Module 9 – Migration and Innovation

Contents

Learning objectives

In this module, you will learn how to:

- Understand migration and innovation in the AWS Cloud.
- Summarize the AWS Cloud Adoption Framework (AWS CAF).
- Summarize the six key factors of a cloud migration strategy.
- Describe the benefits of AWS data migration solutions, such as AWS Snowcone, AWS Snowball, and AWS Snowmobile.
- Summarize the broad scope of innovative solutions that AWS offers.

Introduction

So looks like we've established how to get going on the AWS Cloud, but what if you have existing deployments in on-premises environments or have started a cloud journey without AWS? Well, we'd love to help you move across, especially since you can take advantage of some real savings by moving.

This brings us to migration and innovation. We'll show you all the options from migration tools, the **AWS Cloud Adoption Framework**, and even the **Snow Family**, which are physical devices to migrate data in and out of AWS.

So before we adjourn, stay glued to your seats for information on how to move from on-premises environment or the cloud to AWS. We'll even cover **the six Rs of migration.**

Six core perspectives of the AWS Cloud Adoption Framework

Migrating to the cloud is a process. You don't just snap your fingers and have everything magically hosted in AWS. It takes a lot of effort to get applications migrated to AWS, and having a successful cloud migration is something that requires expertise.

What position you hold in your organization will impact the things that you need to know or help with for your migration. If you are a developer, your role and viewpoint will be much different than a cloud architect, business analyst or financial analyst. Different types of people bring different perspectives to the table for migration, and you want to harness those different perspectives and make sure everyone is on the same page.

You also want to ensure that you have the right talent to help support your migration, so HR will need to hire at the correct rate to enable your migration. This can be a lot to keep track of, and someone new to the cloud might not think of all the different people who need to be involved. The AWS professional services team has created something called the AWS Cloud Adoption Framework that can help you manage this process through guidance.

At the highest level, the **AWS Cloud Adoption Framework (AWS CAF)** organizes guidance into six areas of focus, called **Perspectives**. Each Perspective addresses distinct responsibilities. The planning process helps the right people across the organization prepare for the changes ahead.

In general, the **Business**, **People**, and **Governance** Perspectives focus on business capabilities, whereas the **Platform**, **Security**, and **Operations** Perspectives focus on technical capabilities.

Business Perspective
The **Business Perspective** ensures that **IT aligns with business needs** and that IT investments link to key business results.

Use the Business Perspective to create a **strong business case** for cloud adoption and prioritize cloud adoption initiatives. Ensure that your business strategies and goals align with your IT strategies and goals.

Common roles in the Business Perspective include:
- Business managers
- Finance managers
- Budget owners
- Strategy stakeholders

People Perspective

The **People Perspective** supports development of an **organization-wide change management** strategy for successful cloud adoption.

Use the People Perspective to evaluate organizational structures and roles, new skill and process requirements, and identify gaps. This helps prioritize **training, staffing, and organizational changes.**

Common roles in the People Perspective include:
- Human resources
- Staffing
- People managers

Governance Perspective

The **Governance Perspective** focuses on the **skills and processes to align IT strategy with business strategy**. This ensures that you maximize the business value and minimize risks.

Use the Governance Perspective to understand how to update the staff skills and processes necessary to ensure business governance in the cloud. Manage and measure cloud investments to evaluate business outcomes.

Common roles in the Governance Perspective include:
- Chief Information Officer (CIO)
- Program managers
- Enterprise architects
- Business analysts
- Portfolio managers

Platform Perspective

The **Platform Perspective** includes **principles and patterns for implementing** new solutions on the cloud, and **migrating on-premises workloads** to the cloud.

Use a variety of **architectural** models to understand and communicate the structure of IT systems and their relationships. Describe the architecture of the target state environment in detail.

Common roles in the Platform Perspective include:
- Chief Technology Officer (CTO)
- IT managers
- Solutions architects

Security Perspective

The **Security Perspective** ensures that the organization **meets security objectives** for visibility, auditability, control, and agility.

Use the AWS CAF to structure the **selection and implementation of security controls and permissions** that meet the organization's needs.

Common roles in the Security Perspective include:
- Chief Information Security Officer (CISO)
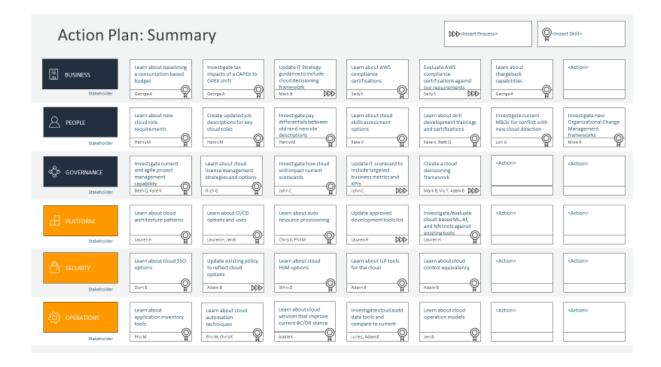- IT security managers
- IT security analysts

<u>Operations Perspective</u>
The **Operations Perspective** helps you to **enable, run, use, operate, and recover IT workloads** to the level agreed upon with your **business stakeholders**.

Define how day-to-day, quarter-to-quarter, and year-to-year business is conducted. Align with and support the operations of the business. The AWS CAF helps these stakeholders define current **operating procedures** and identify the **process changes** and training needed to implement successful cloud adoption.

Common roles in the Operations Perspective include:
- IT operations managers
- IT support managers

6 strategies for migration

Every application, or application groups, if they're tightly coupled, will have six possible options when it comes to your enterprise migration. We call these the six R's. Once you've gone through the discovery phase and know exactly what you have in your existing environment, you decide which option among the six R's is the best fit based on time, cost, priority, and criticality.

When migrating applications to the cloud, six of the most common migration strategies that you can implement are:

- Rehosting
- Replatforming
- Refactoring/re-architecting
- Repurchasing
- Retaining
- Retiring

Rehosting also known as **"lift-and-shift"** involves moving applications without changes. In the scenario of a large legacy migration, in which the company is looking to implement its migration and scale quickly to meet a business case, the majority of applications are rehosted.

Replatforming, also known as "lift, tinker, and shift," involves making a few cloud optimizations to realize a tangible benefit. Optimization is achieved **without** changing the core architecture of the application i.e. you are not touching any core code in the process, and no new dev efforts are involved here. For example, you could take your existing MySQL database and replatform it onto RDS MySQL, without any code changes at all. Or even consider upgrading to Amazon Aurora. This gives significant benefit to your DBA team as well as improved performance without any code changes.

Refactoring (also known as **re-architecting**) involves reimagining how an application is architected and developed by using cloud-native features. Refactoring is driven by a **strong business need to add features, scale, or performance** that would otherwise be difficult to achieve in the application's existing environment. **Dramatic changes** to your architecture can be very beneficial to your enterprise but this will come at the **highest initial cost** in terms of planning and human effort.

Repurchasing involves **moving from a traditional license to a software-as-a-service** model i.e. it involves replacing an existing application with a cloud-based version, such as software found in AWS Marketplace. This is common for companies looking to **abandon legacy software vendors** and get a fresh start as part of migration. For example, a business might choose to implement the repurchasing strategy by migrating from a customer relationship management (CRM) system to Salesforce.com. The total upfront expense of the step therefore goes up, but the potential benefits could be substantial.

Retaining consists of keeping applications that are critical for the business in the source environment. This might include applications that are about to be deprecated, and require major refactoring before they can be migrated, or, work that can be postponed until a later time.

Retiring is the process of removing applications that are no longer needed. Some parts of your enterprise IT portfolio are just no longer needed. We found as much as 10% to 20% of companies' application portfolios include applications that are no longer being used or already have replacements live and functional. Using the AWS migration plan as the opportunity to actually end-of-life these applications can save significant cost and effort for your team. Sometimes you just have to turn off the lights.

AWS Snow Family members

Some of our customers need to get data to AWS and most of them would like to do it in an efficient and timely manner. The usual route is to simply copy the required data over the internet or better yet, if they have a Direct Connect line. However, with the **limitations of bandwidth**, in general, this can take days, weeks, or even months.

For example, a dedicated one gigabyte per second network connection theoretically moves one petabyte of data in about 100 days and in the real world likely longer and at a higher cost.

The **AWS Snow Family** is a collection of **physical devices** that help to physically transport up to exabytes of data into and out of AWS.

AWS Snow Family is composed of **AWS Snowcone**, **AWS Snowball**, and **AWS Snowmobile**.

These devices offer different capacity points, and most **include built-in computing capabilities.** AWS owns and manages the Snow Family devices and integrates with AWS security, monitoring, storage management, and computing capabilities.

It should be noted that all Snow Family devices are designed to be secure and tamper-resistant while on-site or in transit. This means the hardware and software is cryptographically signed, and all data stored is **automatically encrypted** using 256-bit

encryption keys, owned and managed by you, the customer. You can even use **AWS Key Management Service** to generate and manage keys.

AWS Snowcone is a small, rugged, and secure **edge computing** and **data transfer device**. It features 2 CPUs, 4 GB of memory, and **8 TB** of usable storage. Edge computing options are Amazon EC2 instances and AWS IoT Greengrass. Customers usually use these devices to ship terabytes of information such as analytics data, video libraries, image collections, backups, and even tape replacement data.

AWS Snowball offers two types of devices:

- **Snowball Edge Storage Optimized** devices are well suited for large-scale data migrations and recurring transfer workflows, in addition to local computing with higher capacity needs.
    - Storage: **80 TB** of hard disk drive (HDD) capacity for block volumes and Amazon S3 compatible object storage, and 1 TB of SATA solid state drive (SSD) for block volumes.
    - Compute: 40 vCPUs, and 80 GiB of memory to support Amazon EC2 sbe1 instances (equivalent to C5).

- **Snowball Edge Compute Optimized** provides **powerful computing resources** for use cases such as machine learning, full motion video analysis, analytics, and local computing stacks.
    - Storage: **42-TB** usable HDD capacity for Amazon S3 compatible object storage or Amazon EBS compatible block volumes and 7.68 TB of usable NVMe SSD capacity for Amazon EBS compatible block volumes.
    - Compute: 52 vCPUs, **208 GiB of memory**, and an optional NVIDIA Tesla V100 **GPU**. Devices run Amazon EC2 sbe-c and sbe-g instances, which are equivalent to C5, M5a, G3, and P3 instances.

Once you plug them into your infrastructure, you can even run AWS Lambda functions, Amazon EC2-compatible AMI's, or even AWS IoT Greengrass to perform simple processing of data right then and there. Customers usually ship these to remote locations, where it's trickier to have a lot of computing power lying around. The use cases include capturing of streams from IoT devices, image compression, video transcoding, and even industrial signalling.

AWS Snowmobile is an **exabyte**-scale data transfer service used to move large amounts of data to AWS. You can transfer up to **100 petabytes** of data per Snowmobile, a 45-foot long ruggedized shipping container, pulled by a semi-trailer truck. It is tamper resistant, waterproof, temperature controlled, it even has fire suppression and GPS tracking. I mean, can you believe that it also has 24/7 video surveillance with a dedicated security team and escort security vehicle during transit? That's some serious business.

Innovation with AWS Services

There's so much more that can be done on AWS that we have time to talk about here. For example, when it comes to migrating onto AWS, we didn't even cover running **VMware on AWS**. The same VMware based infrastructure that you use on-premise can in many cases, just be lifted up and dropped onto AWS via **VMware Cloud on AWS**. And this is just one of many concepts that make AWS a place where builders go to create and innovate at the pace of their ideas.

When examining how to use AWS services, it is important to focus on the desired outcomes. You are properly equipped to drive innovation in the cloud if you can clearly articulate the following conditions:

- The current state
- The desired state
- The problems you are trying to solve

Consider some of the paths you might explore in the future as you continue on your cloud journey.

Serverless applications

With AWS, **serverless** refers to **applications that don't require you to provision, maintain, or administer servers.** You don't need to worry about fault tolerance or availability. AWS handles these capabilities for you.

AWS Lambda is an example of a service that you can use to run serverless applications. If you design your architecture to trigger Lambda functions to run your code, you can bypass the need to manage a fleet of servers.

Building your architecture with serverless applications enables your developers to focus on their core product instead of managing and operating servers.

Artificial intelligence

AWS offers a variety of services powered by **artificial intelligence (AI)**.

For example, you can perform the following tasks:
- Convert speech to text with Amazon **Transcribe**.
- Discover patterns in text with Amazon **Comprehend**.
- Identify potentially fraudulent online activities with Amazon **Fraud Detector**.
- Build voice and text chatbots with Amazon **Lex**.

Machine learning

Traditional **machine learning (ML)** development is complex, expensive, time consuming, and error prone. AWS offers **Amazon SageMaker** to remove the difficult work from the process and empower you to build, train, and deploy ML models quickly. With Amazon SageMaker, you can quickly and easily begin working on machine learning projects. You do not need to follow the traditional process of manually bringing together separate tools and workflows.

You can use ML to analyse data, solve complex problems, and predict outcomes before they happen. Tools like Amazon **SageMaker** and Amazon Augmented AI, or Amazon **A2I**, provide a machine learning platform that any business can build upon without needing PhD level expertise in-house. Amazon **Augmented AI (Amazon A2I)** provides **built-in human review workflows** for common machine learning use cases, such as content moderation and text extraction from documents. With Amazon A2I, you can also create your own workflows for machine learning models built on Amazon SageMaker or any other tools.

Or perhaps, ready-to-go AI solutions like Amazon **Lex**, the heart of Alexa.

Or what about Amazon **Textract**. Extracting text and data from documents to make them more usable for your enterprise instead of them just being locked away in a repository.

Do you want to put machine learning literally into the hands of your developers? Why not try **AWS DeepRacer**? A chance for your developers to experiment with **reinforcement learning**. One of the newest branches of machine learning algorithms, all while having fun in a racing environment.

AWS offers brand new technologies in things like Internet of Things. Enabling connected devices to communicate all around the world. Speaking of communication around the world, have you ever wanted to have your own **satellite**? Too expensive to launch your own? Why not just use **AWS Ground Station** and only pay for the satellite time you actually need?

Summary

Over the last few videos, you started to learn about migration to AWS, as well as some interesting and innovative services you can use to either aid in your migration or to step your game up with AWS.

You learned about the **AWS Cloud Adoption Framework**. The Cloud Adoption Framework gives you guidance on who to loop into a cloud migration, what their roles are, and the sorts of things that they should be focused on. There's the **Business, People, and Governance Perspectives for nontechnical planning, and the Platform, Security, and Operations Perspectives for technical planning**.

We also talked about the **six R's of migration**. The R's represent different strategies on moving solutions to the cloud. They are **Rehost, Replatform, Repurchase, Refactor, Retire, and Retain.**

There was also the question of how to move massive amounts of data into AWS without going over the network. This is where you learned about **AWS Snowball and AWS Snowmobile,** which allow you to fill in a physical device with your data and have it shipped back to AWS who then uploads it for you. This is useful to sidestep any potential throughput issues, and it is also **more secure** than using high-speed internet.

Quiz

Which Perspective of the AWS Cloud Adoption Framework helps you structure the selection and implementation of permissions?

- Security Perspective

Which strategies are included in the six strategies for application migration? (Select TWO.)

- Retaining and Rehosting

What is the storage capacity of AWS Snowmobile?

- 100 PB

Which statement best describes Amazon Lex?

- A service that enables you to build conversational interfaces using voice and text

Additional resources

To learn more about the concepts that were explored in Module 9, review these resources.

- [Migration & Transfer on AWS](#)
- [A Process for Mass Migrations to the Cloud](#)
- [6 Strategies for Migrating Applications to the Cloud](#)
- [AWS Cloud Adoption Framework](#)
- [AWS Fundamentals: Core Concepts](#)
- [AWS Cloud Enterprise Strategy Blog](#)
- [Modernizing with AWS Blog](#)
- [AWS Customer Stories: Data Centre Migration](#)

Updated by   Lionel Tchami   – December