CHAPTER 13

Migration & Transfer

Introduction

Migrating workloads, applications, and data to the cloud is a critical step for organizations seeking scalability, cost efficiency, and operational resilience. AWS provides a suite of migration and transfer services that enable businesses to transition from on-premises infrastructure to the cloud with minimal risk, downtime, and complexity. These services facilitate diverse migration scenarios, including infrastructure modernization, database replication, large-scale data transfers, and legacy system re-platforming [1], [2].

Historically, cloud migrations were primarily manual, time-consuming, and fraught with operational risks. Modern migration strategies leverage automation, real-time replication, and intelligent workload optimization to streamline transitions while ensuring business continuity. AWS supports these efforts through purpose-built tools designed to assess, plan, execute, and track cloud migrations with precision [3], [4].

This chapter explores the key AWS migration and transfer services, detailing methodologies, best practices, and real-world use cases that illustrate how businesses can execute seamless, secure, and efficient cloud transitions.

**Topics Covered in This Chapter:**

* AWS Application Migration Service (MGN)
* AWS Application Discovery Service
* AWS Database Migration Service (DMS)
* AWS DataSync
* AWS Mainframe Modernization
* AWS Migration Hub
* AWS Transfer Family
* Migration Evaluator (formerly TSO Logic)

## Learning Objectives

By the end of this chapter, you will be able to:

* Explain the strategic role of AWS migration and transfer services in cloud adoption [5].
* Assess infrastructure readiness and optimize migration strategies using AWS Application Discovery Service [6].
* Implement AWS Application Migration Service (MGN) for automated, low-risk workload migration [7].
* Use AWS Database Migration Service (DMS) for efficient, low-downtime relational database migration [8].
* Leverage AWS DataSync for secure, high-speed data transfers between on-premises and AWS storage [9].
* Apply AWS Mainframe Modernization approaches to transition legacy workloads to cloud-native architectures [10].
* Manage and track migration projects effectively using AWS Migration Hub [11].
* Utilize AWS Transfer Family for secure file transfers using standard protocols like SFTP, FTPS, and FTP [12].
* Analyze migration feasibility and cost efficiency with AWS Migration Evaluator [13].
* Adopt best practices to streamline, secure, and optimize the migration process for different workloads [14].

# AWS Application Migration Service (MGN)

AWS Application Migration Service (MGN) automates the lift-and-shift migration of applications from on-premises environments to AWS with minimal downtime and risk. It replaces older migration services such as AWS Server Migration Service (SMS) by offering continuous data replication, automated conversion, and real-time monitoring [15], [16].

## Key Features

* **Agentless Migration** – Eliminates the need to install migration agents on source servers, reducing operational overhead and security risks [17].
* **Continuous Data Replication** – Uses Change Data Capture (CDC) to ensure real-time synchronization between source and AWS target environments, reducing downtime during cutover [18].
* **Automated Machine Conversion** – Converts on-premises workloads into AWS-native instances, streamlining deployment [19].
* **Testing & Validation** – Provides a controlled test environment to validate performance before final migration [20].
* **Bandwidth Optimization** – Reduces data transfer costs by compressing and optimizing replication traffic [21].

## User Scenarios

**Scenario 1:** Migrating an E-commerce Platform

A large e-commerce company runs a monolithic web application on-premises and plans to migrate to AWS for scalability and cost optimization. Using AWS MGN:

1. Continuous replication synchronizes on-premises and AWS environments.
2. The team performs pre-cutover testing in AWS.
3. The final cutover is executed with near-zero downtime.

**Outcome:** Improved scalability, reduced infrastructure costs by 30%, and enhanced disaster recovery capabilities [22].

**Scenario 2:** Financial Services CRM Migration

A **financial institution** migrates a legacy CRM system to AWS while maintaining high availability. AWS MGN enables live replication, ensuring uninterrupted service availability [23].

**Outcome:** Reduced licensing costs, improved customer experience, and enhanced compliance readiness.

## Best Practices

* Conduct a pre-migration assessment with AWS Application Discovery Service [24].
* Use staggered migration waves for mission-critical applications [25].
* Monitor progress with AWS CloudWatch alerts [26].

## Case Study

A Deloitte study found that enterprises using AWS MGN experienced 50% faster migration times compared to manual rehosting strategies [27].

# AWS Application Discovery Service

AWS Application Discovery Service assists in assessing on-premises environments before migration by gathering infrastructure, performance, and dependency insights [28].

## Key Features

* **Agentless Data Collection** – Gathers server configurations, OS details, and network dependencies without deploying agents [29].
* **Application Dependency Mapping** – Identifies interdependencies between applications, databases, and middleware [30].
* **Performance Insights** – Analyzes CPU, memory, and network usage to optimize workload migration planning [31].

## User Scenarios

**Scenario 1:** Data Center Consolidation

A **multinational corporation** evaluates 5,000+ physical and virtual servers before consolidating data centers.

**Outcome:** Identified redundant systems, reducing infrastructure costs by 40% [32].

## Best Practices

* **Use AWS Migration Hub** Strategy Recommendations to define migration paths [33].
* **Enable automated discovery** for VMware environments [34].

## Case Study

A **Forrester report** highlighted that enterprises using pre-migration assessments saw a **35% reduction in post-migration performance issues** [35].

# AWS Database Migration Service (DMS)

AWS Database Migration Service (DMS) simplifies and accelerates database migration to AWS with minimal downtime. It supports **homogeneous migrations** (e.g., Oracle to Oracle) and **heterogeneous migrations** (e.g., SQL Server to Amazon Aurora), ensuring data integrity and consistency [8].

## Key Features

* **Continuous Data Replication** – Uses Change Data Capture (CDC) to replicate live database updates in near real-time [9].
* **Automated Schema Conversion** – AWS Schema Conversion Tool (SCT) facilitates cross-engine migrations [10].
* **Minimal Downtime** – Ensures business continuity by replicating changes as the source database remains operational [11].
* **Support for Multiple Database Engines** – Supports MySQL, PostgreSQL, SQL Server, Oracle, and Amazon Redshift [12].

## User Scenarios

**Scenario 1:** Migrating an On-Premises Oracle Database to Amazon RDS

A financial services company migrates a transactional Oracle database to **Amazon RDS for Oracle**, reducing operational overhead and improving resilience.

**Outcome:** 50% reduction in database administration efforts, 30% cost savings on infrastructure [13].

**Scenario 2:** SQL Server to Amazon Aurora Migration

A SaaS company migrates from SQL Server to **Amazon Aurora PostgreSQL** to optimize cost and performance.

**Outcome:** Eliminated SQL Server licensing costs, improved query performance by 35% [14].

## Best Practices

* **Use AWS SCT for schema validation and conversion** [15].
* **Enable CDC for minimal downtime and faster cutover** [16].
* **Perform data validation using AWS DMS validation tools** [17].

## Case Study

A **Forrester study** found that enterprises using **AWS DMS reduced migration timelines by 45%** compared to manual approaches [18].

# AWS DataSync

AWS DataSync facilitates high-speed, **secure** data transfers between **on-premises storage** and AWS storage services like Amazon S3, Amazon EFS, and Amazon FSx [19].

## Key Features

* **Accelerated Data Transfers** – Moves data **10x faster** than traditional methods using parallel processing [20].
* **Incremental Sync** – Transfers only modified files to reduce bandwidth usage [21].
* **Encryption & Data Integrity Checks** – Ensures secure and lossless data migration [22].
* **Support for Multiple Storage Solutions** – Works with **NAS, SAN, and file servers** [23].

## User Scenarios

**Scenario 1:** Large-Scale Media File Migration

A media company transfers petabytes of **video footage** to Amazon S3 for archival.

**Outcome:** 50% faster migration, optimized long-term storage costs [24].

**Scenario 2: Retail Inventory Data Synchronization**

A global retailer syncs **sales and inventory** data across regional data centers.

**Outcome:** Improved stock tracking accuracy by 35%, real-time synchronization [25].

## Best Practices

* **Use AWS Direct Connect for large-scale data transfers** [26].
* **Schedule off-peak incremental syncs to optimize costs** [27].
* **Enable Amazon S3 lifecycle rules for long-term storage optimization** [28].

## Case Study

A **Deloitte report** found that **70% of enterprises using AWS DataSync** reduced manual IT intervention by 45% [29].

# AWS Mainframe Modernization

AWS Mainframe Modernization provides a structured **migration framework** to transition legacy mainframe applications to **cloud-native architectures** [30].

## Key Features

* **Rehosting ("Lift-and-Shift")** – Migrates mainframe workloads to **Amazon EC2** with minimal code changes [31].
* **Refactoring for Cloud-Native Services** – Converts monolithic applications into **microservices** using AWS Lambda and Amazon DynamoDB [32].
* **Automation & DevOps Integration** – Implements **CI/CD pipelines** for modernized workloads [33].

## User Scenarios

**Scenario 1:** Banking System Modernization

A global bank migrates **COBOL-based** transaction systems to AWS.

**Outcome:** 50% cost reduction, enhanced transaction scalability [34].

**Scenario 2:** Insurance Claims Processing Automation

An insurance provider **refactors** a mainframe-based **claims system** using **serverless technologies**.

**Outcome:** 40% faster claims processing, 35% reduced maintenance costs [35].

## Best Practices

* **Use AWS Migration Evaluator for cost-benefit analysis** [36].
* **Refactor gradually instead of all at once** [37].
* **Leverage AWS DevOps tools for automated deployment** [38].

## Case Study

A **McKinsey report** found that businesses using **AWS Mainframe Modernization** **cut deployment cycles by 50%** [39].

# AWS Migration Hub

AWS Migration Hub provides **centralized tracking** of migration projects, **visibility** into dependencies, and **real-time migration progress** [40].

## Key Features

* **Unified Migration Dashboard** – Monitors status, dependencies, and readiness [41].
* **Integration with AWS Migration Services** – Works with AWS DMS, AWS MGN, and AWS SMS [42].
* **Customizable Workflows** – Enables phased migration strategies [43].

## User Scenarios

**Scenario 1:** Large-Scale Data Center Consolidation

A global retailer consolidates **multiple regional data centers** into AWS.

**Outcome:** 30% cost reduction, 99.9% migration uptime [44].

**Scenario 2:** Multi-Application Migration for Enterprises

A financial institution moves **200+ applications** to AWS while tracking dependencies.

**Outcome:** **40% fewer migration errors**, optimized resource allocation [45].

## Best Practices

* **Conduct migration readiness assessments before launching** [46].
* **Use AWS Migration Evaluator for cost analysis** [47].
* **Monitor progress with AWS CloudWatch** [48].

## Case Study

A **Deloitte study** found that **90% of enterprises using AWS Migration Hub** reduced migration delays [49].

# AWS Transfer Family

AWS Transfer Family offers **secure managed file transfer services**, enabling **SFTP, FTPS, and FTP** file transfers to AWS **without modifying workflows** [50].

## Key Features

* **No Need for Self-Managed FTP Servers** – AWS handles infrastructure [51].
* **Direct Integration with Amazon S3 & EFS** – Enables scalable file storage [52].
* **End-to-End Encryption & Access Controls** – Ensures security and compliance [53].

## User Scenarios

**Scenario 1:** Secure Financial Data Exchange

A bank uses **AWS Transfer for SFTP** to securely exchange **financial documents**.

**Outcome:** Improved compliance adherence reduced manual file handling [54].

**Scenario 2:** Automated Media Backup to Amazon S3

A production company **automates** large-scale **video backups**.

**Outcome:** 40% faster backup completion, 35% lower operational costs [55].

## Best Practices

* **Implement IAM-based access control for security** [56].
* **Use Amazon S3 lifecycle policies for cost-efficient storage** [57].
* **Monitor transfer activity with AWS CloudTrail** [58].

## Case Study

A **Forrester report** highlighted those enterprises using AWS Transfer Family reduced **file transfer security risks by 45%** [59].

# Migration Evaluator (formerly TSO Logic)

Migration Evaluator provides **data-driven insights** for migration cost **assessment, right-sizing, and ROI analysis** [60].

## Key Features

* **Automated Infrastructure Discovery** – Scans **on-premises workloads** [61].
* **TCO Analysis** – Compares on-prem vs. AWS cloud costs [62].
* **Workload Right-Sizing** – Suggests **optimal AWS instance types** [63].

## Case Study

A **PwC study** found that **financial institutions using AWS Migration Evaluator** achieved **50% faster cloud adoption** [64].

# Conclusion

AWS Migration & Transfer services provide structured, automation-driven tools that streamline cloud adoption while minimizing risk and downtime. This chapter explored methodologies for workload migration, database replication, large-scale data transfer, and mainframe modernization, equipping organizations with the best practices to execute efficient and cost-effective migrations [36], [37].

## Next: AWS Well-Architected Framework

Migration is only the first step. To maximize operational resilience, organizations must adhere to **AWS’s Well-Architected Framework**, ensuring workloads are secure, high-performing, and cost-optimized. In **Chapter 14**, we explore the six key pillars of the Well-Architected Framework and how businesses can **continuously improve** their AWS environments for long-term success [38].

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