

In a deployment process, the act of promoting changes to a production environment.

relocate

See 7 Rs.

replatform

See 7 Rs.

repurchase

See 7 Rs.

resiliency

An application's ability to resist or recover from disruptions. High availability and disaster recovery are common considerations when planning for resiliency in the AWS Cloud. For more information, see AWS Cloud Resilience.

resource-based policy

A policy attached to a resource, such as an Amazon S3 bucket, an endpoint, or an encryption key. This type of policy specifies which principals are allowed access, supported actions, and any other conditions that must be met.

responsible, accountable, consulted, informed (RACI) matrix

A matrix that defines the roles and responsibilities for all parties involved in migration activities and cloud operations. The matrix name is derived from the responsibility types defined in the matrix: responsible (R), accountable (A), consulted (C), and informed (I). The support (S) type is optional. If you include support, the matrix is called a *RASCI matrix*, and if you exclude it, it's called a *RACI matrix*.

responsive control

A security control that is designed to drive remediation of adverse events or deviations from your security baseline. For more information, see Responsive controls in *Implementing security controls on AWS*.

retain

See 7 Rs.

retire

See 7 Rs.

Retrieval Augmented Generation (RAG)

A generative AI technology in which an LLM references an authoritative data source that is outside of its training data sources before generating a response. For example, a RAG model might perform a semantic search of an organization's knowledge base or custom data. For more information, see What is RAG.

rotation

The process of periodically updating a secret to make it more difficult for an attacker to access the credentials.

row and column access control (RCAC)

The use of basic, flexible SQL expressions that have defined access rules. RCAC consists of row permissions and column masks.

RPO

See recovery point objective.

RTO

See recovery time objective.

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.

S

SAML 2.0

An open standard that many identity providers (IdPs) use. This feature enables federated single sign-on (SSO), so users can log into the AWS Management Console or call the AWS API operations without you having to create user in IAM for everyone in your organization. For more information about SAML 2.0-based federation, see About SAML 2.0-based federation in the IAM documentation.

SCADA

See supervisory control and data acquisition.

SCP

See service control policy.

secret

In AWS Secrets Manager, confidential or restricted information, such as a password or user credentials, that you store in encrypted form. It consists of the secret value and its metadata. The secret value can be binary, a single string, or multiple strings. For more information, see What's in a Secrets Manager secret? in the Secrets Manager documentation.

security by design

A system engineering approach that takes security into account through the whole development process.

security control

A technical or administrative guardrail that prevents, detects, or reduces the ability of a threat actor to exploit a security vulnerability. There are four primary types of security controls: preventative, detective, responsive, and proactive.

security hardening

The process of reducing the attack surface to make it more resistant to attacks. This can include actions such as removing resources that are no longer needed, implementing the security best practice of granting least privilege, or deactivating unnecessary features in configuration files.

security information and event management (SIEM) system

Tools and services that combine security information management (SIM) and security event management (SEM) systems. A SIEM system collects, monitors, and analyzes data from servers, networks, devices, and other sources to detect threats and security breaches, and to generate alerts.

security response automation

A predefined and programmed action that is designed to automatically respond to or remediate a security event. These automations serve as detective or responsive security controls that help you implement AWS security best practices. Examples of automated response actions include modifying a VPC security group, patching an Amazon EC2 instance, or rotating credentials.

server-side encryption

Encryption of data at its destination, by the AWS service that receives it.

service control policy (SCP)

A policy that provides centralized control over permissions for all accounts in an organization in AWS Organizations. SCPs define guardrails or set limits on actions that an administrator can delegate to users or roles. You can use SCPs as allow lists or deny lists, to specify which services or actions are permitted or prohibited. For more information, see Service control policies in the AWS Organizations documentation.

service endpoint

The URL of the entry point for an AWS service. You can use the endpoint to connect programmatically to the target service. For more information, see AWS service endpoints in *AWS General Reference*.

service-level agreement (SLA)

An agreement that clarifies what an IT team promises to deliver to their customers, such as service uptime and performance.

service-level indicator (SLI)

A measurement of a performance aspect of a service, such as its error rate, availability, or throughput.

service-level objective (SLO)

A target metric that represents the health of a service, as measured by a service-level indicator.

shared responsibility model

A model describing the responsibility you share with AWS for cloud security and compliance. AWS is responsible for security *of* the cloud, whereas you are responsible for security *in* the cloud. For more information, see Shared responsibility model.

Shadow AI

Unauthorized AI applications built or used outside of governed channels within an organization.

SIEM

See security information and event management system.

single point of failure (SPOF)

A failure in a single, critical component of an application that can disrupt the system.

SLA

See service-level agreement.

SLI

See service-level indicator.

SLO

See service-level objective.

split-and-seed model

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.

SPOF

See single point of failure.

star schema

A database organizational structure that uses one large fact table to store transactional or measured data and uses one or more smaller dimensional tables to store data attributes. This structure is designed for use in a data warehouse or for business intelligence purposes.

strangler fig pattern

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

subnet

A range of IP addresses in your VPC. A subnet must reside in a single Availability Zone.

supervisory control and data acquisition (SCADA)

In manufacturing, a system that uses hardware and software to monitor physical assets and production operations.

symmetric encryption

An encryption algorithm that uses the same key to encrypt and decrypt the data.

synthetic testing

Testing a system in a way that simulates user interactions to detect potential issues or to monitor performance. You can use Amazon CloudWatch Synthetics to create these tests.

system prompt

A technique for providing context, instructions, or guidelines to an LLM to direct its behavior. System prompts help set context and establish rules for interactions with users.

T

tags

Key-value pairs that act as metadata for organizing your AWS resources. Tags can help you manage, identify, organize, search for, and filter resources. For more information, see Tagging your AWS resources.

target variable

The value that you are trying to predict in supervised ML. This is also referred to as an *outcome variable*. For example, in a manufacturing setting the target variable could be a product defect.

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.

test environment

See environment.

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.

tool

A function or API that an agent can invoke to perform operations in external systems.

transit gateway

A network transit hub that you can use to interconnect your VPCs and on-premises networks. For more information, see What is a transit gateway in the AWS Transit Gateway documentation.

trunk-based workflow

An approach in which developers build and test features locally in a feature branch and then merge those changes into the main branch. The main branch is then built to the development, preproduction, and production environments, sequentially.

trusted access

Granting permissions to a service that you specify to perform tasks in your organization in AWS Organizations and in its accounts on your behalf. The trusted service creates a service-linked role in each account, when that role is needed, to perform management tasks for you. For more information, see Using AWS Organizations with other AWS services in the AWS Organizations documentation.

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.

two-pizza team

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.

U

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: *Epistemic uncertainty* is caused by limited, incomplete data, whereas *aleatoric uncertainty* is caused by the noise and randomness inherent in the data.

undifferentiated tasks

Also known as *heavy lifting*, work that is necessary to create and operate an application but that doesn't provide direct value to the end user or provide competitive advantage. Examples of undifferentiated tasks include procurement, maintenance, and capacity planning.

upper environments

See environment.

V

vacuuming

A database maintenance operation that involves cleaning up after incremental updates to reclaim storage and improve performance.

version control

Processes and tools that track changes, such as changes to source code in a repository.

VPC peering

A connection between two VPCs that allows you to route traffic by using private IP addresses. For more information, see What is VPC peering in the Amazon VPC documentation.

vulnerability

A software or hardware flaw that compromises the security of the system.

W

warm cache

A buffer cache that contains current, relevant data that is frequently accessed. The database instance can read from the buffer cache, which is faster than reading from the main memory or disk.

warm data

Data that is infrequently accessed. When querying this kind of data, moderately slow queries are typically acceptable.

window function

A SQL function that performs a calculation on a group of rows that relate in some way to the current record. Window functions are useful for processing tasks, such as calculating a moving average or accessing the value of rows based on the relative position of the current row.

workload

A collection of resources and code that delivers business value, such as a customer-facing application or backend process.

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.

WORM

See write once, read many.

WQF

See AWS Workload Qualification Framework.

write once, read many (WORM)

A storage model that writes data a single time and prevents the data from being deleted or modified. Authorized users can read the data as many times as needed, but they cannot change it. This data storage infrastructure is considered immutable.

Z

zero-day exploit

An attack, typically malware, that takes advantage of a zero-day vulnerability.

zero-day vulnerability

An unmitigated flaw or vulnerability in a production system. Threat actors can use this type of vulnerability to attack the system. Developers frequently become aware of the vulnerability as a result of the attack.

zero-shot prompting

Providing an LLM with instructions for performing a task but no examples (*shots*) that can help guide it. The LLM must use its pre-trained knowledge to handle the task. The effectiveness of zero-shot prompting depends on the complexity of the task and the quality of the prompt. See also few-shot prompting.

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.