



Migration to Cloud





Migration to Cloud

Why people migrate?

- To make tomorrow better than today



Why organizations migrate to cloud?

- Organizations are moving legacy applications and data to the cloud.



Migration – Plan, Prepare, Perform

People Migration

Skills, Legal requirements, Finance, Family obligation, Weather, Kid's School, Social Circle, Pets, Transport, Accommodation



PLAN

Visa (self, family), Pet (vaccine), Car (documentation), Cash (exchange currency), Weather (buy clothes), Travel (Ticket & accommodation)



PREPARE

Handover your packages to a shipping company, Carry important documents with you, Follow best practices, Be ready to adjust



PERFORM

Step 1 - Assess your readiness

Are you ready? (Identify the gaps)



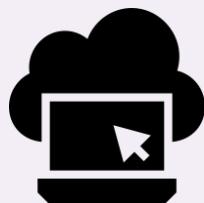
PLAN

Assess your organization's current readiness for operating in the cloud. Identify the desired business outcomes and develop the business case for migration.



PREPARE

Create a migration plan and refine your business case. Address gaps in your organization's readiness, with a focus on building your baseline environment, and developing cloud skills.

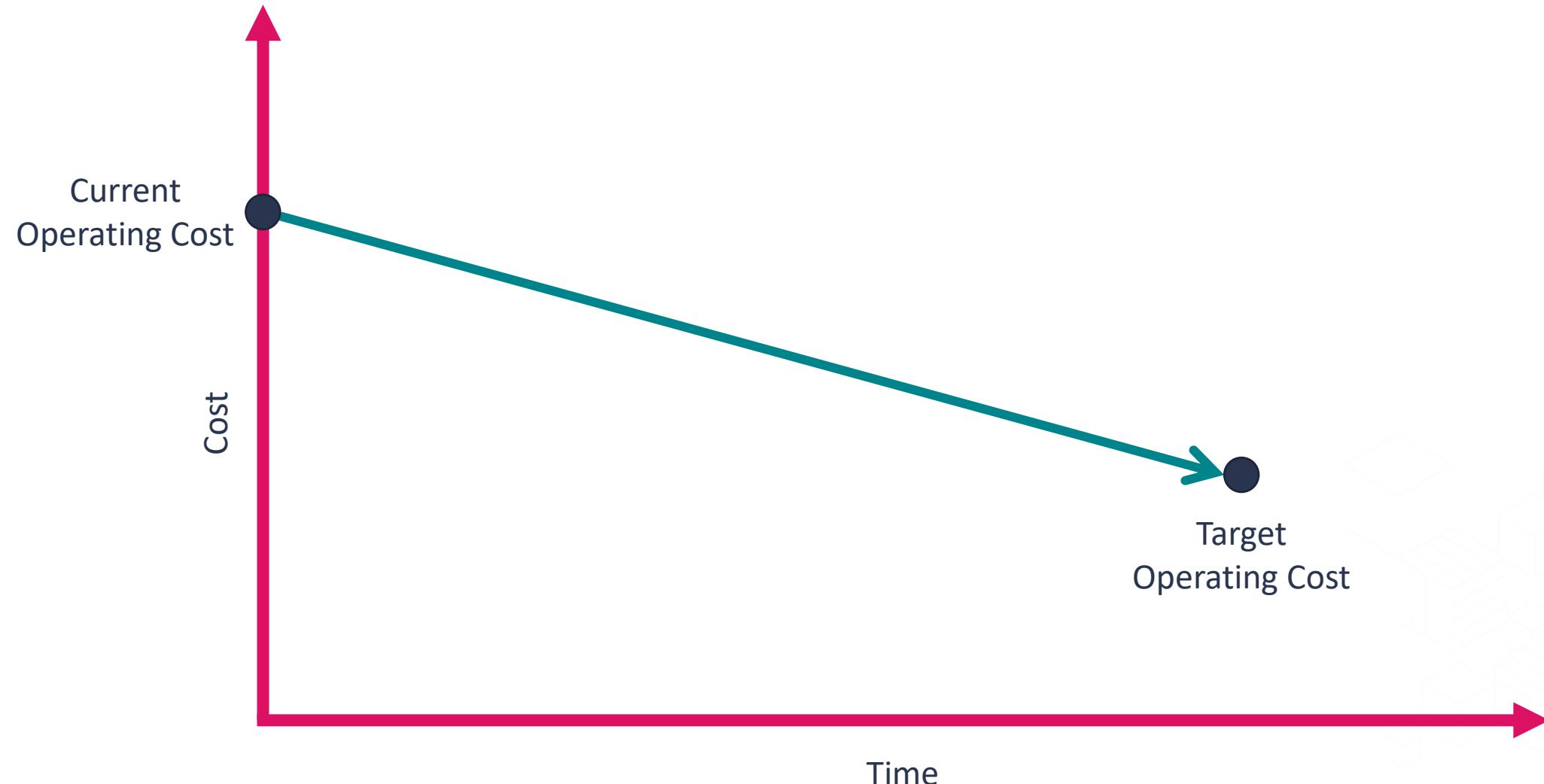


PERFORM

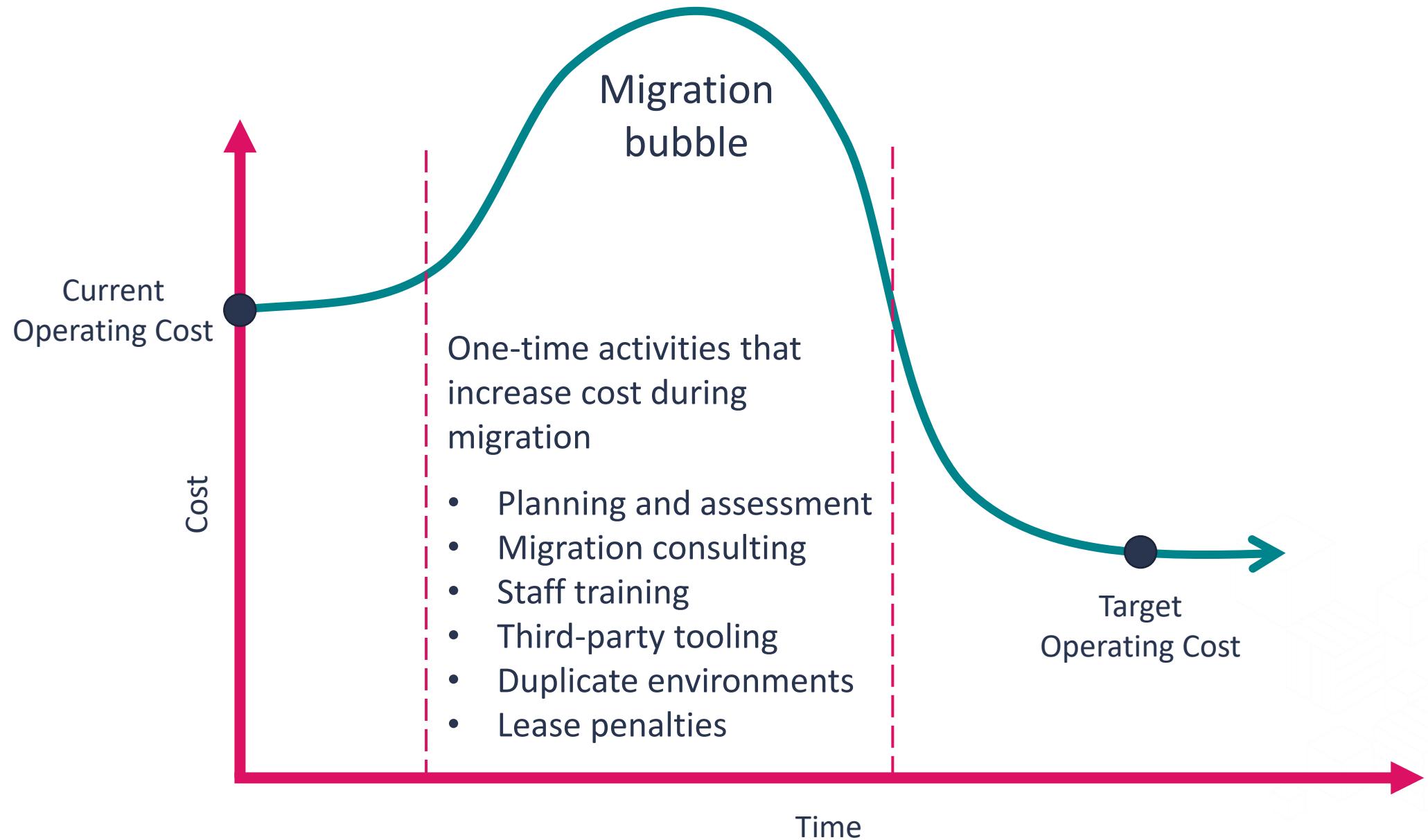
Migrate, validate and optimize using 7 Rs of cloud migration by making the choice that best suits your organization. Optimize sooner than later.

Cloud Migration

Cost Saving - Expectation



Cost Saving - Reality



Migration – Plan, Prepare, Perform

People Migration

Consultancy Firms
or
Hiring Companies



Immigration



Ticketing



Shipping



Funding



Housing



Amenities

Access

Mobilize

Migrate and Modernize

Cloud Migration

AWS Migration
Acceleration
Program (MAP)



Methodology



Tools



Partners



Investment

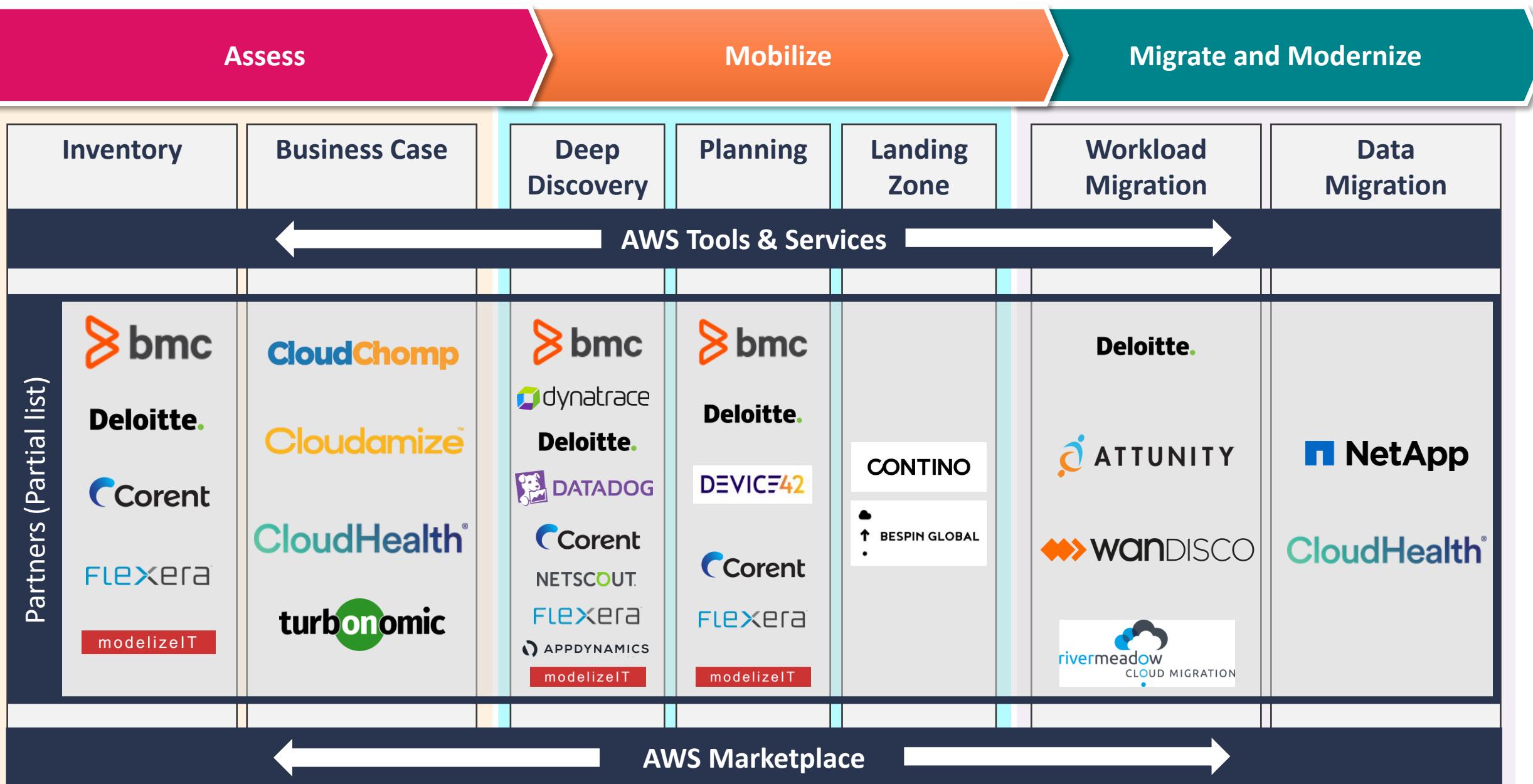


Training

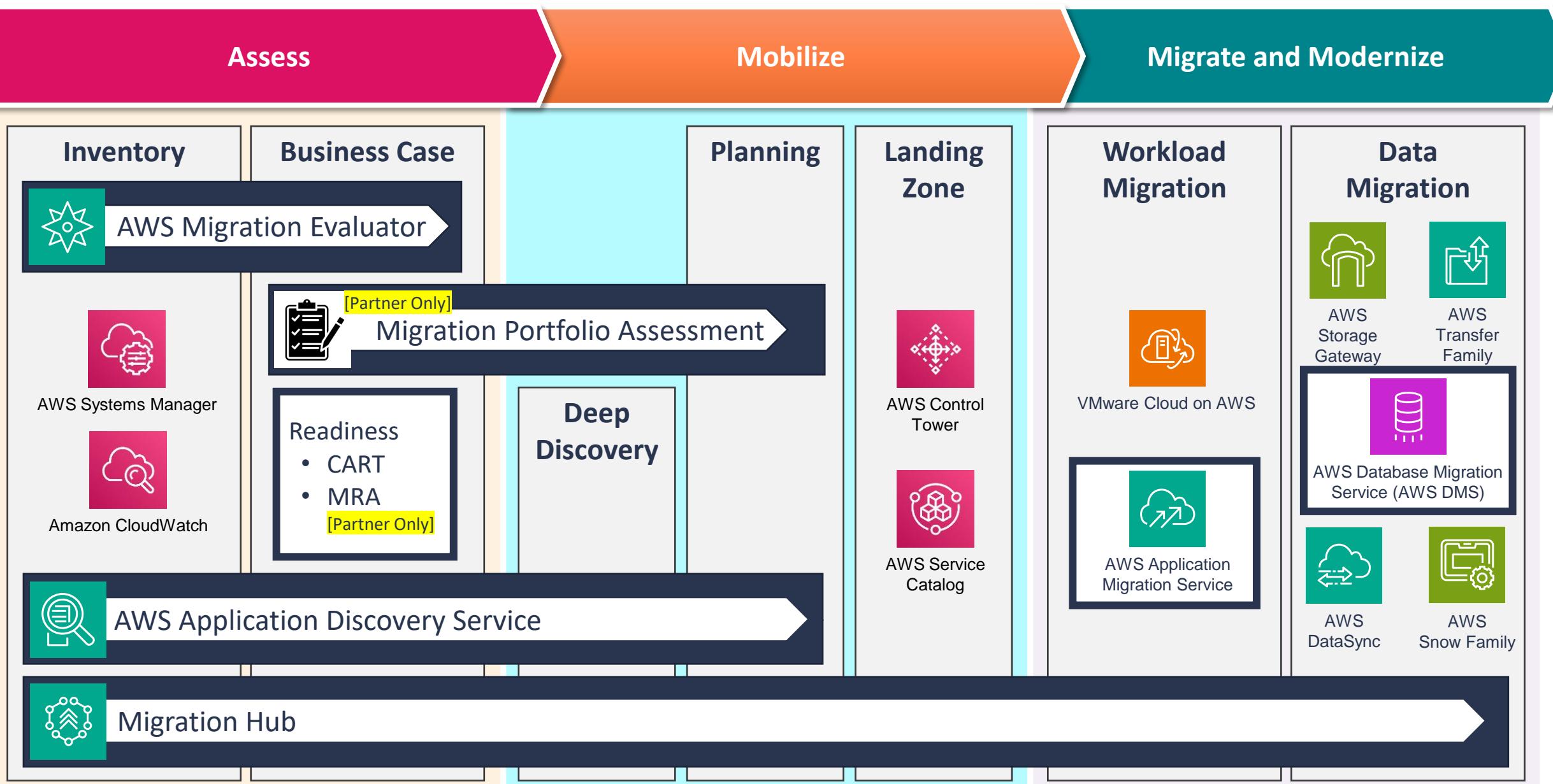


Service

Cloud Migration – Tools Portfolio



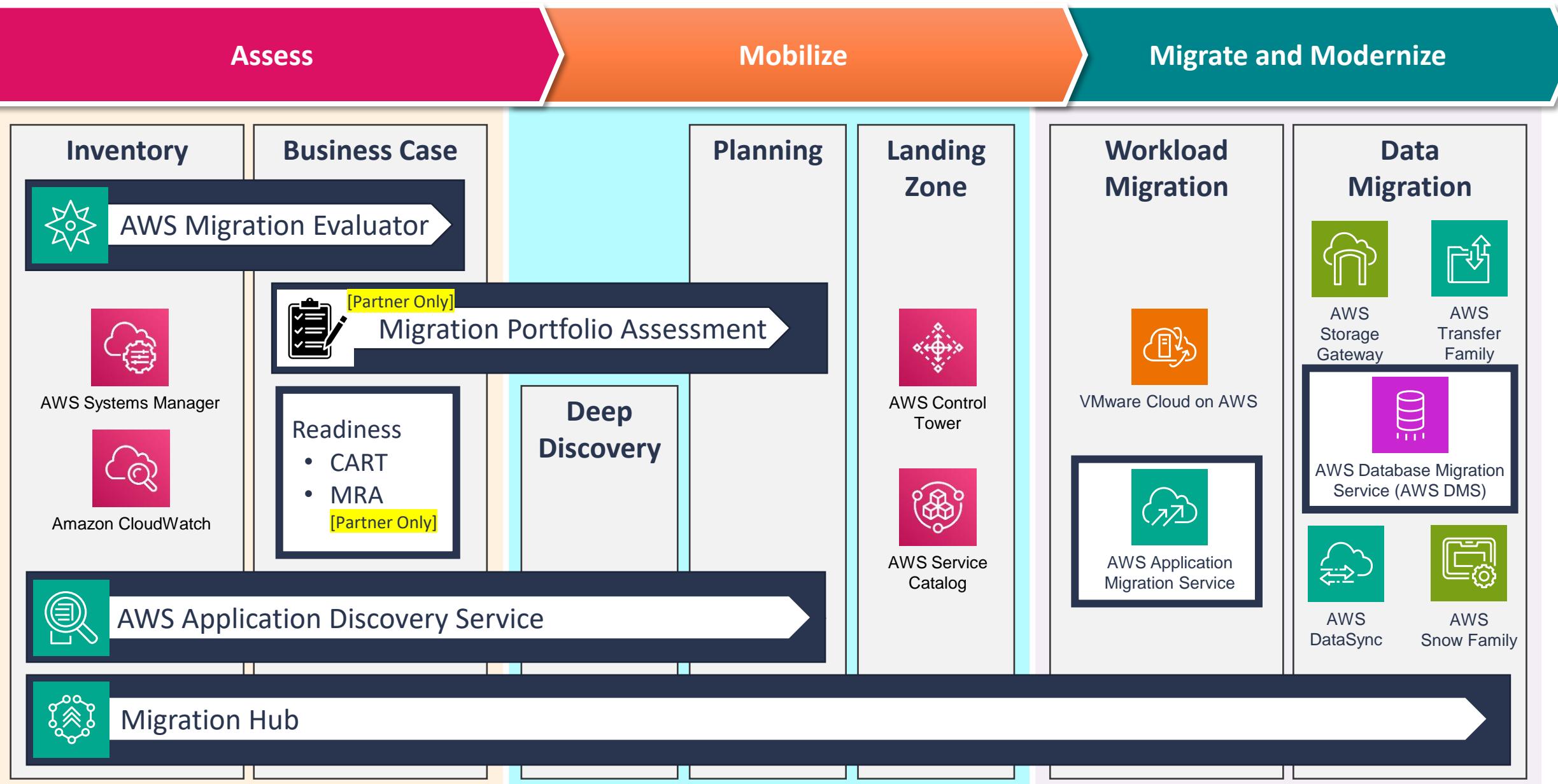
Cloud Migration – AWS Tools and Services Portfolio



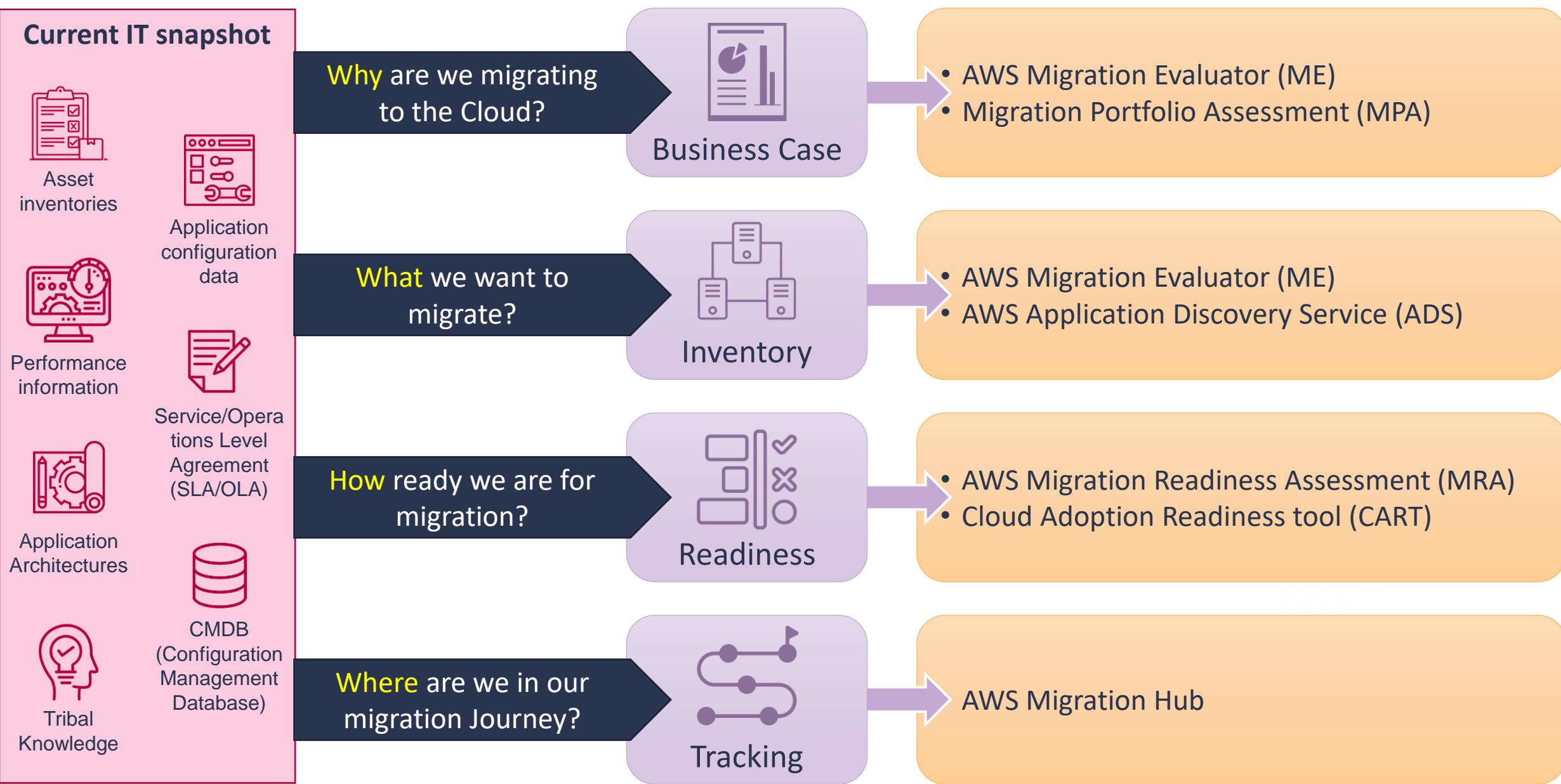


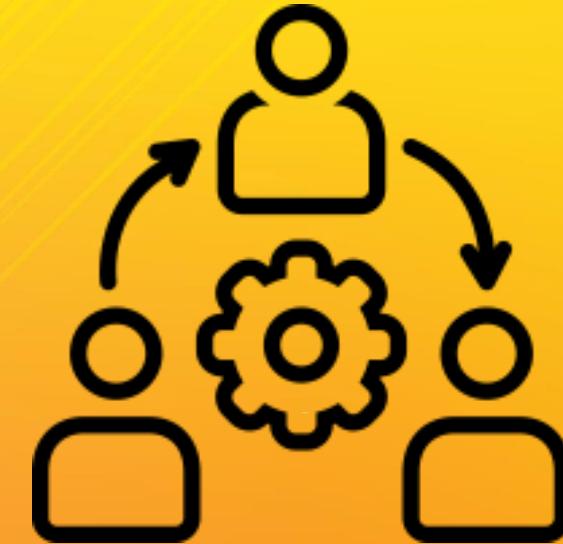
Assess Phase

Assess Phase



Assess Phase

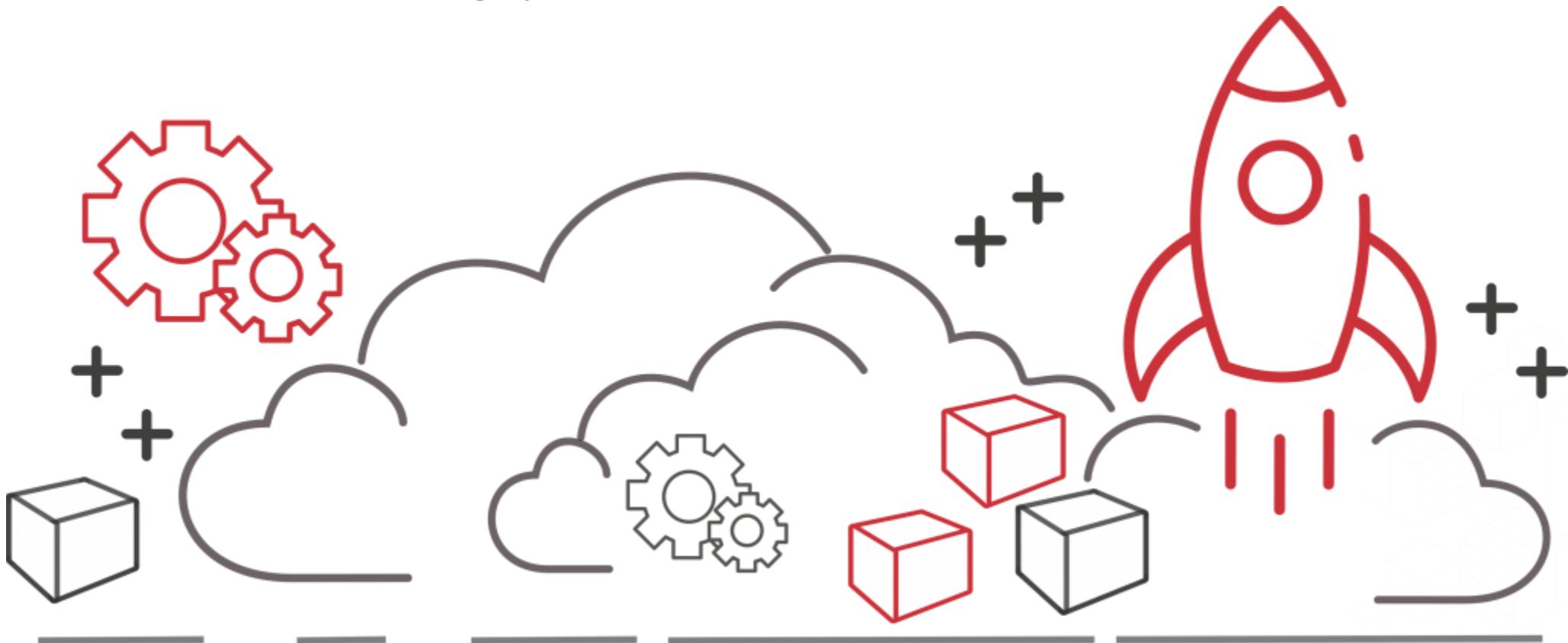




Assess Organization
Readiness

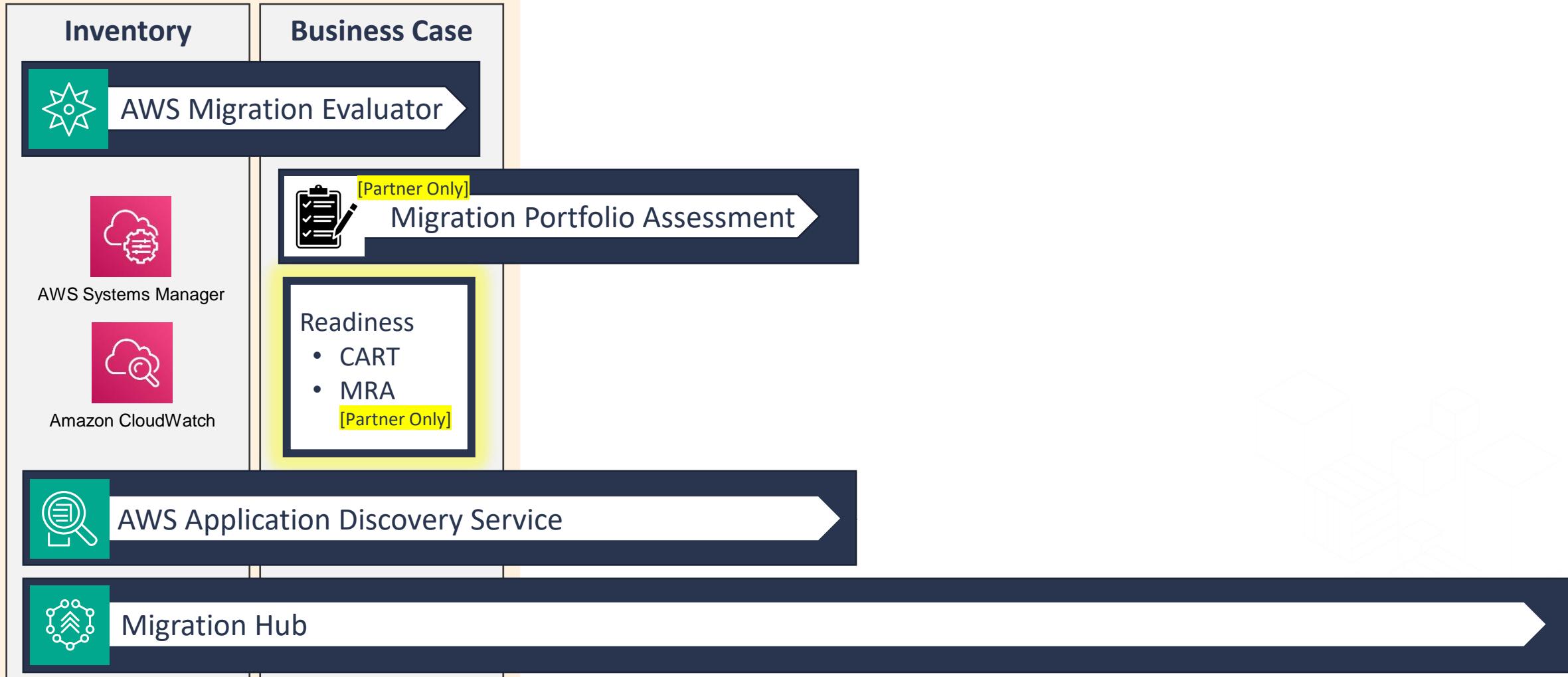
Assess Organization Readiness

- A migration readiness assessment is a process of gaining insights into how far along an organization is in their cloud journey, understanding their current cloud-readiness strengths and weaknesses, and building an action plan to close identified gaps.



Assess Phase

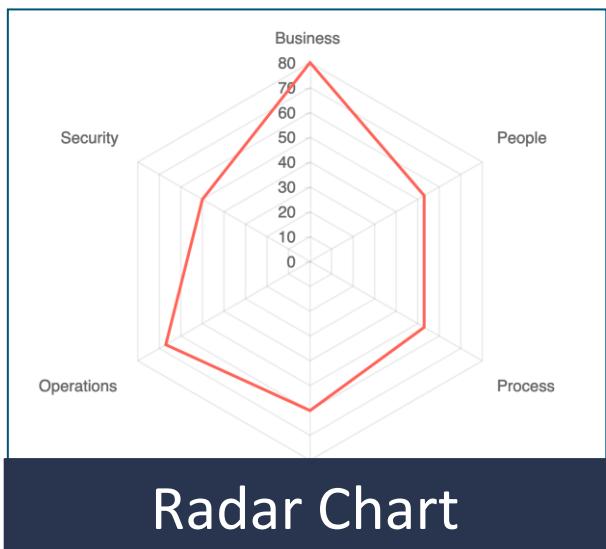
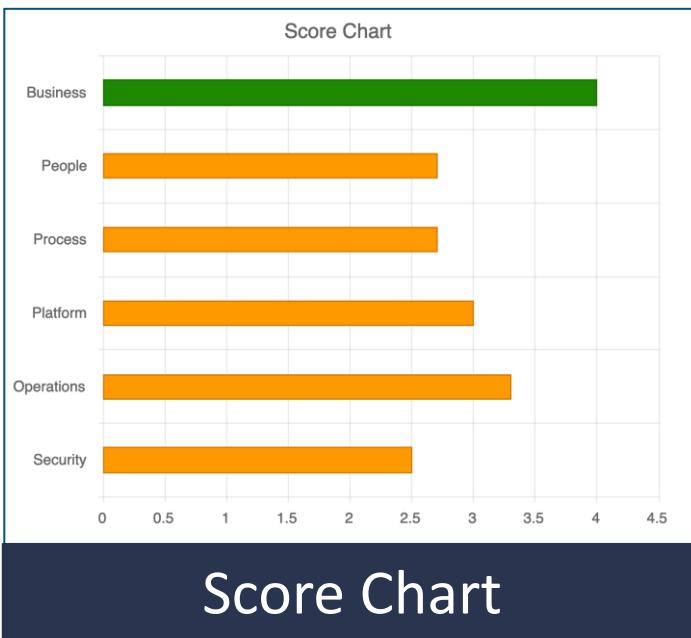
Assess



Assess Organization Readiness – CART vs. MRA

	Cloud Adoption Readiness Tool (CART)	Migration Readiness Assessment (MRA)
Available to	Everyone	AWS Team and AWS Partners
Assessment Type	Self-service online assessment	One day workshop by AWS Team or Partners
Usage	When you are in the early stages of checking for cloud adoption readiness.	When you want to deepen engagement and create an actionable migration strategy.
No. of question	<p>47 questions spanned over 6 categories:</p> <ul style="list-style-type: none"> • Business • People • Governance • Platform • Security • Operations 	<p>80+ questions spanned over 8 categories:</p> <ul style="list-style-type: none"> • Business Case • Customer Migration Project Plan • Skills & COE • Landing Zone • Application Portfolio Discovery & Planning • Migration Process & Experience • Operating Model • Security & Compliance
Output	<ul style="list-style-type: none"> • Scores summary, Radar chart, Heatmap • Summary report 	<ul style="list-style-type: none"> • Scores summary, Radar chart, Heatmap • Summary report • PowerPoint Assessment Review Presentation
Required for MAP	<ul style="list-style-type: none"> • No 	<ul style="list-style-type: none"> • Yes
Web Portal	https://cloudreadiness.amazonaws.com/ 	https://accelerate.amazonaws.com/ 

Output



Business Section

Business Rationale

Question: Has your company identified a specific business reason for moving to the cloud?

Response: 4 - A draft analysis has been completed

Rating: 4

Business Case

Question: Has your company developed a business case for moving to the cloud, and if so, is your business case based on multiple, credible and quality sources?

Response: 4 - A few data sources, and some consensus among the team

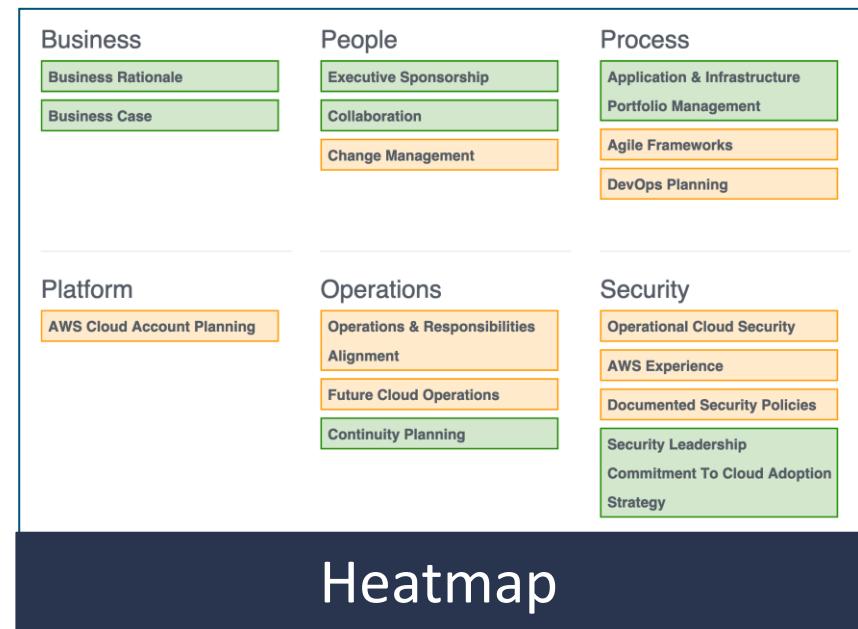
Rating: 4

Recommended Actions :

Congratulations on your successful alignment and level of readiness for this section. For more information and continued learning, please find these valuable assets below:

- [AWS Whitepapers: Cloud Computing Economics](#)
- [AWS Total Cost of Operation \(TCO\)](#)
- [AWS Simple Monthly Calculator](#)

Summary Report



Sample Report



Migration Readiness Assessment (MRA)

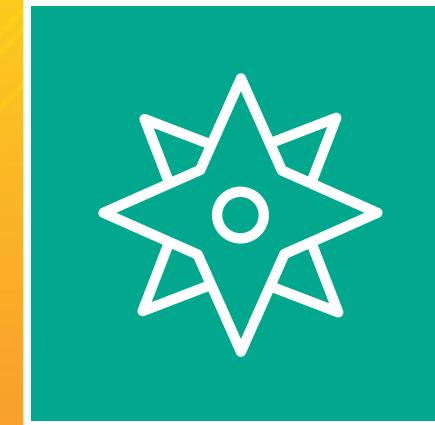
- AWS Migration Competency Partners

- Partner Offerings (just few)

- [T-Systems](#)
- [Swisscom](#)
- [Comprinno](#)
- [SoftwareOne](#)



- Migration Services Competency
- Migration & Modernization Software Competency



AWS Migration Evaluator
(Formerly TSO Logic)

Cloud Migration – AWS Tools and Services Portfolio

Assess

Inventory Business Case



AWS Migration Evaluator



AWS Systems Manager



Amazon CloudWatch



[Partner Only]

Migration Portfolio Assessment

Readiness

- CART
- MRA

[Partner Only]



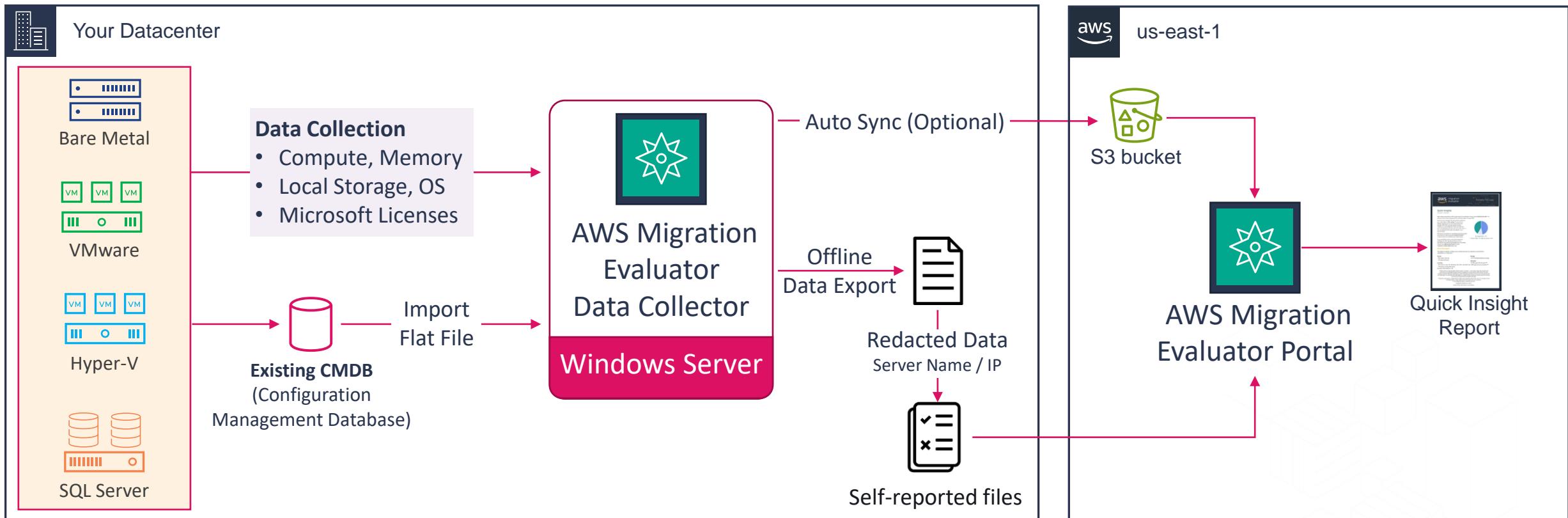
AWS Application Discovery Service



Migration Hub

AWS Migration Evaluator (Formerly TSO Logic)

- AWS Migration Evaluator simplifies on-premises analysis of compute, local storage, memory, and Microsoft licenses.

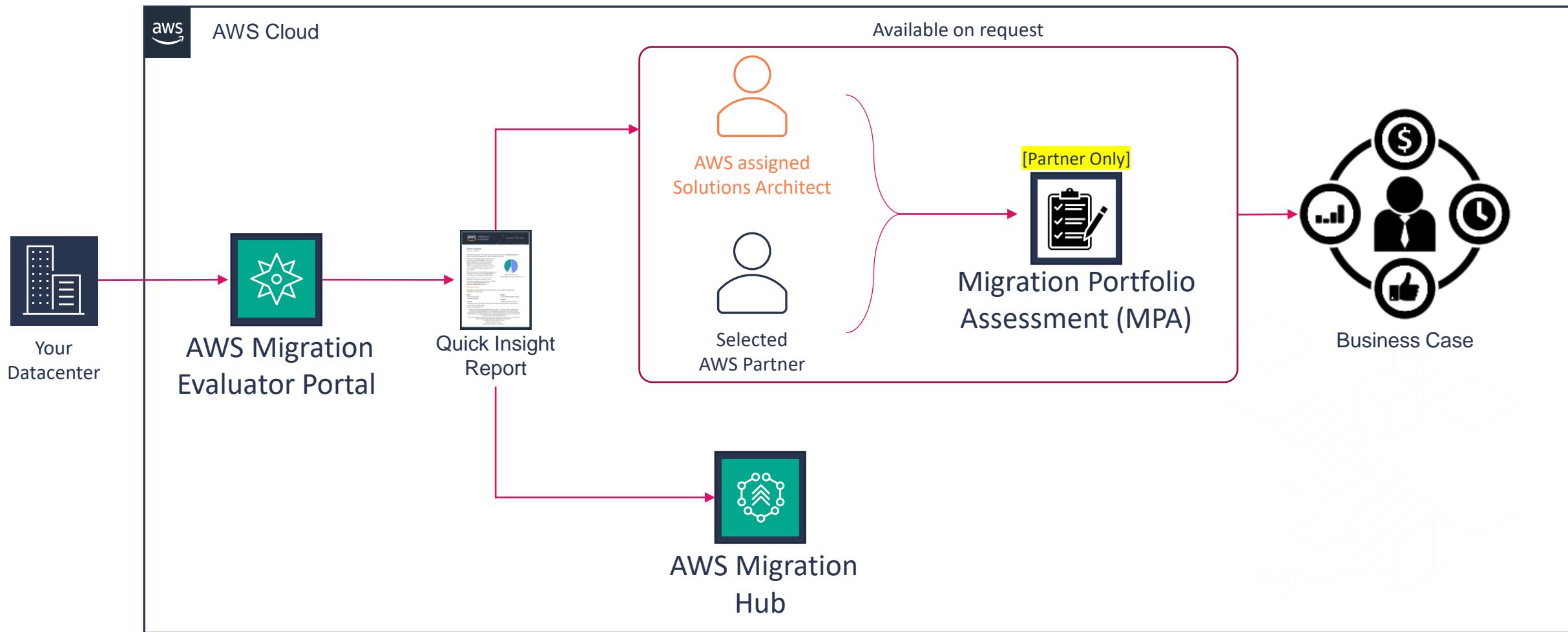


[Overview](#)

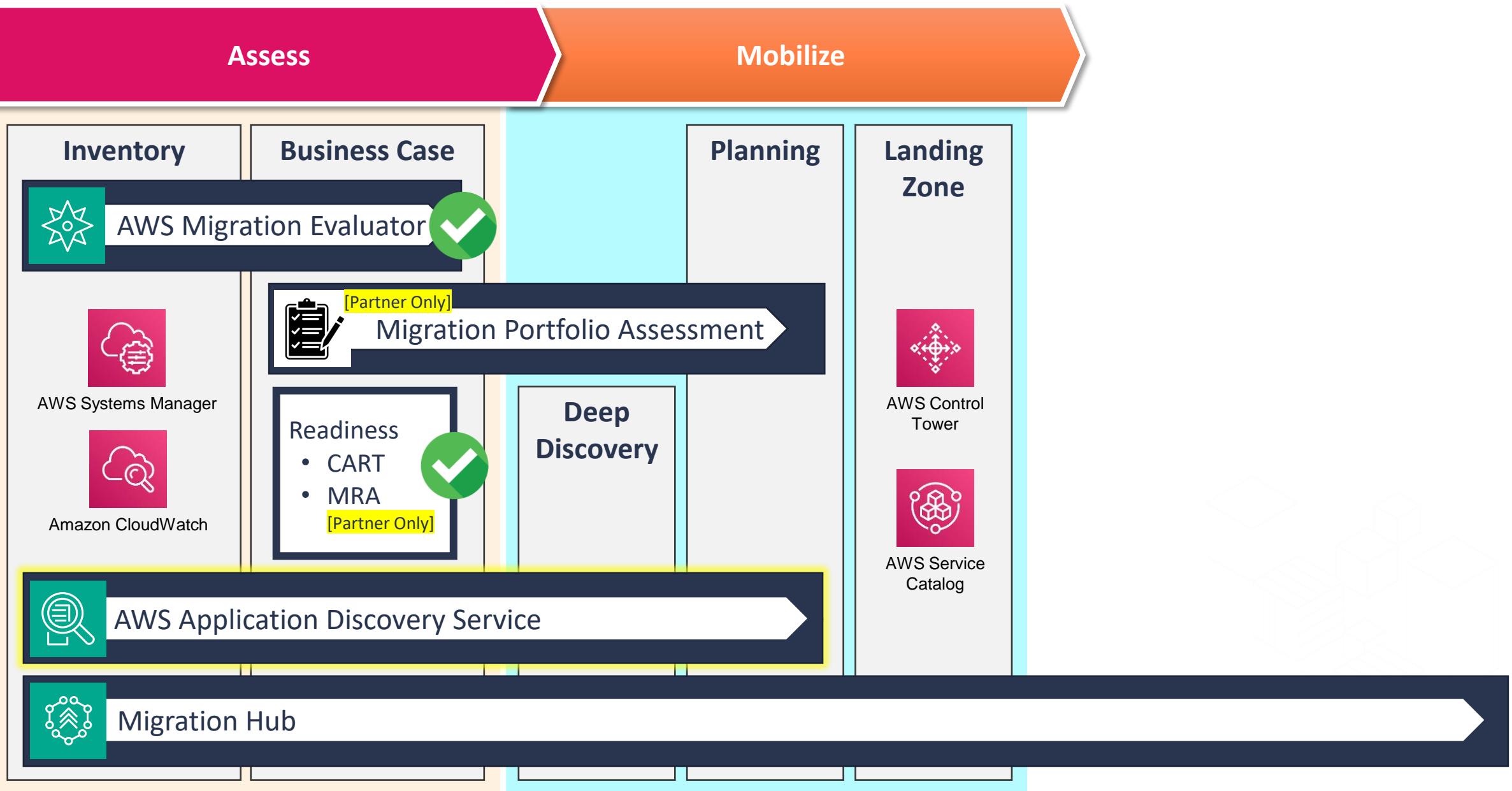
<https://console.tsologic.com>

AWS Migration Evaluator (Formerly TSO Logic)

- Migration Evaluator Quick Insights projects the cost of running existing workloads in the AWS cloud.



Cloud Migration – AWS Tools and Services Portfolio



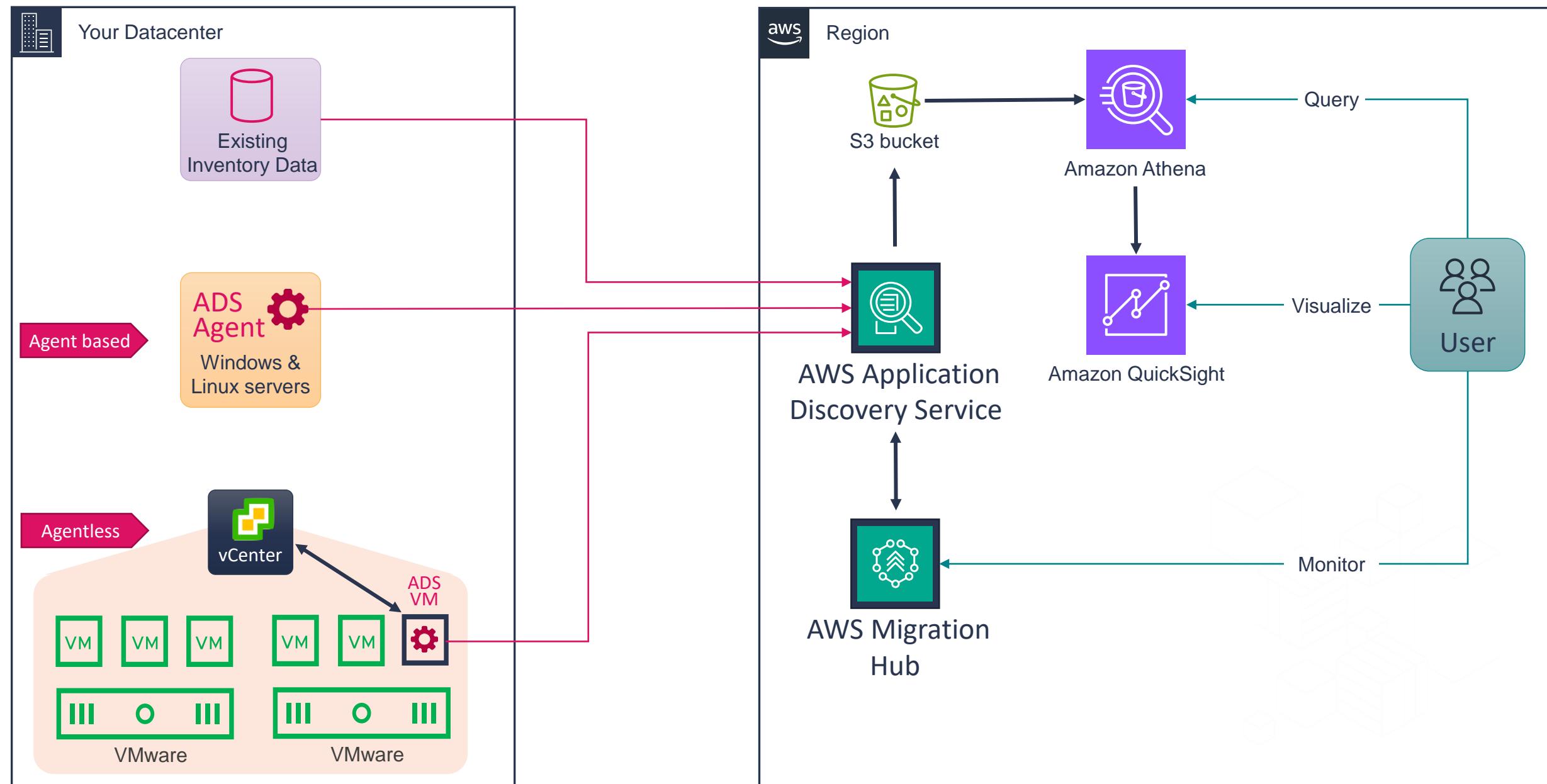


AWS Application Discovery
Service (ADS)

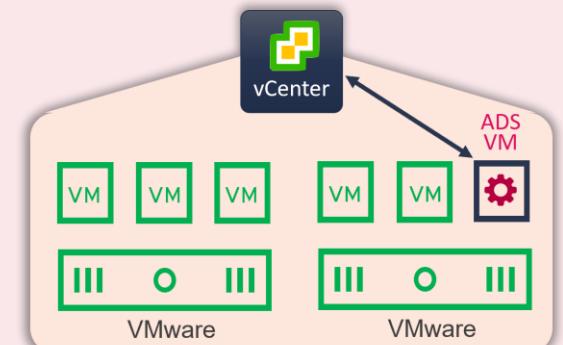
AWS Application Discovery Service (ADS)

- AWS Application Discovery Service collects both server and database configuration information.
 - Server information includes hostnames, IP addresses, MAC addresses, as well as the resource allocation and utilization details of key resources such as CPU, network, memory, and disk.
 - Collected database information includes the database engine identity, version, and edition. Once collected, this information can be used to size AWS resources as part of migration planning.
- Application Discovery Service agents record inbound and outbound network activity for each server. This data can then be used to understand the dependencies across servers.
- There is no charge for using ADS. You only pay for the AWS resources (e.g., Amazon S3, Amazon Athena, or Amazon Kinesis Firehose) that are provisioned to store your on-premises data.

AWS Application Discovery Service (ADS) – Data Collection



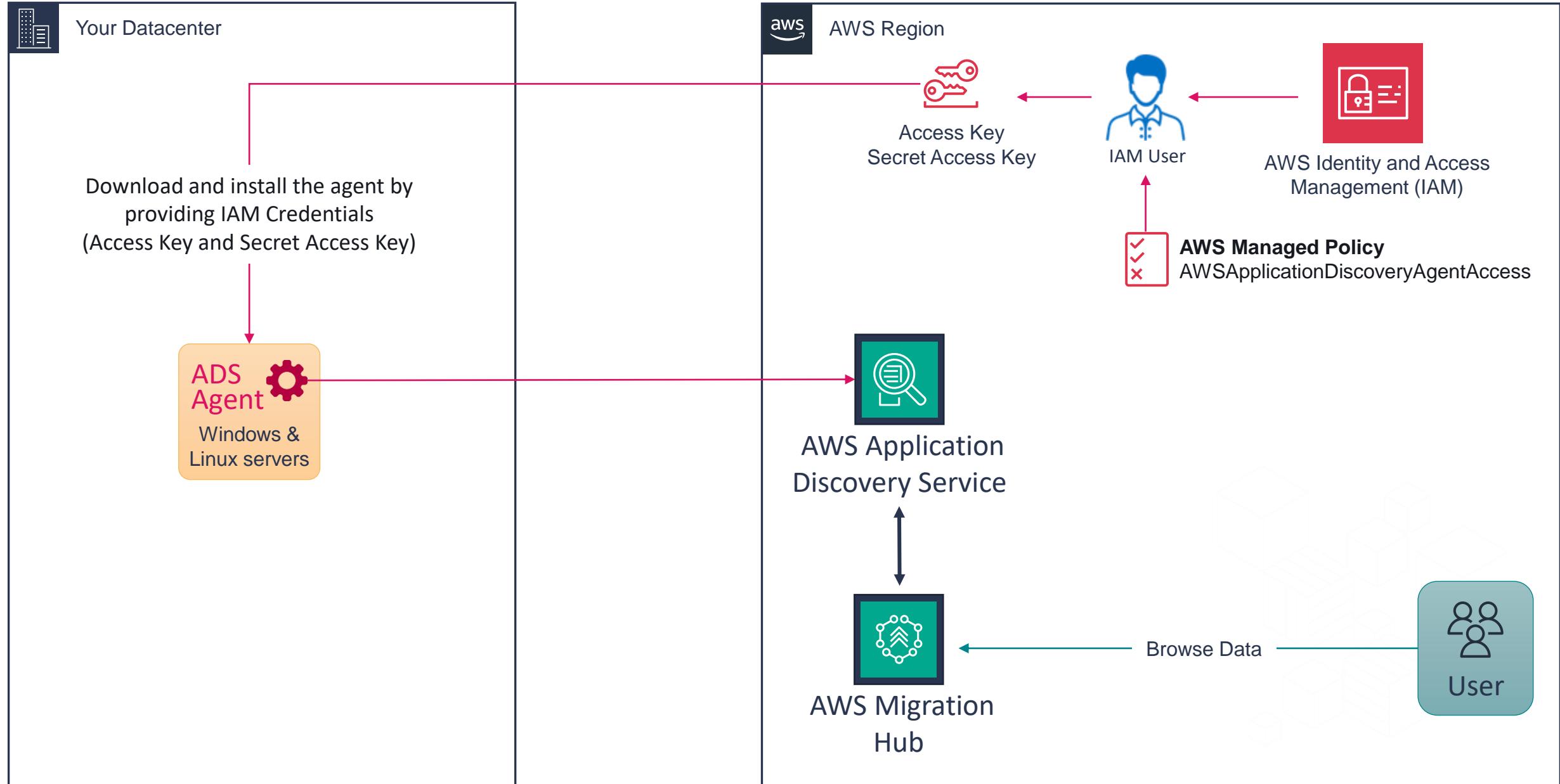
Agent based Collector vs. Agentless Collector

	Agent based Collector	Agentless Collector
Collects data from	Windows and Linux servers (Physical or Virtual)	VMware vCenter Server
Deployment	On every server  Windows & Linux servers	Through vCenter Server on a vSphere Host 
Data sent to AWS	Every 15 minutes	Every 60 minutes
Collects data of Network connections	Yes	No
Collects data of Running processes	Yes	No
Collects data of Databases discovery	None	Oracle, SQL Server, MySQL, and PostgreSQL

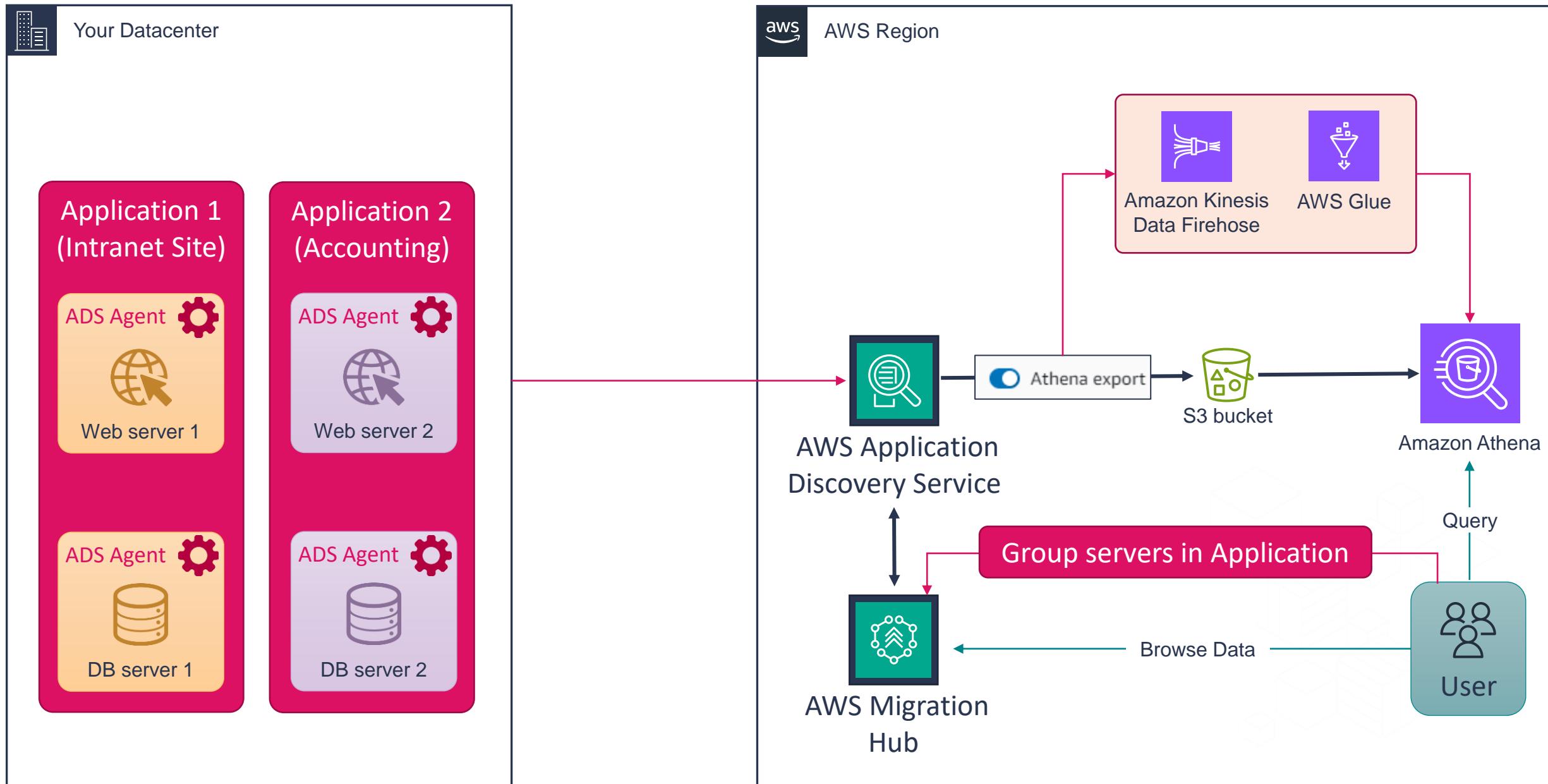
AWS Application Discovery Service vs. Migration Evaluator

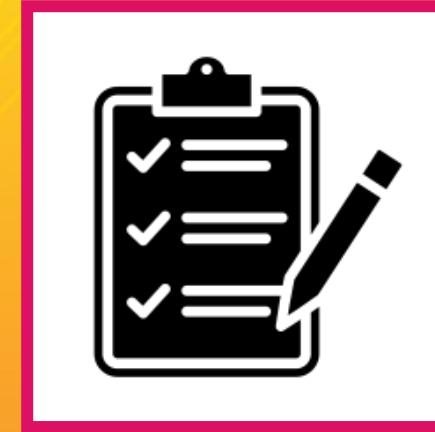
	 Application Discovery Service (ADS)	 Migration Evaluator (ME)
Offered as	Self-Service	Provided as a service where SA/Partners support business case preparation.
Deployment	<ul style="list-style-type: none">Agent based- Per ServerAgentless - Per vCenter Server	Per Data Center
Need an AWS account to access the services	Yes. ADS is accessed through AWS Migration Hub in an AWS Account.	No. ME has its own portal and does not require an AWS account.
Offline data collection	No	Yes
Supported database engines	<ul style="list-style-type: none">Agent based - NoneAgentless - Oracle, SQL Server, MySQL, PostgreSQL	SQL Server
Selection of Region for data storage / export	Yes	Only us-east-1

ADS Agent Installation



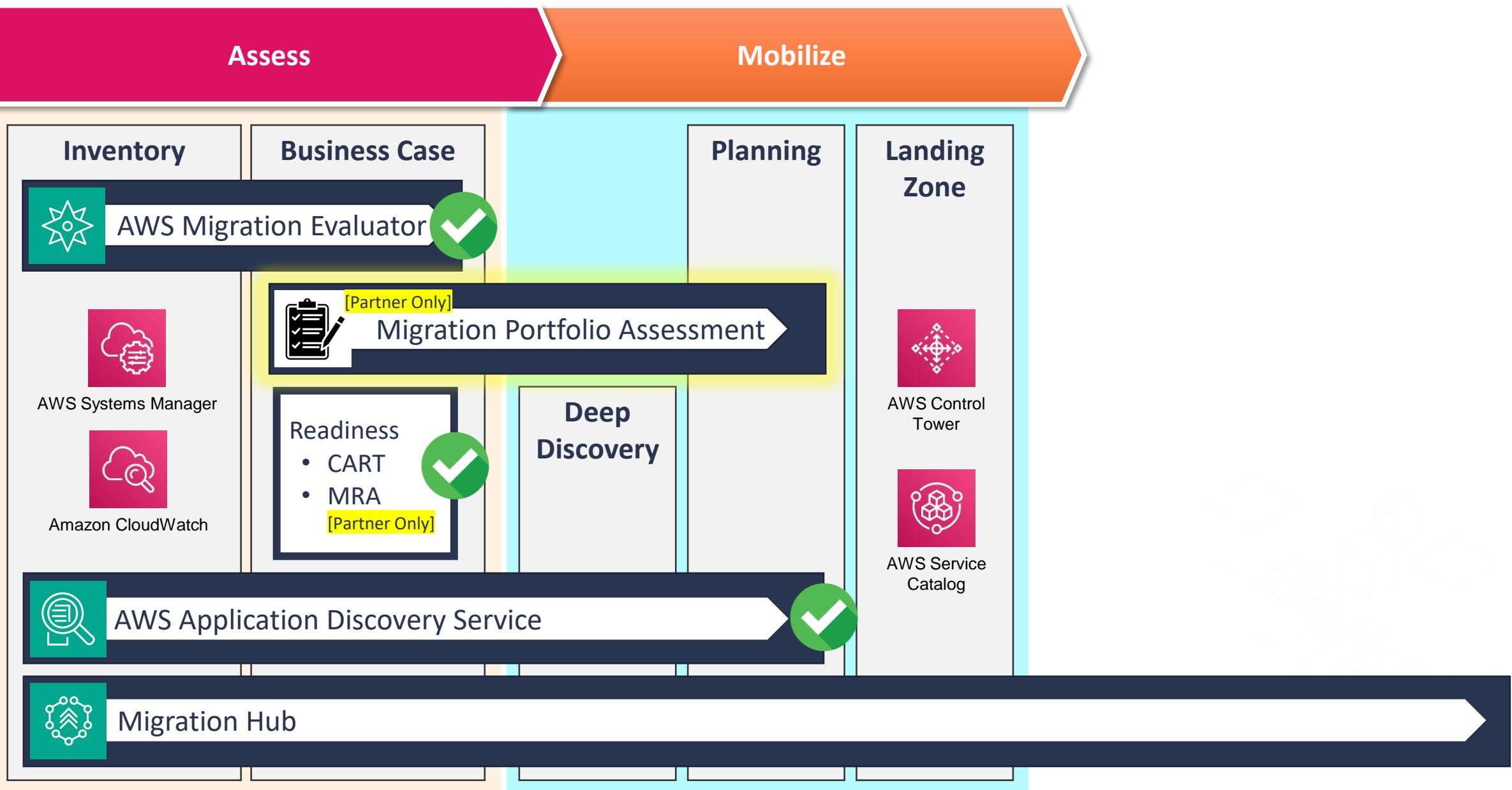
ADS Demo Environment – Migration Immersion Day





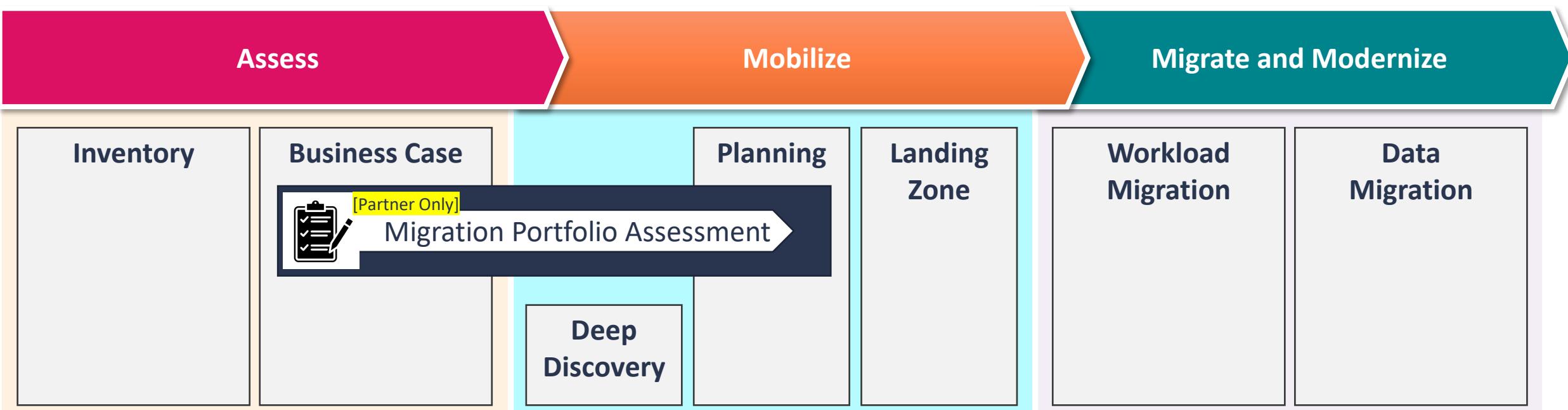
Migration Portfolio
Assessment (MPA)

Cloud Migration – AWS Tools and Services Portfolio



Migration Portfolio Assessment (MPA)

- AWS Migration Portfolio Analysis (MPA) is a web based tool to help analyze a customer's on-premises portfolio.
- It is a AWS Partner Only tool, and is not available to customers.
- Partners can use the MPA to generate a business case to migrate to AWS and to create a high-level migration plan.
- It has features which align to Access and Mobilize Phases.



Migration Portfolio Assessment (MPA)

Data Source



AWS Application
Discovery Service



AWS Migration
Evaluator



Data exported
from CMDB

• Features

- Data normalization
- Scenarios comparison
- AWS cloud economics-bases assumptions

[Migration Immersion Day](#)



[AWS re:Invent 2022 - TCO analysis](#)



Assess

Mobilize

Business Case



[Partner Only]

Migration Portfolio Assessment

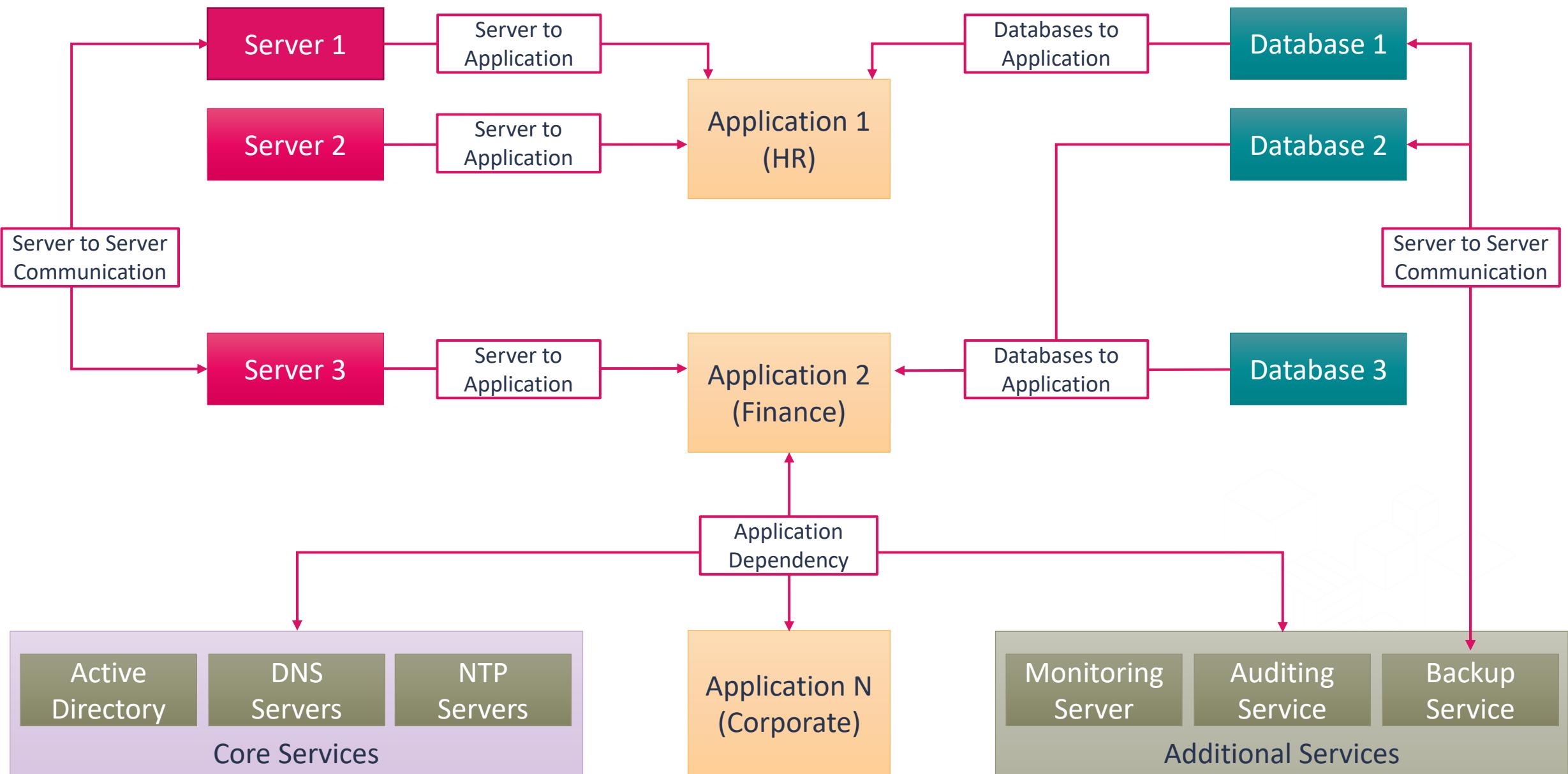
Data →

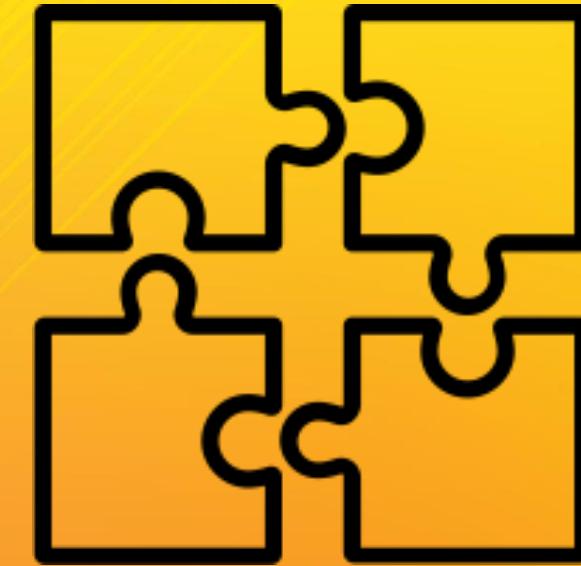
- TCO Analysis
- Cost Estimation
- Migration Cost
- On-Premises Usage Cost
- AWS Cost

Planning

- Strategy Recommendation (7 Rs)
- Application Prioritization
- Dependency Groups
- Migration Waves
- EC2 / RDS Recommendation

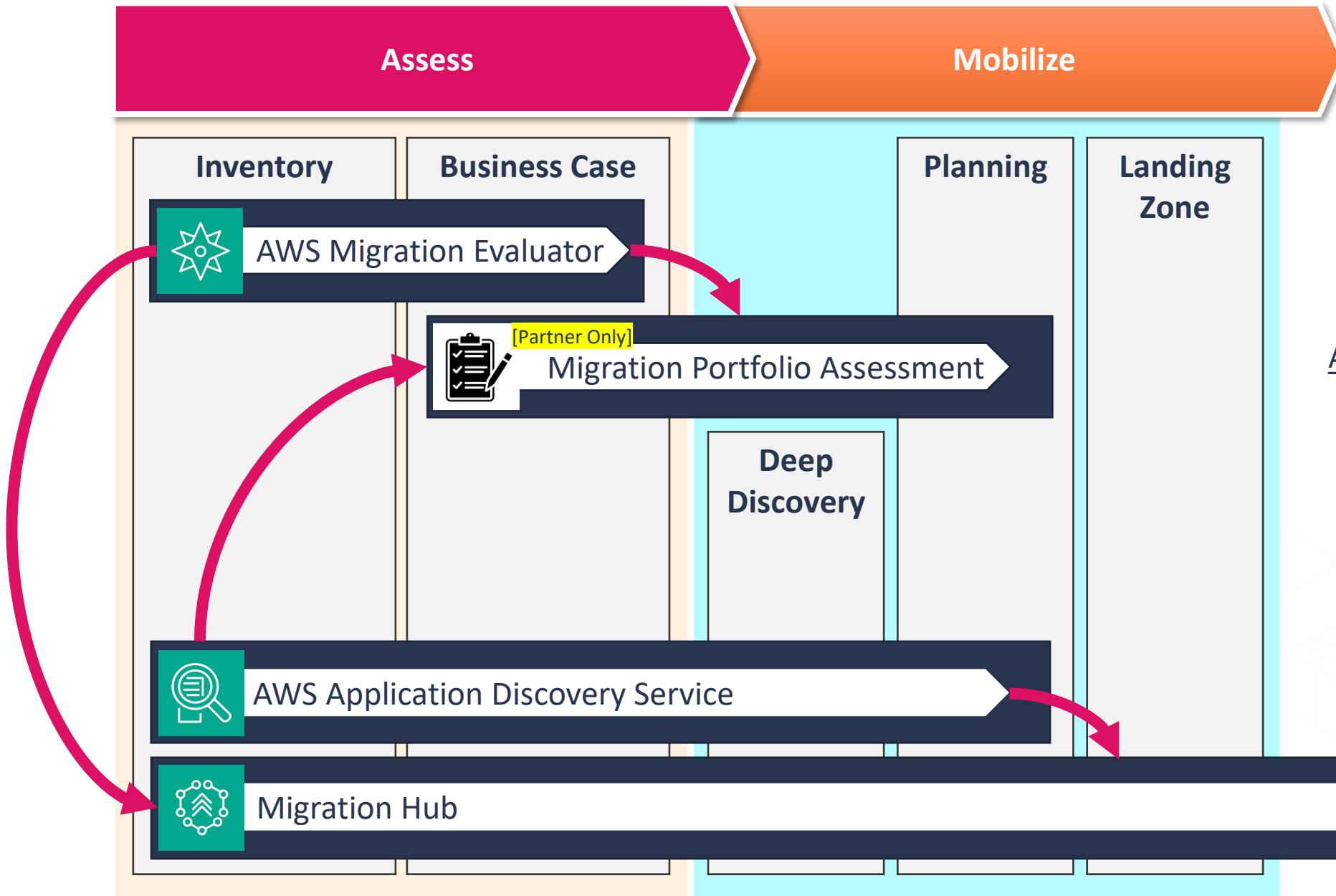
Server, Applications, Network Communications





How all these fit together?

Cloud Migration – AWS Tools and Services Portfolio



AWS re:Invent 2022

TCO analysis



Import data from ADS to MPA

Portfolio Assessment X

All portfolios > MigrEval > Import file

Import portfolio data

Select data type

- Servers
- Applications
- Server to application
- Server communication
- Databases
- Database to application
- Application dependency

Servers

Upload local file

File can be in Excel or CSV format.

Sample files and template files available for download.

For more information on type of files and supported data attributes, please refer to [FAQ](#).

Import

- [Import from file](#)
- [Import from ADS](#)

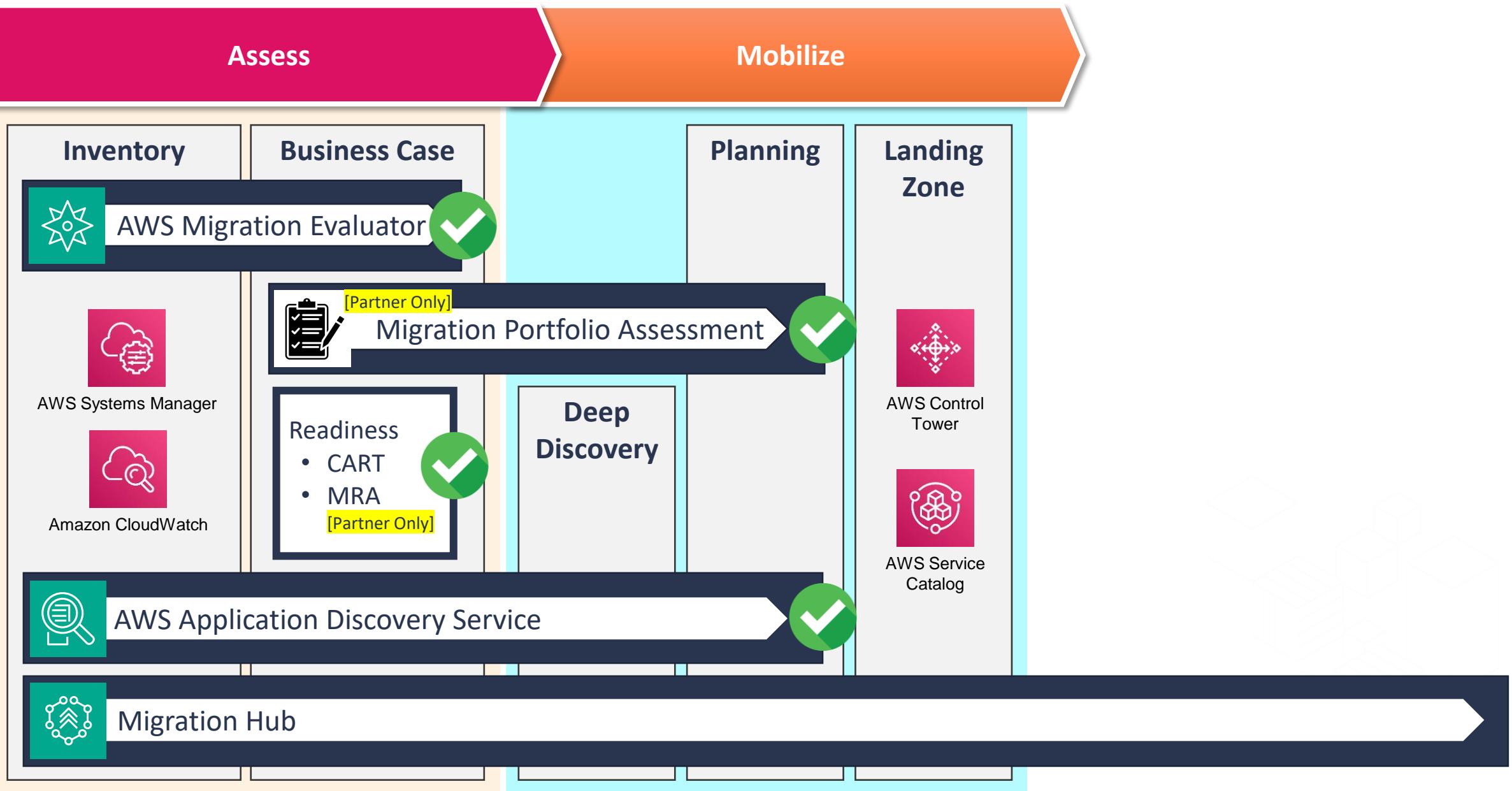
Collect

- Contact management
- Data collection

TCO

- Summary
- Adjustments
- SQL Server optimization
- Application cost summary

Cloud Migration – AWS Tools and Services Portfolio





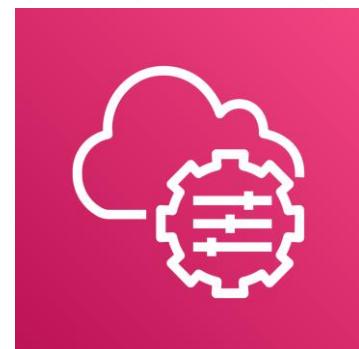
AWS Systems Manager



Amazon CloudWatch

AWS Systems Manager

- What is AWS Systems Manager?
 - AWS Systems Manager is a collection of capabilities that enable visibility and control of your AWS resources and on-premises resources.
- How AWS Systems Manager helps in Access Phase?
 - With Systems Manager, you can collect software configuration and inventory information about your fleet of servers and the software installed on them.
 - You can track detailed system configuration, OS patch levels, application configurations, and other details about your deployment.



AWS Systems Manager

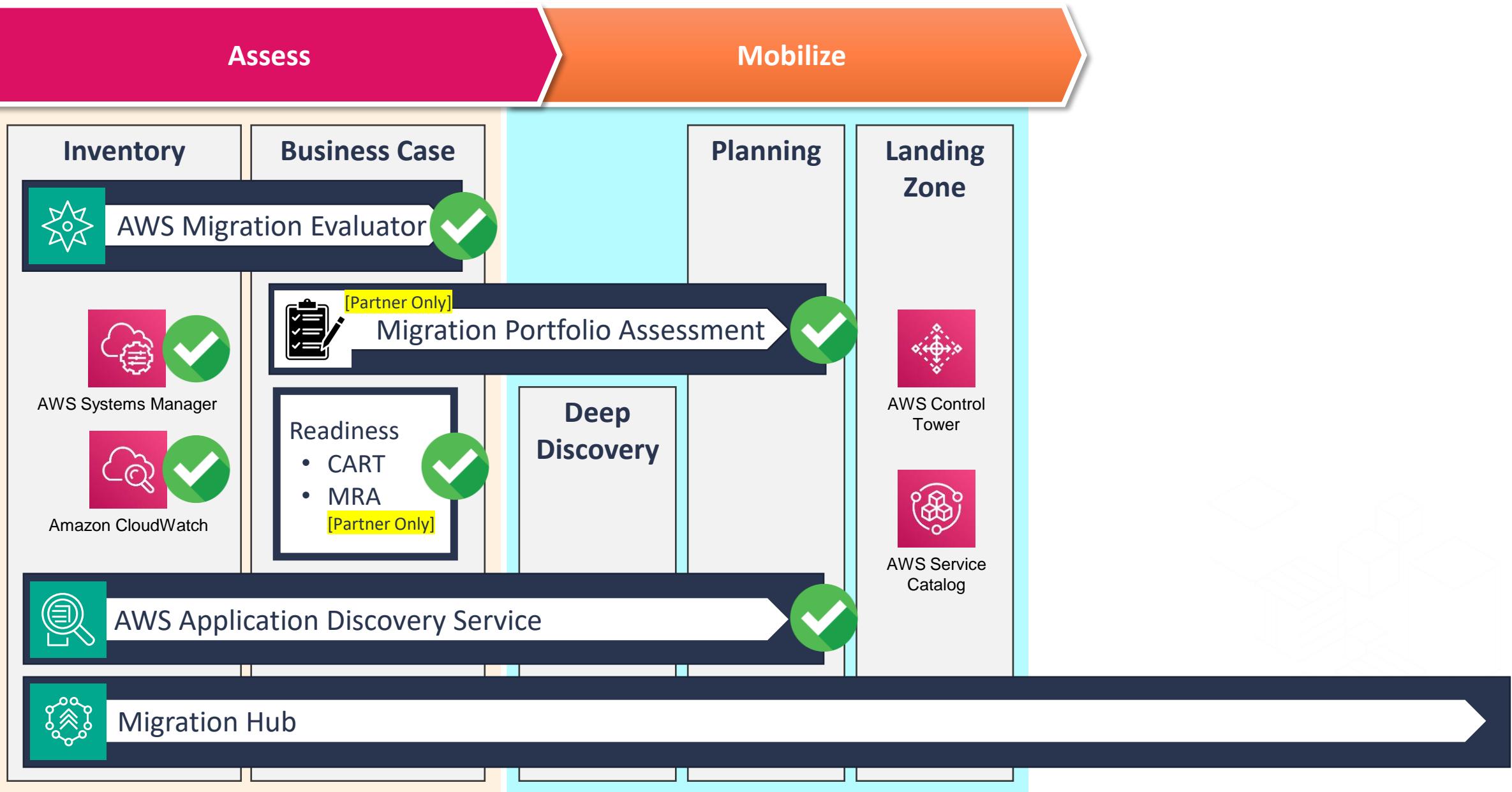
Amazon CloudWatch

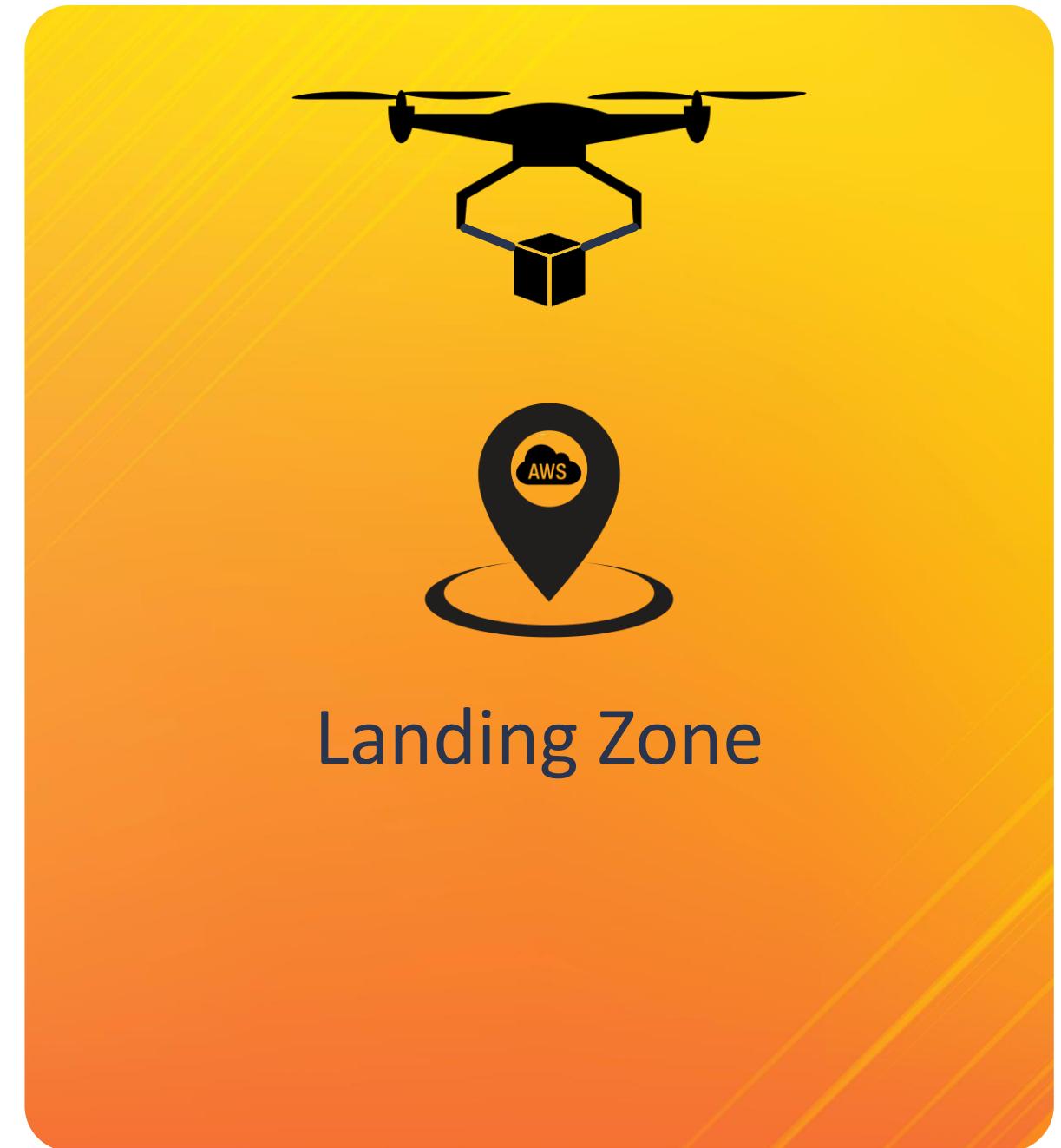
- What is Amazon CloudWatch?
 - Amazon CloudWatch is a monitoring and management service that provides data and actionable insights for AWS, on-premises, hybrid, and other cloud applications and infrastructure resources.
- How Amazon CloudWatch helps in Access Phase?
 - You can collect and access all your performance and operational data in the form of logs and metrics from a single platform rather than monitoring them in silos (server, network, or database).



Amazon CloudWatch

Cloud Migration – AWS Tools and Services Portfolio





Landing Zone

Landing Zone

- In military terminology
 - A landing zone (LZ) is an area where aircraft, especially helicopters, can land. It is also called LZ.
- In AWS Cloud terms
 - It is a zone to land your AWS workloads.
 - A landing zone is a well-architected, multi-account AWS environment that is scalable and secure.



U.S. Army troops practice securing a landing zone

Source: Wikipedia



- This is a starting point from which your organization can quickly launch and deploy workloads and applications.

Building a Landing Zone

- Building a landing zone involves technical and business decisions to be made across account structure, networking, security, and access management in accordance with your organization's growth and business goals for the future.
- How to build a Landing Zone?
 - Build manually using white papers and the well architected framework as guide
 - It can take effort and time.
 - Build using AWS Control Tower
 - Wizard driven process, can be completed in 60 to 90 minutes.

Isn't AWS Control Tower service suitable to only Greenfield deployment?

AWS Control Tower is well suited for both.

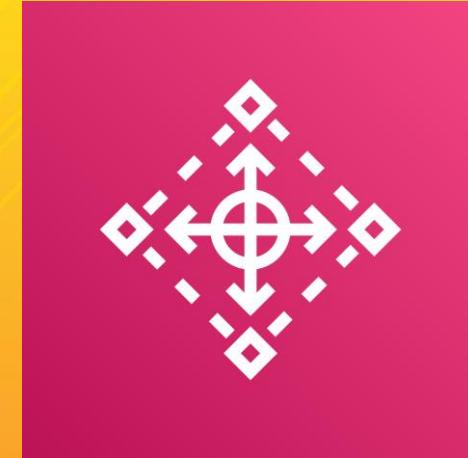
A **greenfield site** refers to ANY land that hasn't been previously developed.

This could be ancient woodland, grassland, or agricultural land.

A **brownfield site** refers to previously developed land, which is or was occupied by a permanent structure.

Greenfield Deployment	Brownfield Deployment
Start with a blank slate	Build on existing systems
Choose new technology and facilities	Use existing technology and facilitates
Go with previous builder's or developer's approach	Use your own ideas and approaches
Get started fast	Take time to do upfront planning
May have lower costs, but not always	Startup costs may be higher
Lower risk	Higher risk





AWS Control Tower



AWS Control Tower

AWS Control Tower

Landing zone



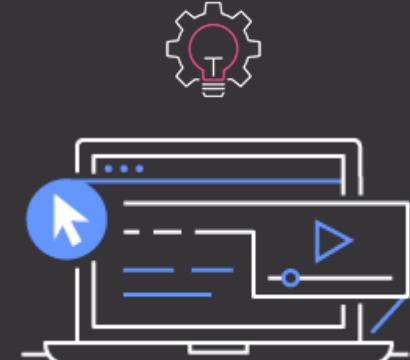
Guardrails



Account Factory



Dashboard



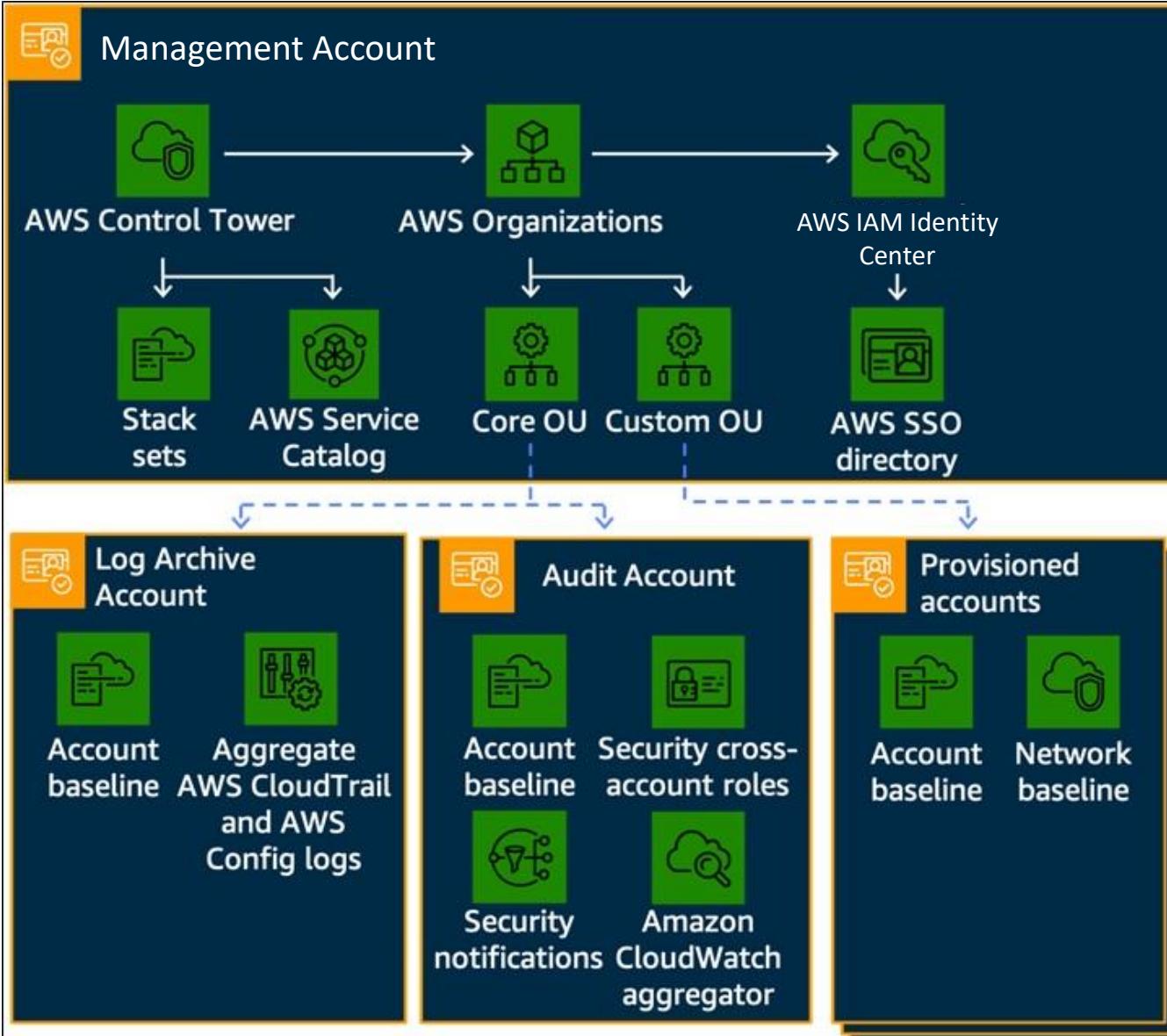
AWS Control Tower – Landing Zone

Landing zone

A well-architected, multi-account AWS environment based on security and compliance best practices.



Landing Zone setup by AWS Control Tower



Underlying services

AWS Organizations

AWS Service Catalog

AWS IAM Identity Center

AWS Config

AWS CloudFormation

Amazon CloudWatch

AWS CloudTrail

AWS Identity and Access Management

Amazon Simple Storage Service

Amazon Simple Notification Service

AWS Lambda

AWS Step Functions

Related services

AWS Security Hub

AWS Systems Manager

There is no additional charge for using AWS Control Tower. You only pay for AWS services enabled by AWS Control Tower.

AWS Control Tower - Guardrails

Landing zone

A well-architected, multi-account AWS environment based on security and compliance best practices.



Guardrails

A high-level rule that provides ongoing governance for your overall AWS environment.



AWS Control Tower – Account Factory

Landing zone

A well-architected, multi-account AWS environment based on security and compliance best practices.



Account Factory



A configurable account template that helps provisioning of new AWS accounts with pre-approved account configurations.



Guardrails

A high-level rule that provides ongoing governance for your overall AWS environment.



AWS Control Tower

Landing zone

A well-architected, multi-account AWS environment based on security and compliance best practices.



Account Factory

A configurable account template that helps provisioning of new AWS accounts with pre-approved account configurations.



Guardrails

A high-level rule that provides ongoing governance for your overall AWS environment.



Dashboard

Offers continuous oversight of your landing zone to your team of central cloud administrators.



AWS Service Catalog

Fancy having a meal...



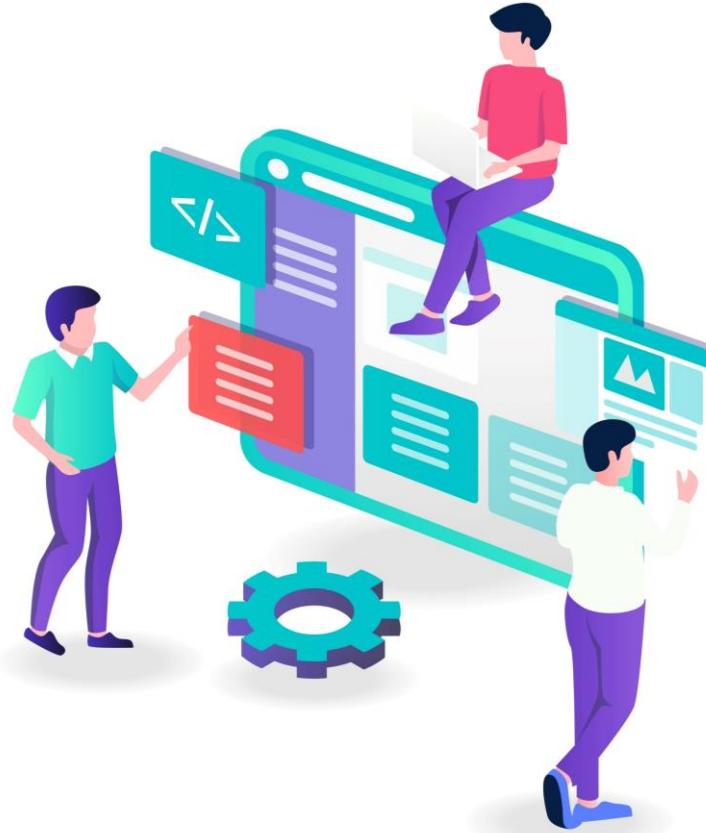
Chefs know it better



Add dressing (if needed)...



Current scenario



- Developer
 - Which version of PHP should be used?
 - What tags are relevant for my workload?
- Security Team
 - Which VPC is suitable for deploying forensic instance?
 - Where is the latest AMI?
- Sys Admins
 - What are best practices for deploying EKS cluster?
 - Do we have a template for 3-Tier App?

In AWS Context

Portfolio

- Product 1
- Product 2
-



Template
Constraints



AWS CloudFormation



Product
Deployed

AWS Service Catalog

FRONTEND PORTFOLIO

- Single Server PHP Server
- Auto Scale PHP Server

DATABASES

- MySQL Standalone
- MySQL with HA

DEVELOPMENT STACK

- LAMP Stack
- MERN Stack
- Ruby on Rails
- Django Stack

MONITORING

- Wireshark
- Nagios

Restaurant Menu

SALADS

lorem	- - - - -	\$5.00
lorem	- - - - -	\$4.50
lorem	- - - - -	\$6.50



SOUPS

lorem	- - - - -	\$6.50
lorem	- - - - -	\$4.50
lorem	- - - - -	\$5.00



SANDWICHES

lorem	- - - - -	\$5.00
lorem	- - - - -	\$4.50
lorem	- - - - -	\$6.50



SALADS

lorem	- - - - -	\$6.50
lorem	- - - - -	\$4.50
lorem	- - - - -	\$5.00



SOUPS

lorem	- - - - -	\$5.00
lorem	- - - - -	\$4.50
lorem	- - - - -	\$6.50



BON APPETIT!

Category

- Dish 1
- Dish 2
-



Customization
Instructions

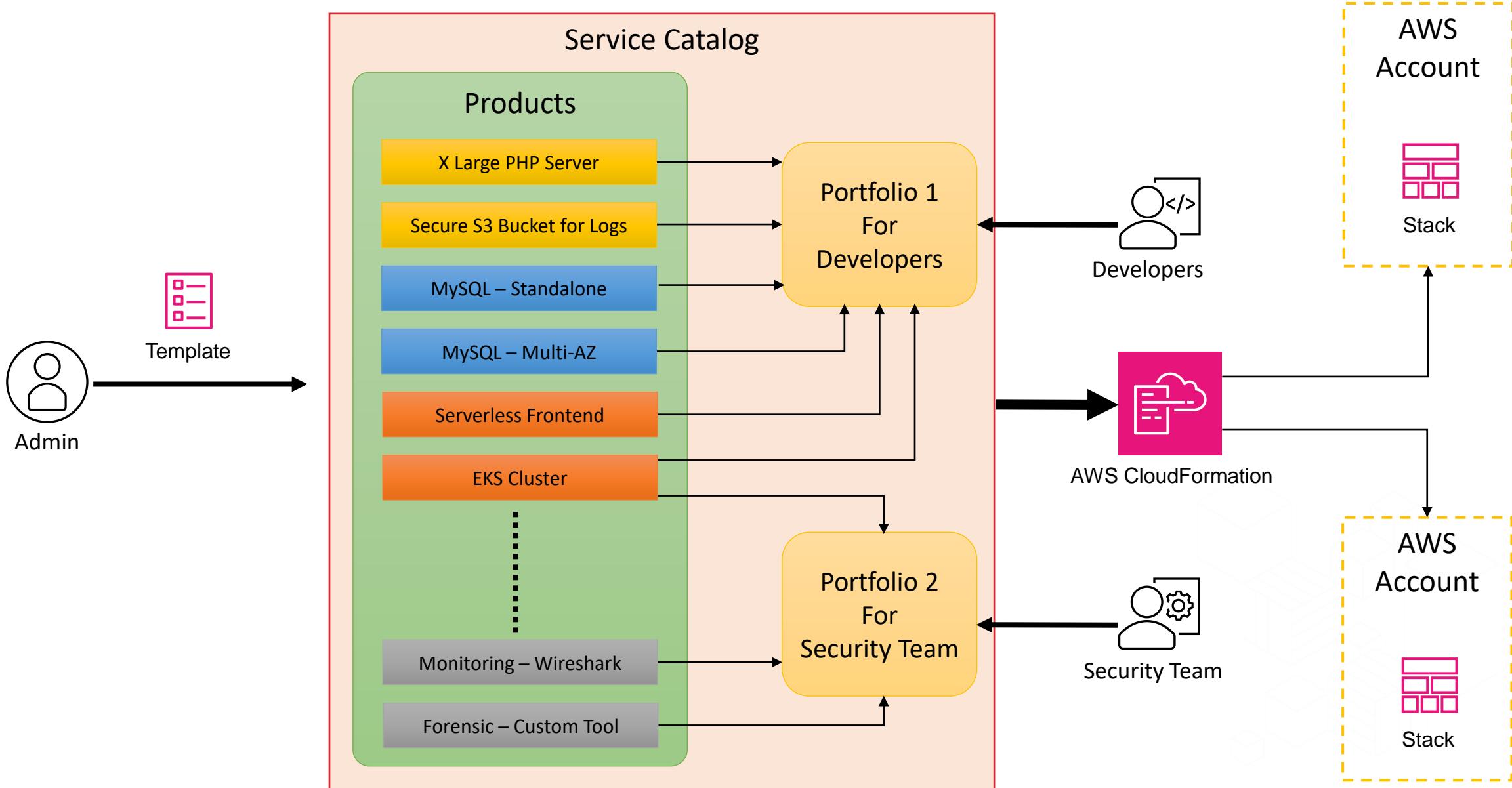


Chef

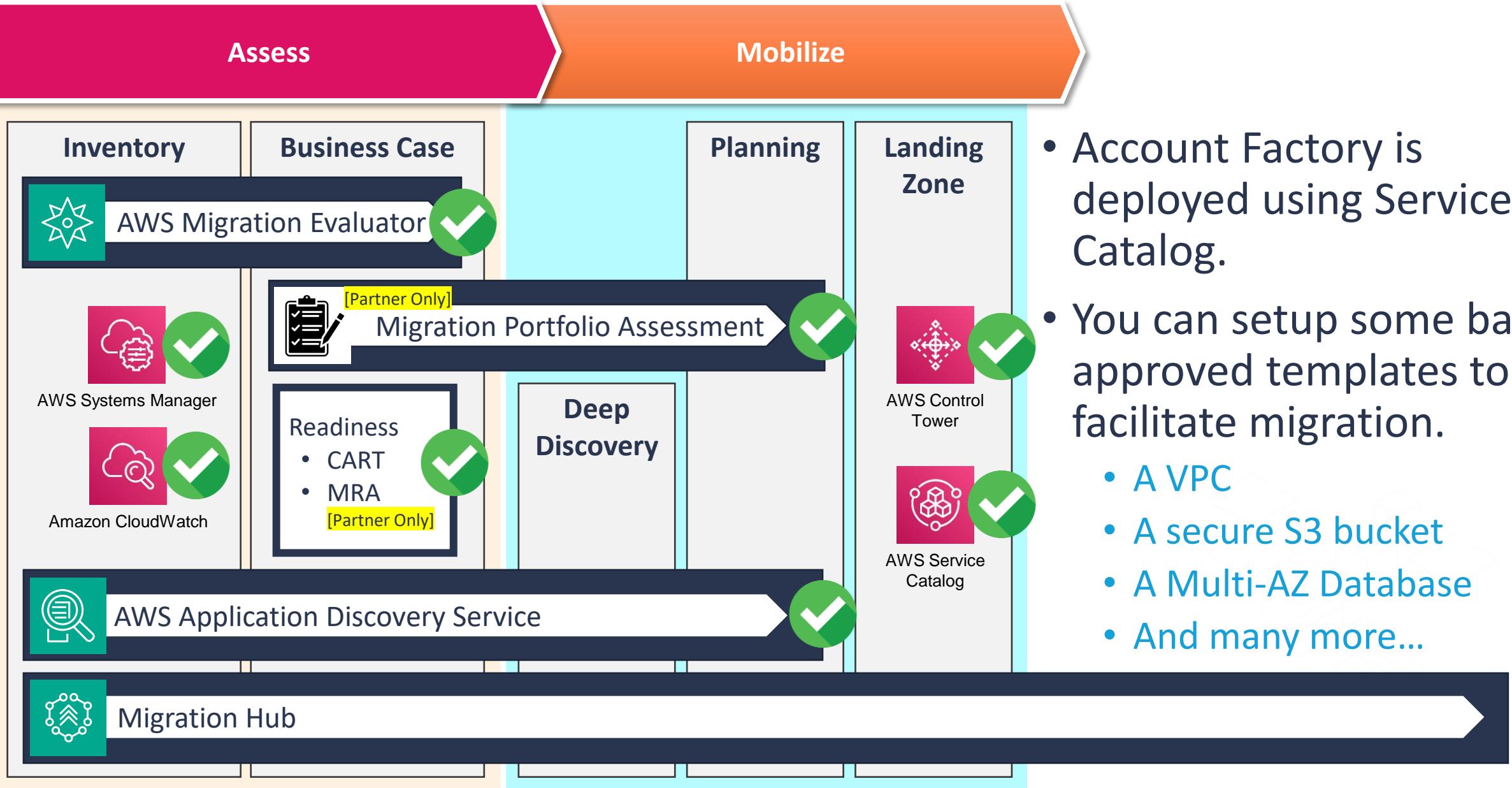


Dish
Served

How AWS Service Catalog works?



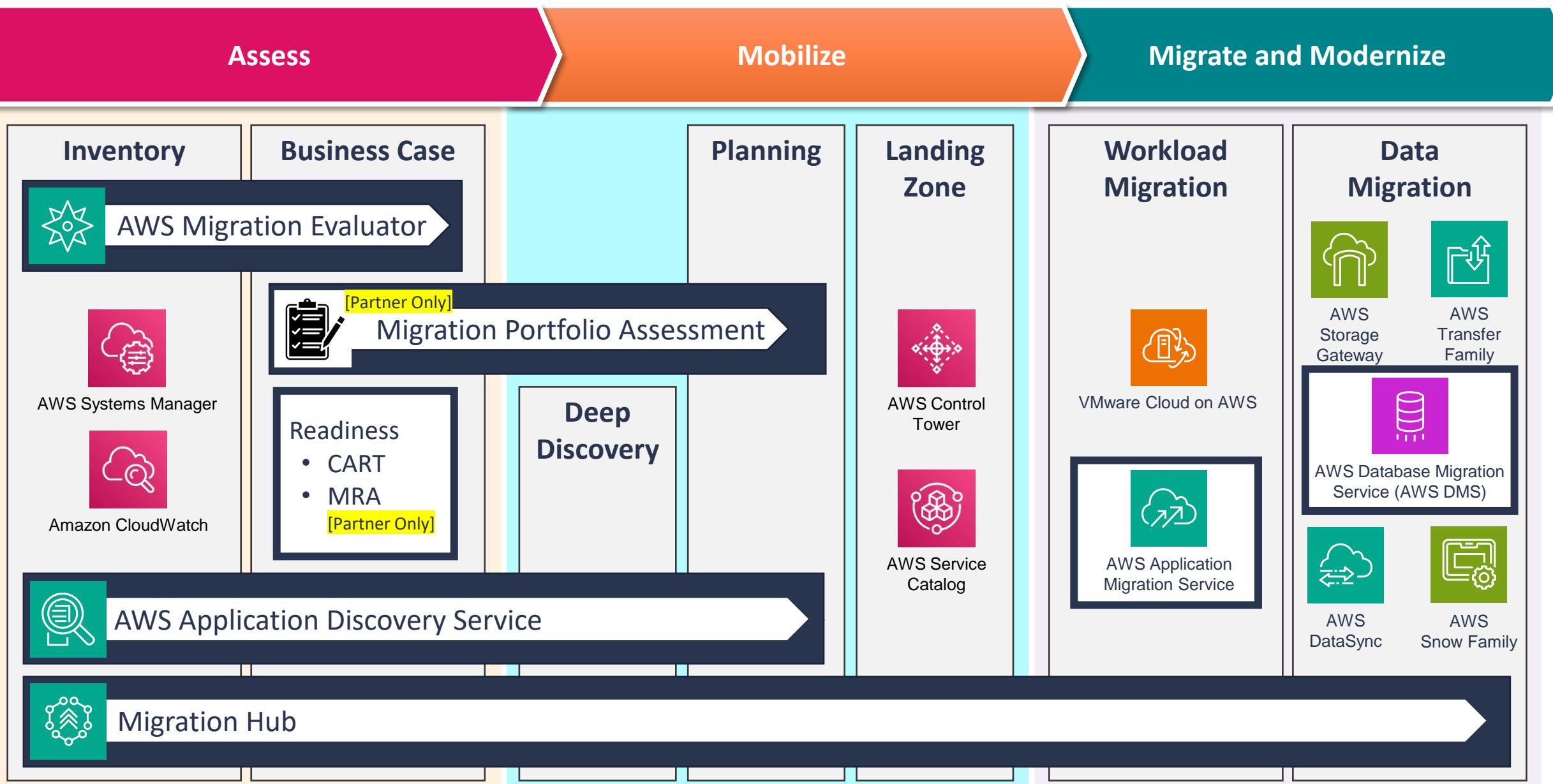
Cloud Migration – AWS Tools and Services Portfolio





Migrate and Modernize
Phase

Cloud Migration – AWS Tools and Services Portfolio





AWS Prescriptive Guidance

- AWS Prescriptive Guidance provides time-tested strategies, guides, and patterns to help accelerate your cloud migration, modernization, and optimization projects.



STRATEGIES

Business perspectives, methodologies, and frameworks for cloud migration and modernization, for CxOs and senior managers.



GUIDES

Guidance for planning and implementing strategies, with focus on best practices and tools, for architects, managers, and technical leads.



PATTERNS

Steps, architectures, tools, and code for implementing common migration, optimization, and modernization scenarios, for builders and other users.

Cloud Migration – AWS Tools and Services Portfolio

Assess

Mobilize

Migrate and Modernize

Inventory



AWS Migration Evaluator



AWS Systems Manager



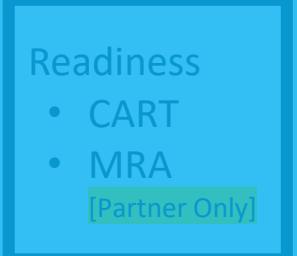
Amazon CloudWatch

Business Case



[Partner Only]

Migration Portfolio Assessment



AWS Application Discovery Service



Migration Hub



Planning

AWS Perspective

Guidance

Landing Zone



AWS Control Tower



AWS Service Catalog

Workload Migration



VMware Cloud on AWS



AWS Application Migration Service

Data Migration



AWS Storage Gateway



AWS Transfer Family



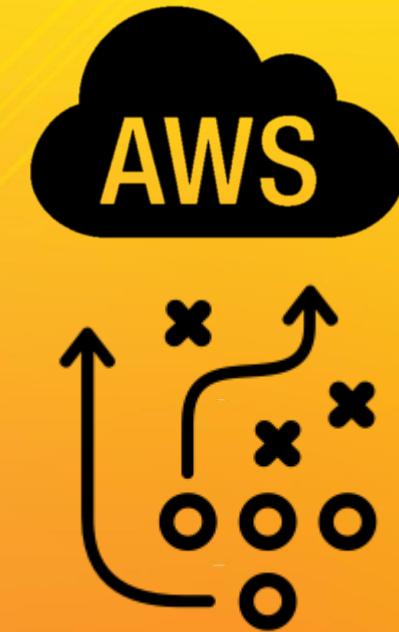
AWS Database Migration Service (AWS DMS)



AWS DataSync



AWS Snow Family

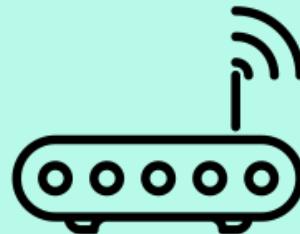


Migration Strategies
(7 Rs of migration)

Moving to a new house?

Internet connection

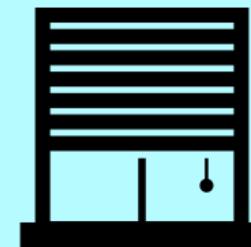
Check if same provider serves new address



Provider-Level lift and shift

Roller blinds

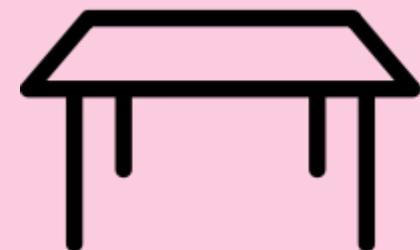
Cut to size for new place, add electronic motor



Lift and reshape

Study Table

Add a bigger table top, add castors, add a power socket



Re-design, Re-architect

Relocate

Cooking Oven

Exchange with vendor for a new and efficient one

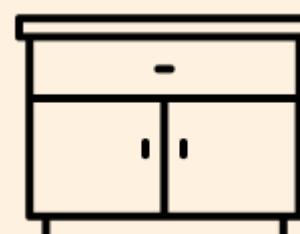


Drop and shop

Rehost

Old cabinet

Discard after dismantling (check sentimental value)



Decommission

Replatform

Flower Plants in the garden

Leave at current place



May be co-locate or revisit

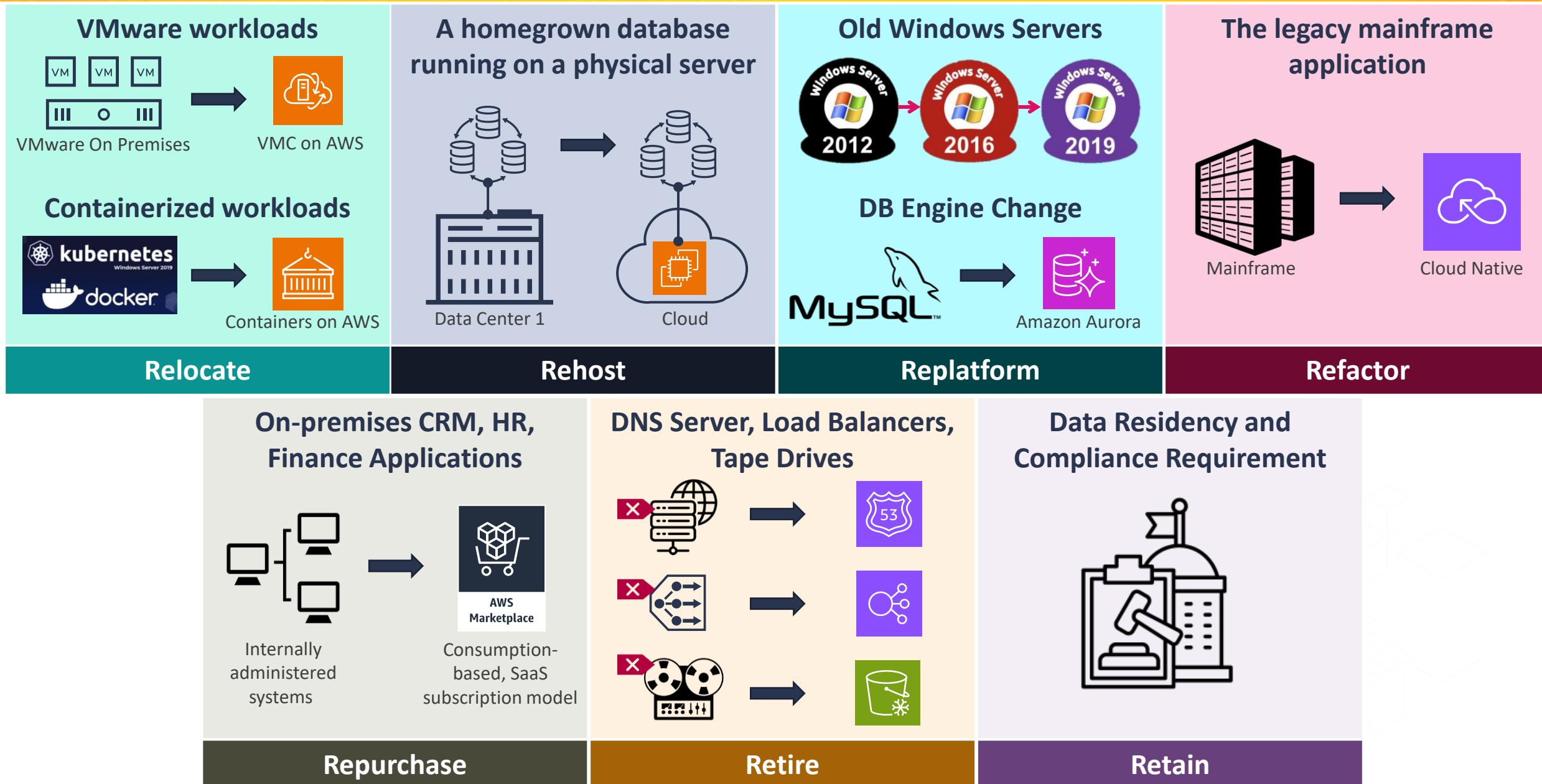
Refactor

Repurchase

Retire

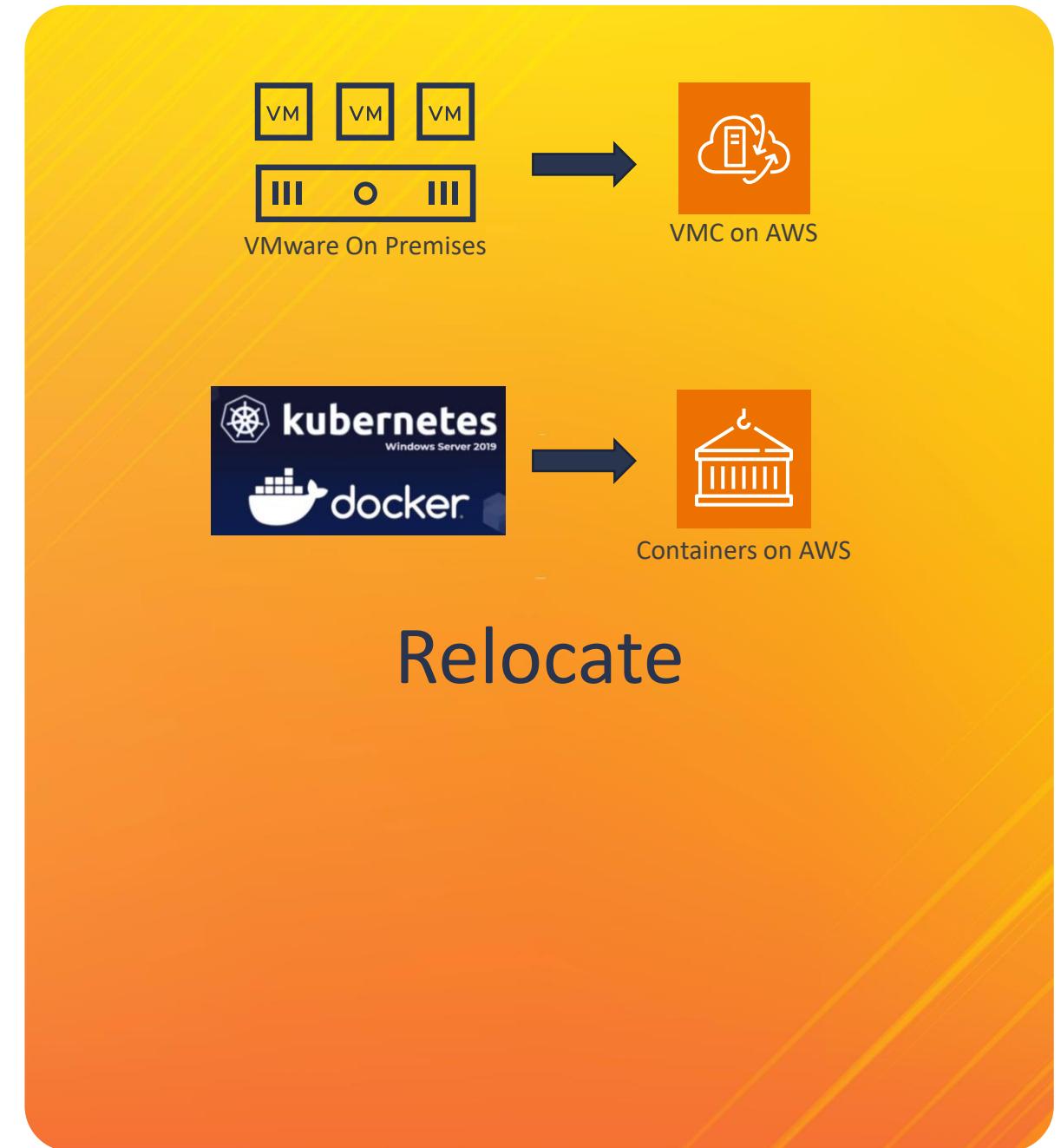
Retain

Moving to cloud?

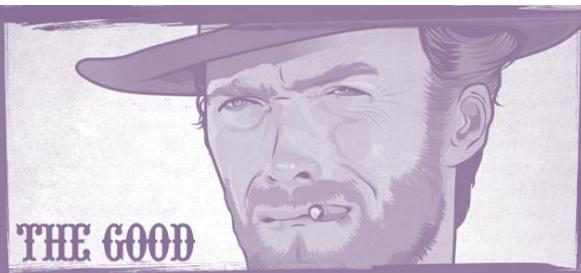




Migration Strategies
(7 Rs of migration)



- Migrate applications and data from datacentres / cloud providers / regions to an equivalent cloud infrastructure of another cloud provider or region.
- Also referred as Switching Location or Hypervisor-Level Lift and Shift.



- Minimizes downtime and disruption since users remain seamlessly connected during the migration process.
- No impact on ongoing operations, no need to rewrite the application source code, no retraining of staff or investment in upgraded hardware is required.

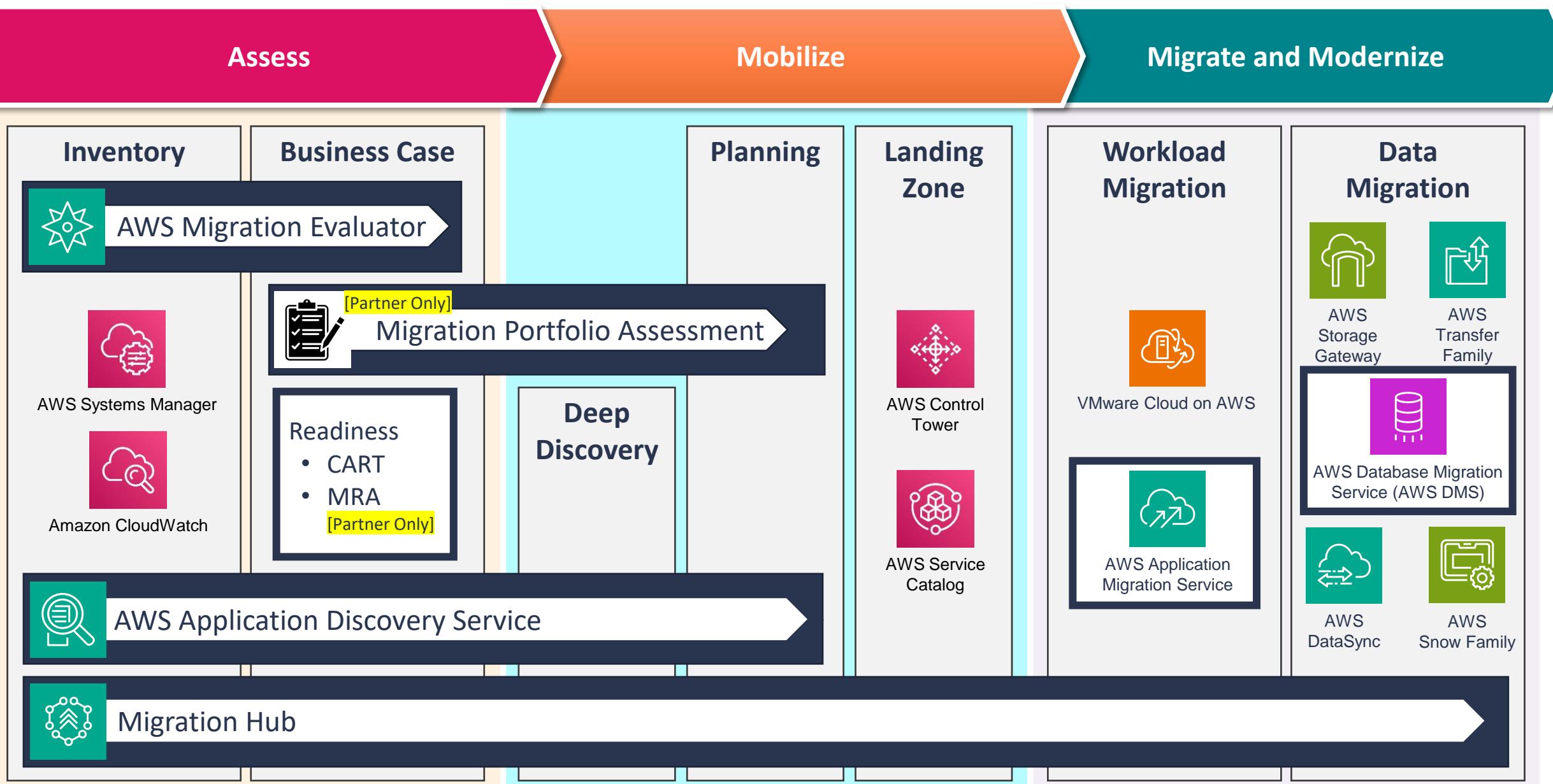


- Not able to take advantage of cloud native features (managed services, scalability, etc.) as workloads are not optimized for cloud.
- Since most of the operations are still managed by the organization, relocating does not shift much responsibility to the cloud provider to help save time and effort.



- Continued maintenance and compatibility with existing applications on the new platform can use time and resources.
- Minimal benefit in terms of cost saving because of hypervisor license, operational overhead.

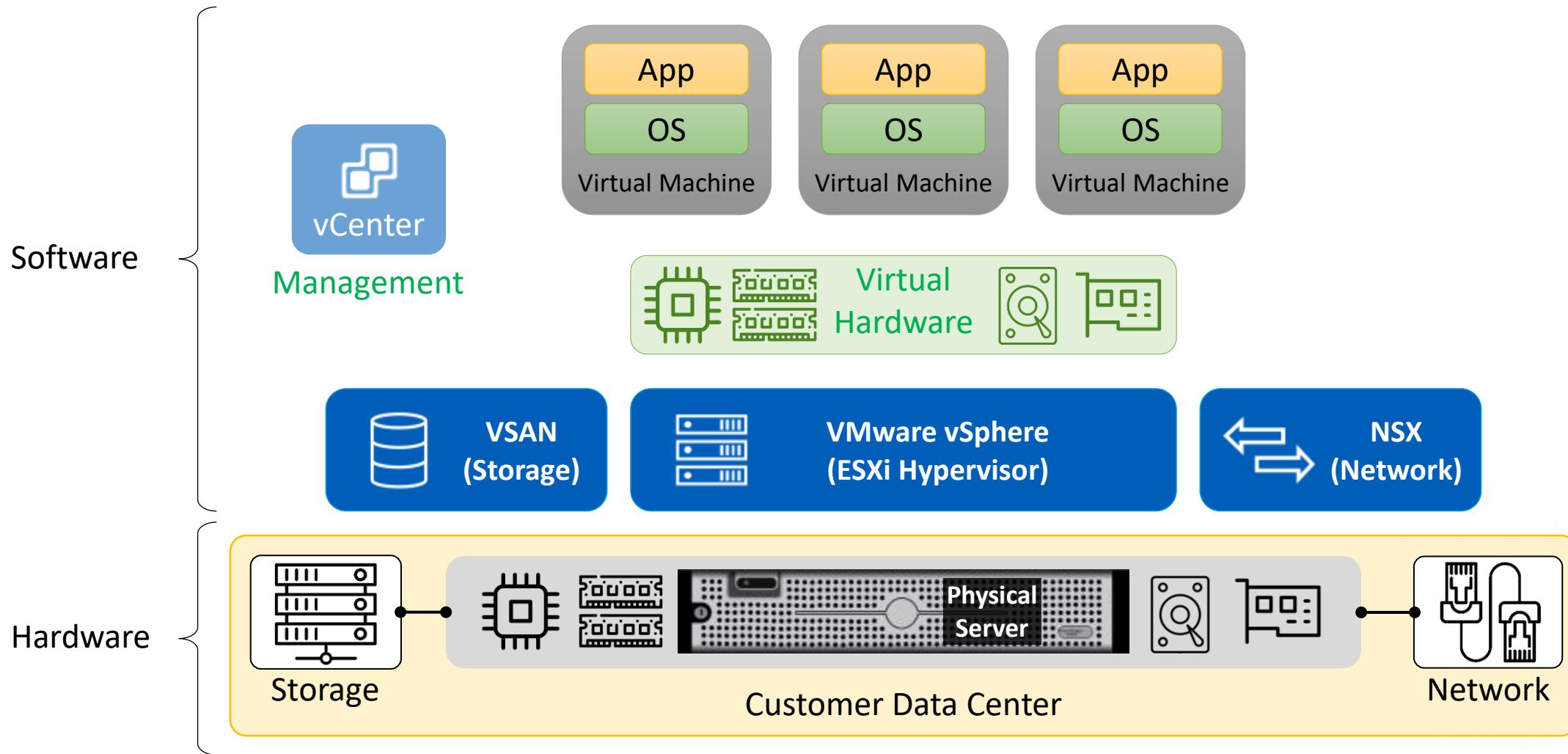
Cloud Migration – AWS Tools and Services Portfolio



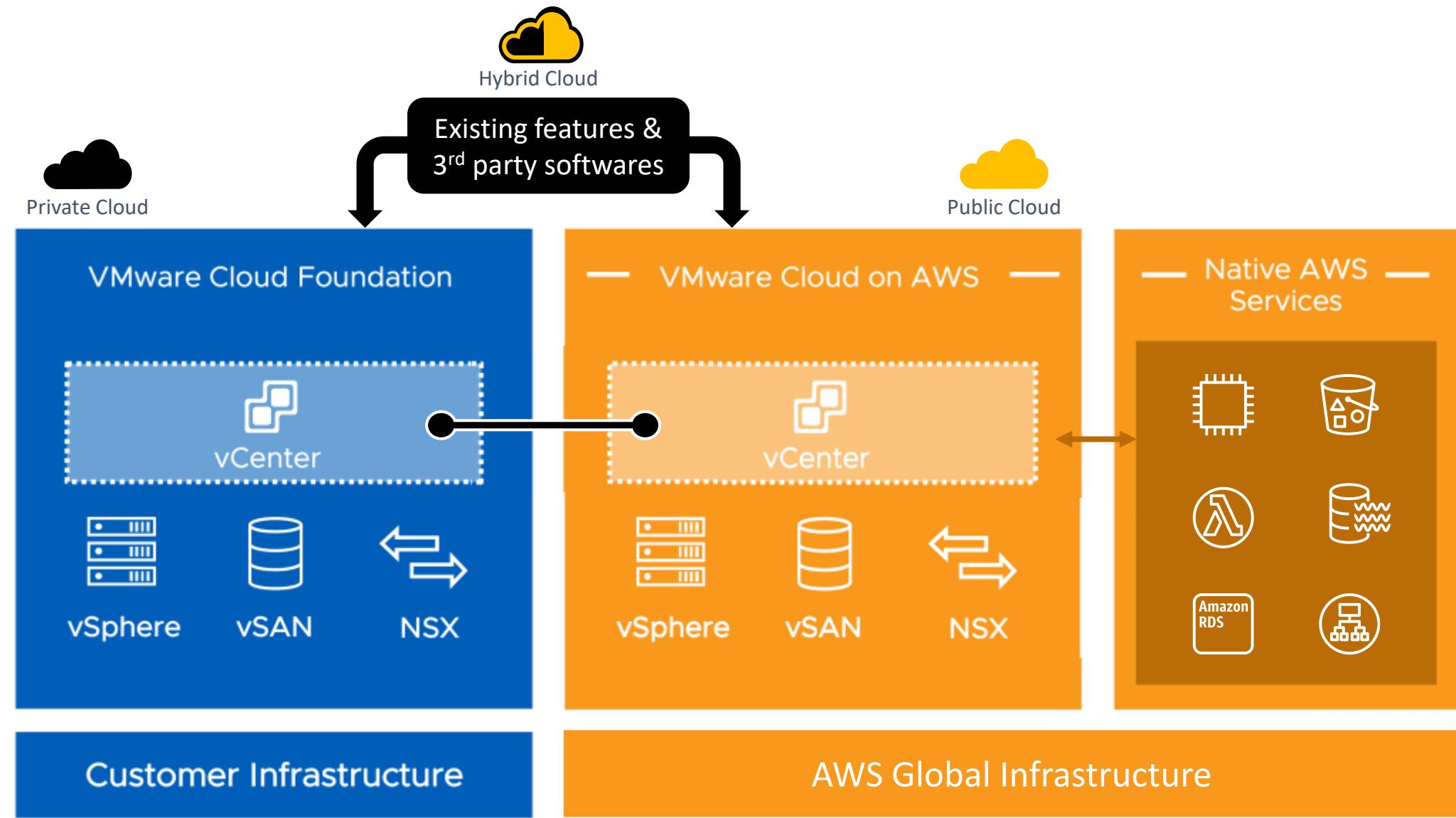


VMware Cloud on AWS

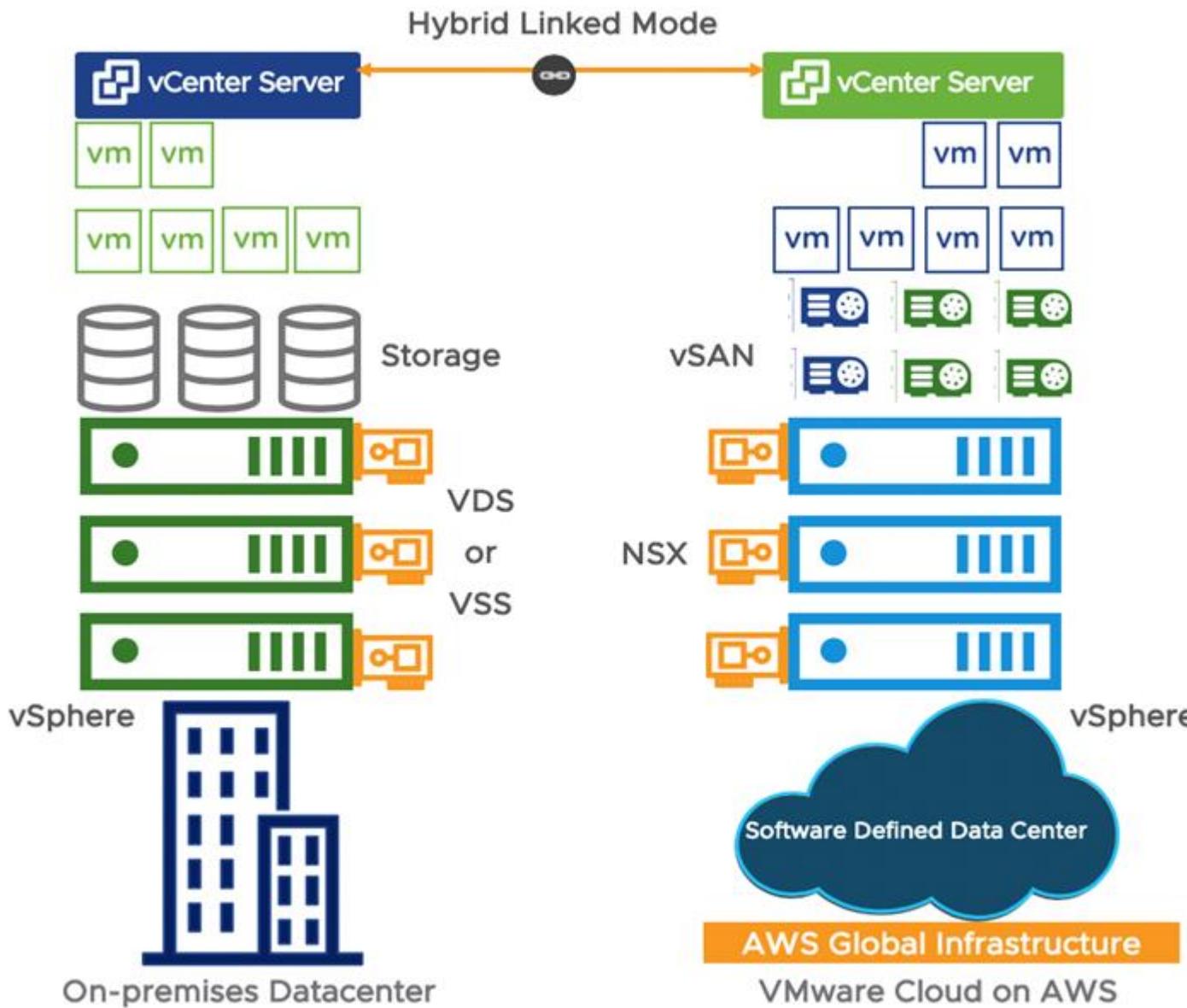
VMware Software Defined Data Center (SDDC)



VMware Cloud on AWS (VMC on AWS)



Migration Type – Cold Migration



- **Cold Migration**
 - Backup and Restore
 - Considerable Downtime
- **Warm Migration**
 - Replication
 - Low Downtime
- **Live Migration**
 - vMotion
 - No Downtime



vCenter Hybrid Linked Mode

vSphere Client | Menu | Search in all environments

vcenter.sddc-34-213-24-154.vmwarevmc.com

SUMMARY | MO... | CONF... | PERMI... | DATA... | HOSTS &... | ... | DATA...

Virtual Machines: 9
Hosts: 1

Custom Attributes

Attribute	Value
No items to display	

Edit...

Tags

Assigned Tag

Assign... Remove...

Version Information

vcenter.cdc-52-40-110-179...

SDDC-Datacenter

Cluster-1

esx-0.cdc-52-40-11...

esx-1.cdc-52-40-110...

esx-2.cdc-52-40-11...

esx-3.cdc-52-40-11...

Compute-Resource...

Mgmt-ResourcePool

vcsa-tmm-01.cpbu.lab

PaloAlto

TMM-CL-01

esx-tmm-01.cpbu.lab

esx-tmm-02.cpbu.l...

esx-tmm-03.cpbu.l...

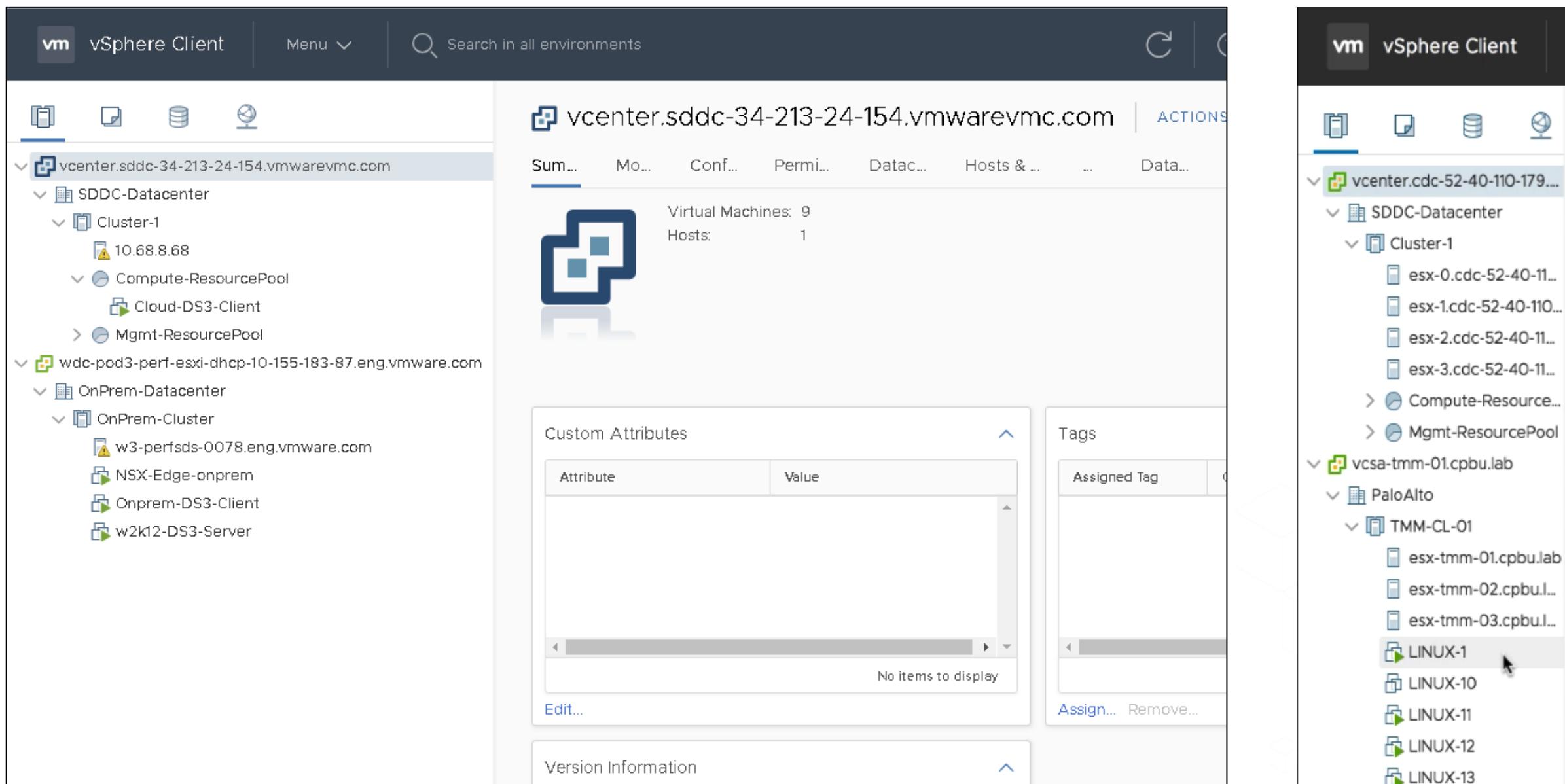
LINUX-1

LINUX-10

LINUX-11

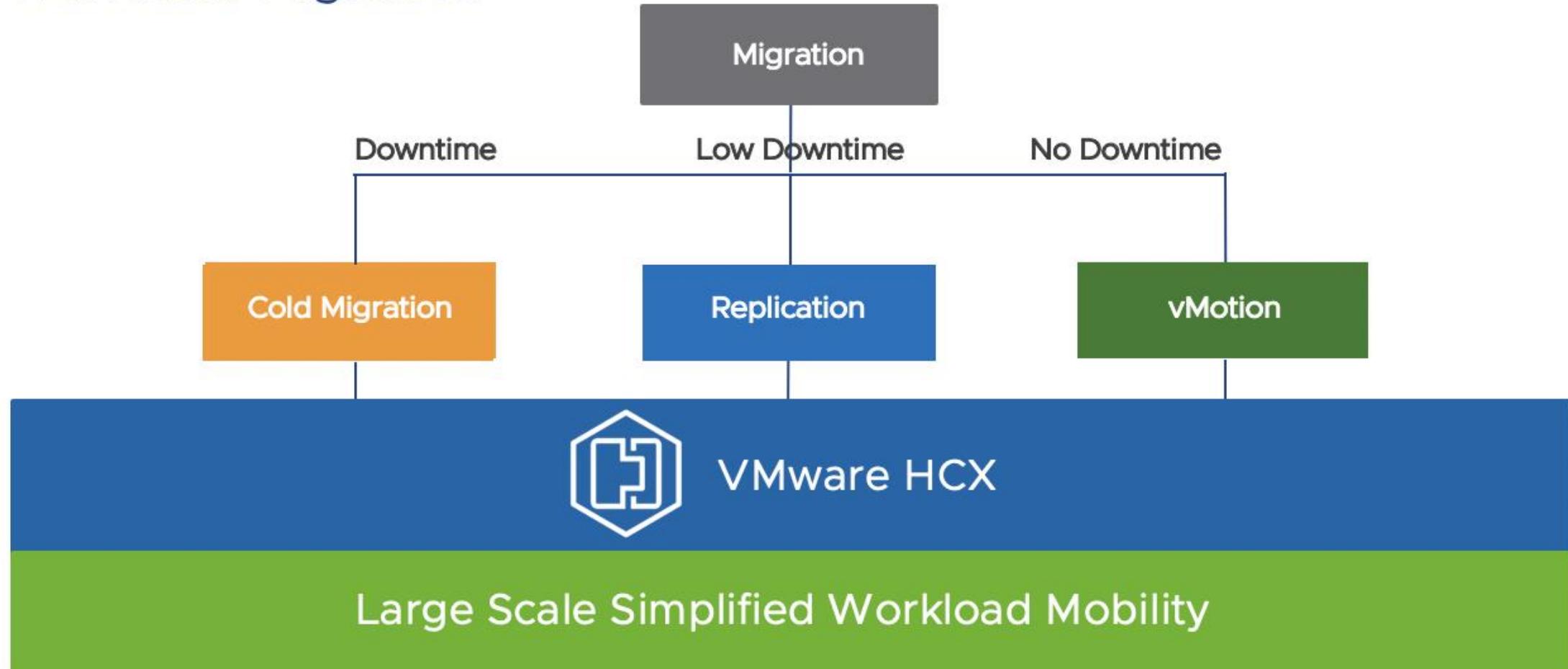
LINUX-12

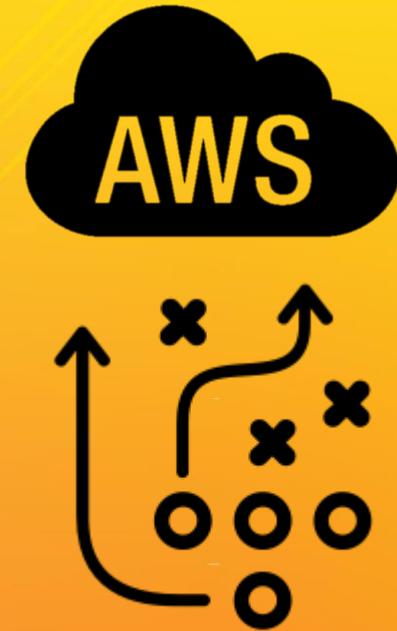
LINUX-13



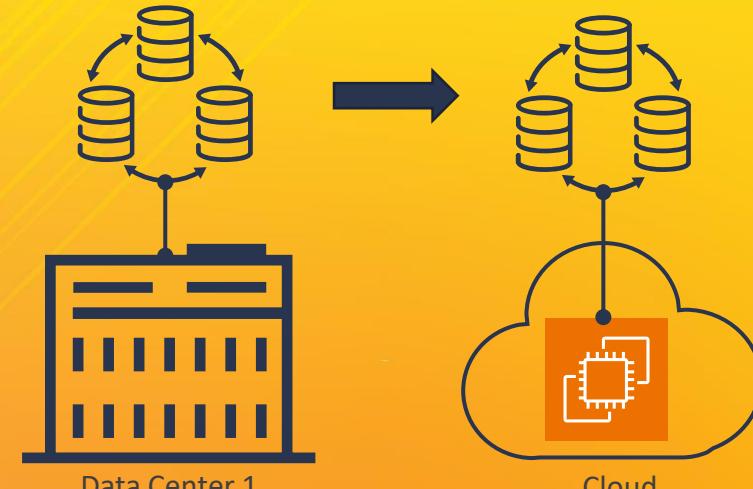
VMware HCX – Hybrid Cloud Migration Extension

Workload Migration





Migration Strategies
(7 Rs of migration)



Rehost

- Migrate applications and data from on-premises infrastructure to the cloud without making any significant changes to the application architecture.
- Also referred as Lift and Shift.



- Quickly migrate applications with minimal disruption “as-is” to the cloud services that match the workload’s existing storage, networking, and compute requirements.
- Using rehosting, companies can increase their systems' resilience, service availability, and more without costly system upgrades.

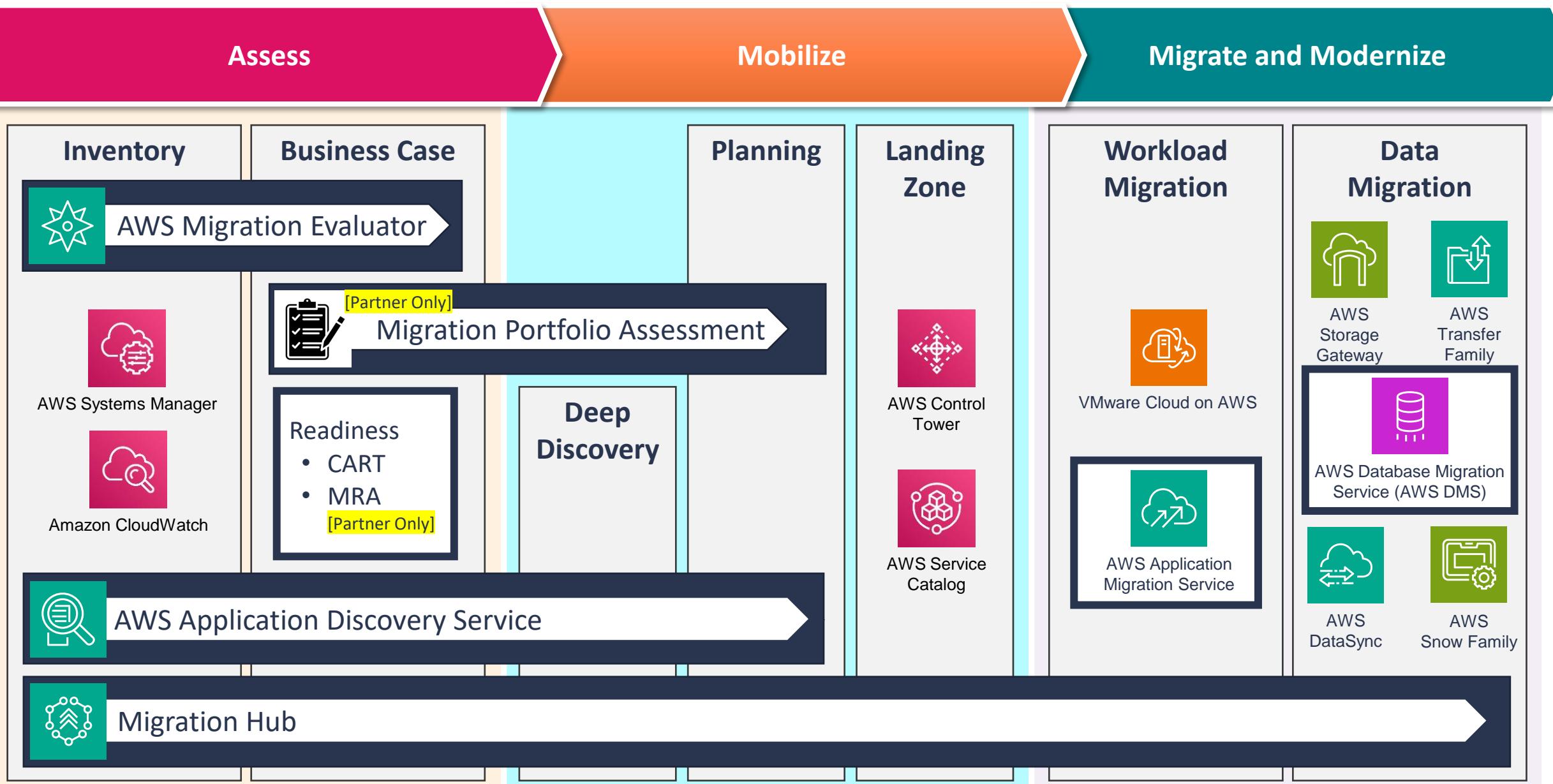


- Not able to take advantage of cloud native features (managed services, scalability, optimization etc.) as workloads are not fine-tuned for cloud.
- A rehosted workload may introduce compatibility, performance, security, and other technical and operational gaps, negatively affecting end users.



- By rehosting, an application becomes cloud-enabled and cloud-based, not cloud-native. As a result, the workload is still restricted in utilizing cloud-native capabilities.
- The migration process may fail if the application requirements aren't mapped out accurately to the corresponding cloud configuration.

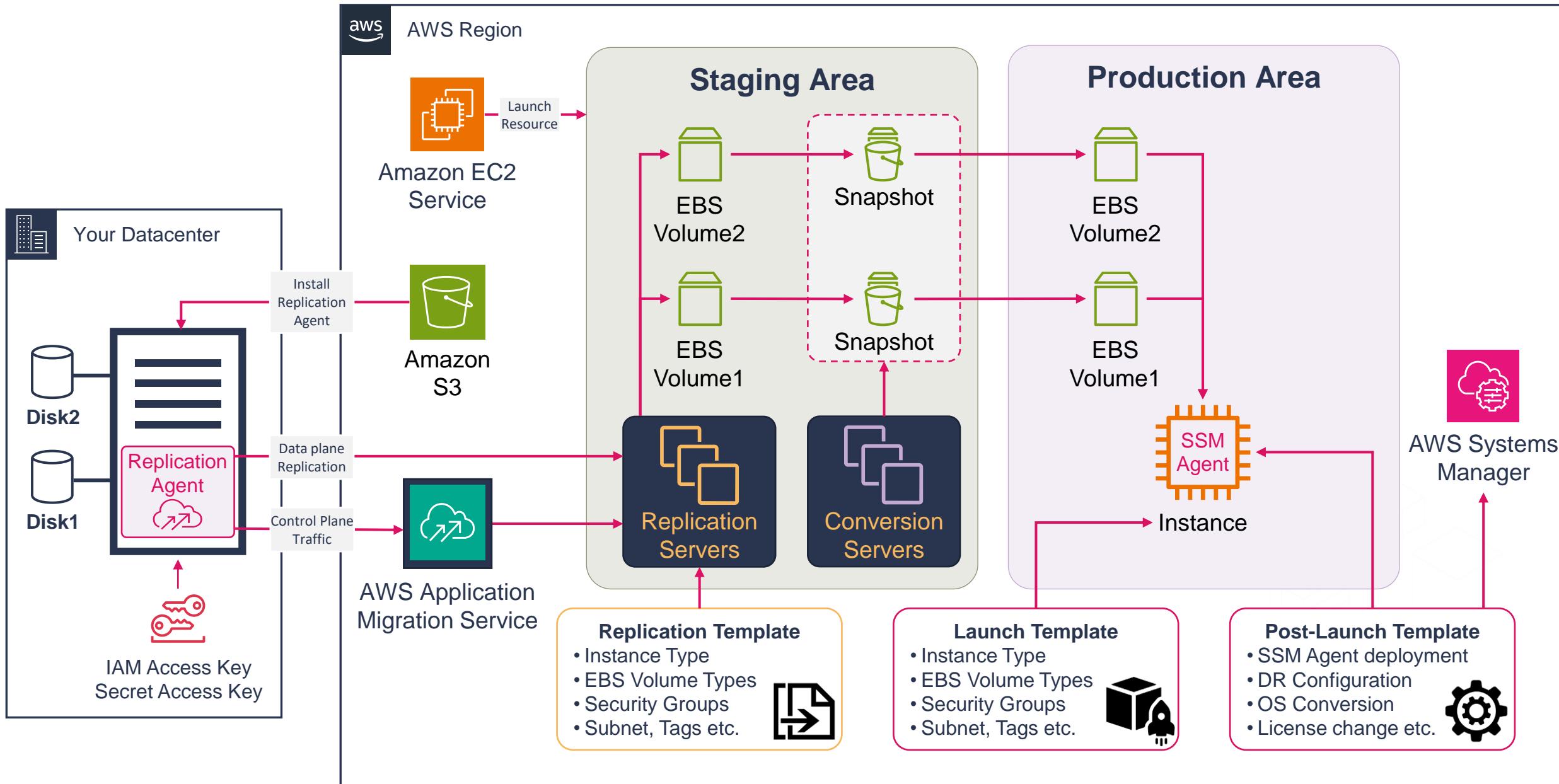
Cloud Migration – AWS Tools and Services Portfolio

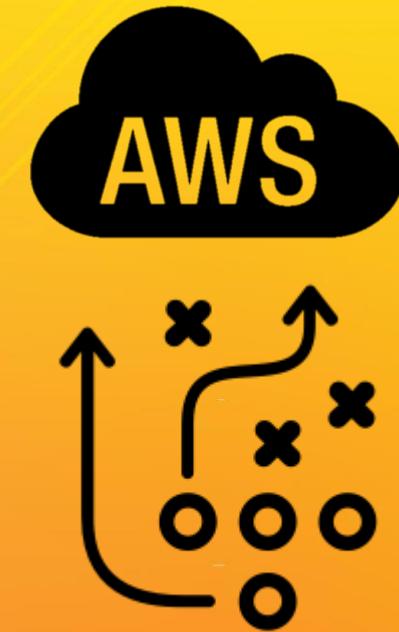


What is MGN?

- Primary migration service recommended for lift-and-shift migrations.
- Allows migrating physical, virtual and cloud servers to AWS.
- AWS MGN is the next generation of CloudEndure Migration.
- Use it to perform non-disruptive tests prior to cutover.
- After testing, quickly migrate your applications to the cloud during a short cutover window, typically measured in minutes.

AWS Application Migration Service (MGN) – Architecture





Migration Strategies
(7 Rs of migration)



Old Windows Servers

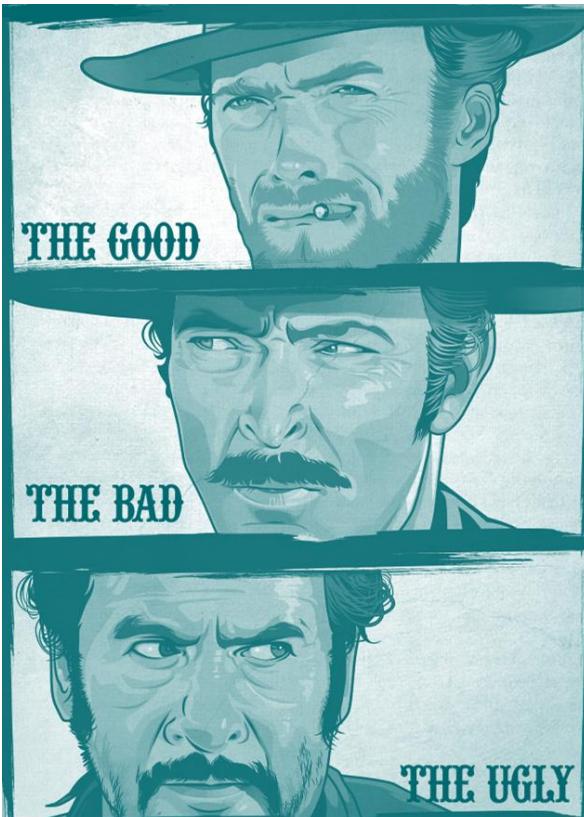


DB Engine Change

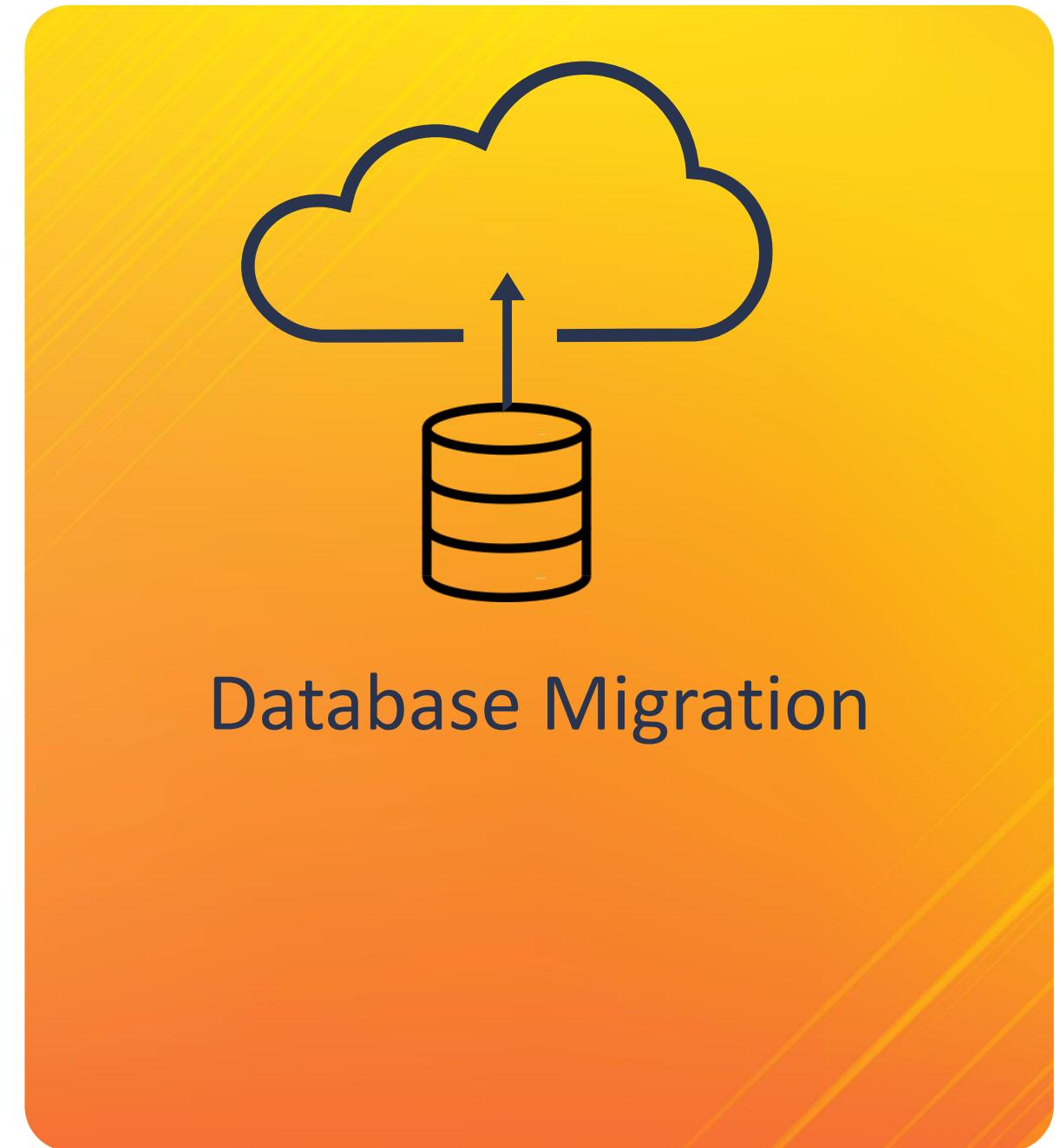


Replatform

- Replatform strategy modifies existing on-premises applications to work optimally in the cloud while retaining much of their core architecture.
- Also referred as Lift, Tinker (modify) and Shift.



- It mostly involves switching from self-hosted architecture to managed services.
- It allows applications to leverage cloud capabilities, like auto-scaling, managed storage, automation and data processing services.
- Even if it requires only minor changes, making the changes can still be costly and time-consuming compared to rehosting.
- It requires thorough testing, continuous AWS monitoring, and anomaly detection to avoid costly issues.
- Sometimes “scope creep” can turn a replatform project to refactor project.



Database Migration

Assess

Mobilize

Migrate and Modernize



AWS Database Migration Service – Fleet Advisor



AWS Schema Conversion Tool (AWS SCT)



AWS Database Migration Service (AWS DMS)

← Vendor and 3rd Party Tools & Services →

AWS Programs

AWS Migration Acceleration Program (MAP)

AWS Optimization and Licensing Assessment (AWS OLA)

Database Freedom

Database Migration Accelerator – Fixed Price

Data Lab

Native Database Migration Tools for Homogenous Migration

- Many DBAs are familiar with a wide range of tools that handle database migration and replication.
- These tools are typically offered by database engine vendors and third-party companies.
 - Full backup/restore
 - Microsoft SQL Server databases - Full and differential backup (.bak) files.
 - Oracle RMAN
 - Logical backup or export
 - Various 3rd Party backup software
 - Native database high availability (HA) tools
 - Microsoft SQL Server
 - Oracle Data Guard
 - Change Data Capture (CDC) replication
 - Microsoft SQL Server CDC
 - Oracle GoldenGate, Qlik, and Talend

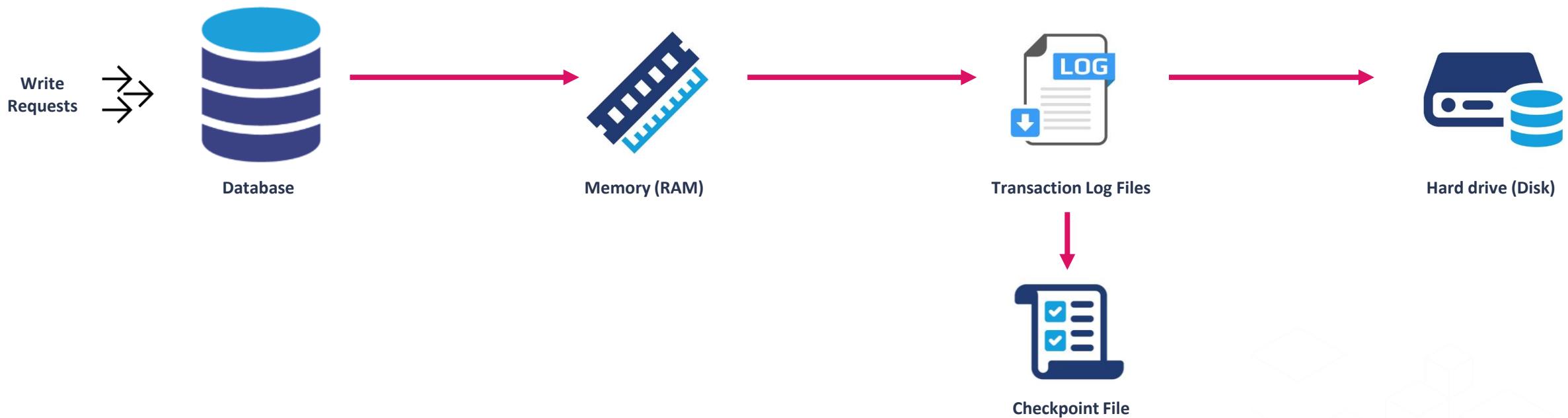




Database Migration Basic Concepts

Transaction Logs

- A transaction log (also transaction journal, database log, binary log or audit trail) records all transactions executed on a database.

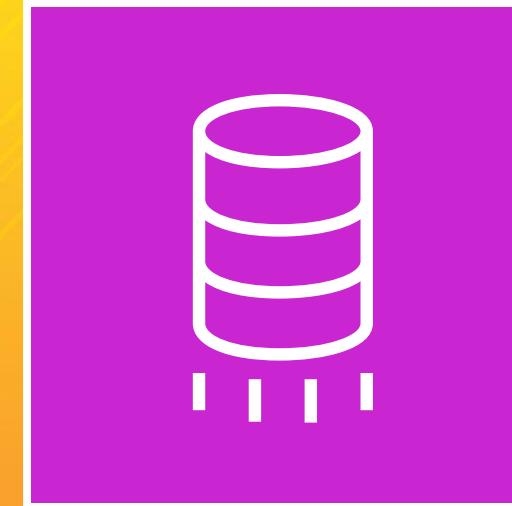


- The transaction log serves two main purposes:
 1. it allows the database to undo or redo transactions in case of a failure
 2. it provides an audit trail of the database activity

Change data capture (CDC)

- Change data capture (CDC) is a specific technology that recognizes, tracks, and delivers data changes in a database.
- CDC looks for changes in a database, and when found, it records it. This record may be stored either in the same database or in externally.
- Each database engine has specific configuration requirements for exposing this change stream to a given user account. Most engines require some additional configuration to make it possible for the capture process to consume the change data in a meaningful way, without data loss. For example, Oracle requires the addition of supplemental logging, and MySQL requires row-level binary logging (bin logging).

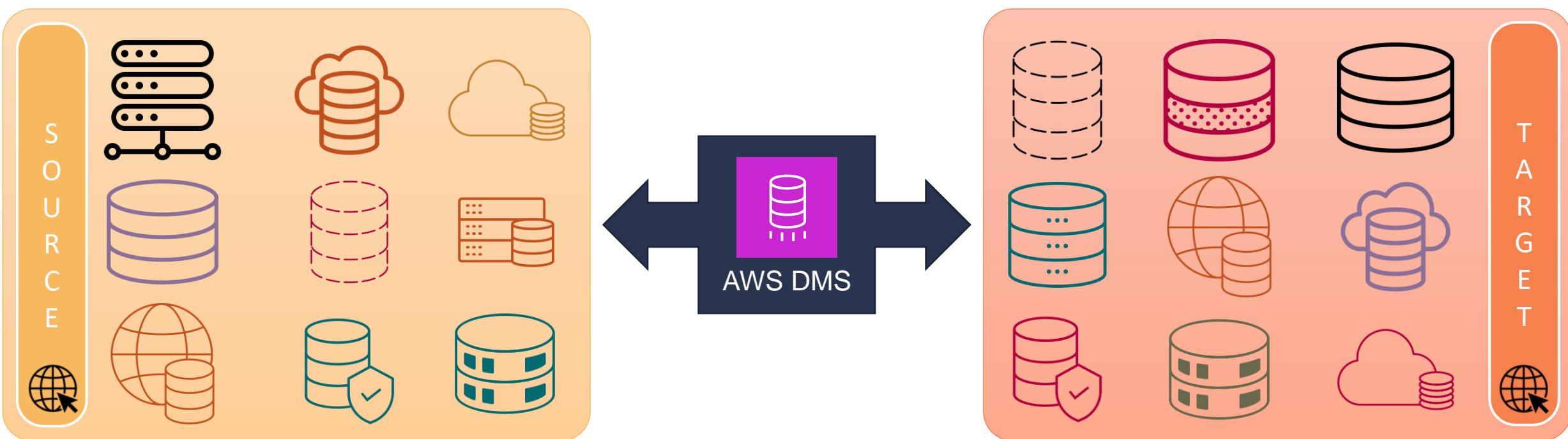




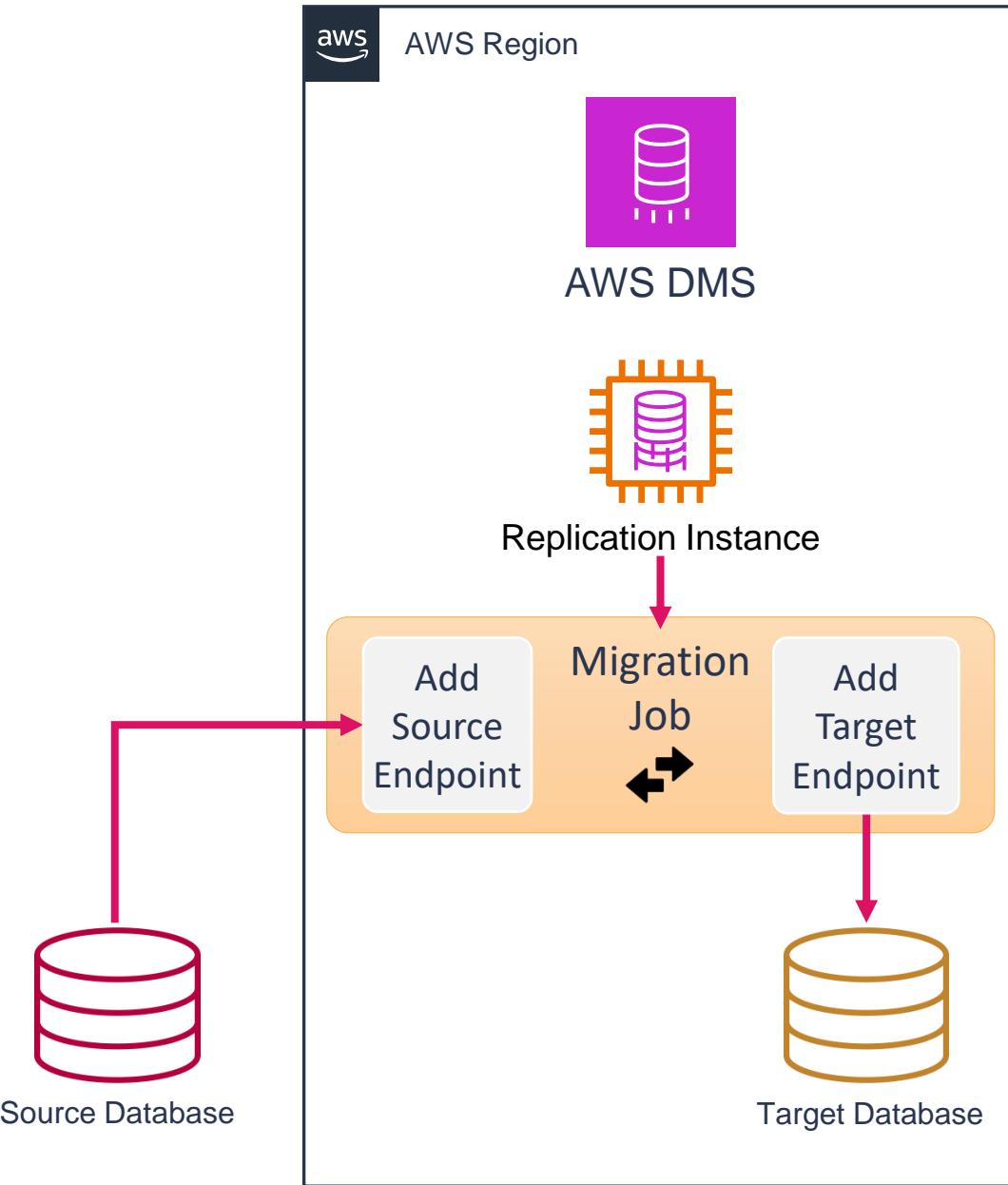
AWS Database Migration
Service (AWS DMS)

AWS Database Migration Service (AWS DMS)

- AWS DMS helps you migrate relational databases, data warehouses, NoSQL databases, and other types of data stores into the AWS Cloud or between combinations of cloud and on-premises setups.
- It supports homogeneous migrations as well as heterogeneous migrations between different database platforms.



AWS DMS – Architecture



- At least one of the endpoint (source or target) must be on an AWS service.
- Step 1
 - Setup a Replication Instance (a managed EC2 instance that runs replication software)
- Step 2
 - Add source and target databases
- Step 3
 - Start the migration job

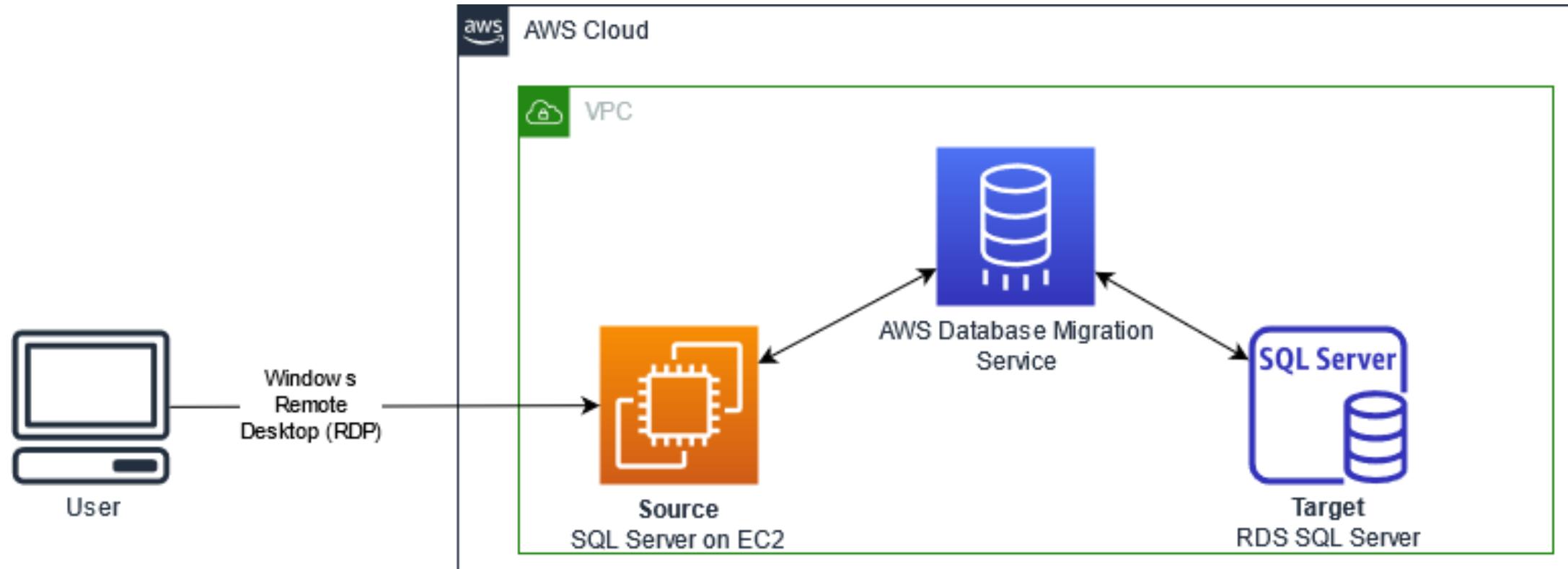


AWS DMS – Replication Types

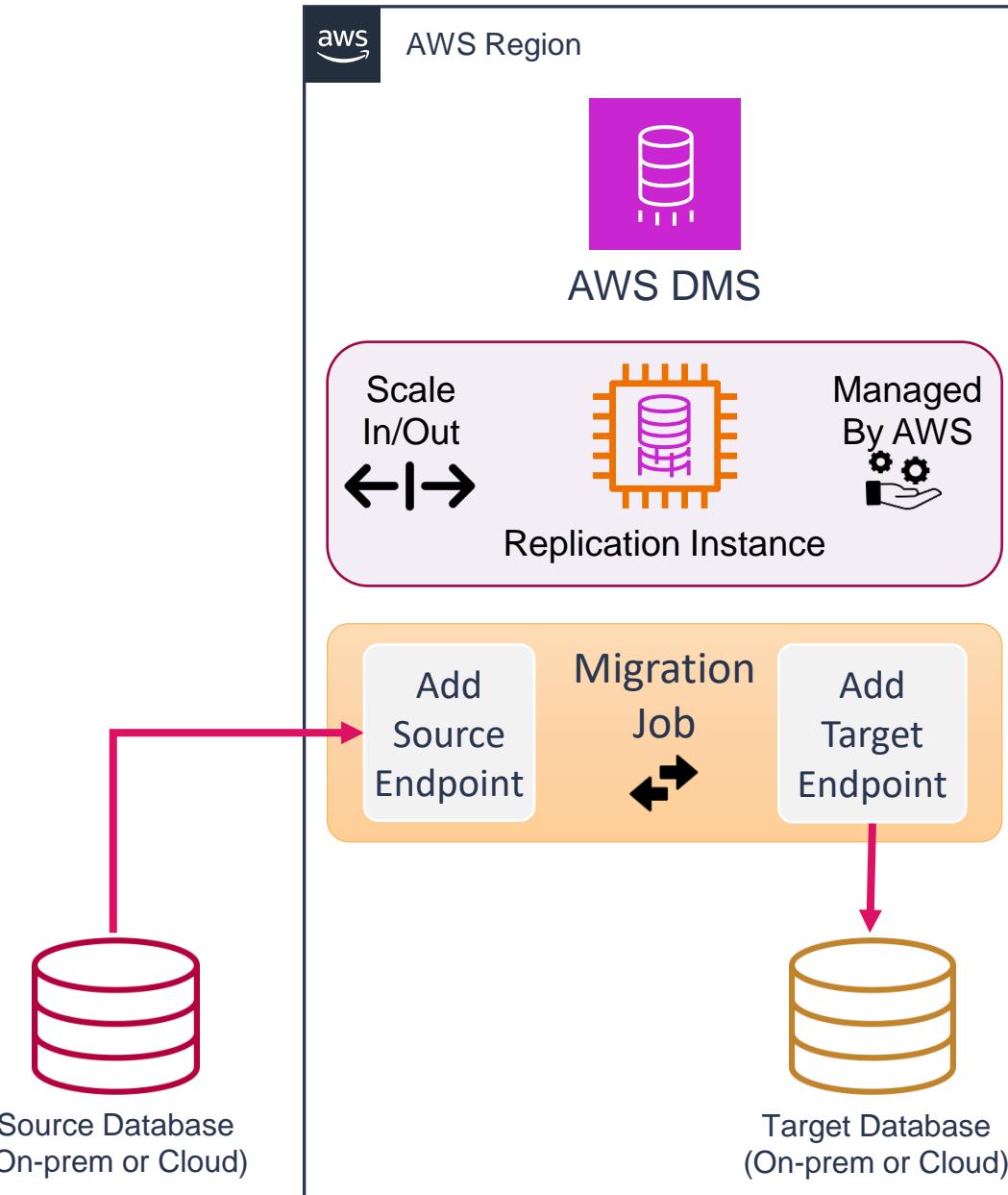
- Migrate existing data (Full load Only)
 - Perform a one-time migration from the source endpoint to the target endpoint.
- Migrate existing data and replicate ongoing changes(Full load and CDC)
 - Perform a one-time migration from the source to the target, and then continue replicating data changes from the source to the target.
- Replicate data changes only(CDC only)
 - Don't perform a one-time migration, but continue to replicate data changes from the source to the target.

AWS Database Migration Workshop

- Microsoft SQL Server to Amazon RDS for SQL Server



AWS DMS Serverless



- AWS DMS Serverless is a feature that provides automatic provisioning, scaling, built-in high availability, and a pay-for-use billing model.
- The Serverless feature eliminates replication instance management tasks like capacity estimation, provisioning, cost optimization, and managing replication engine versions and patching.

Database Migration

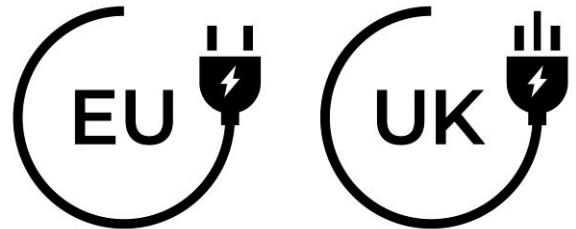
- How about heterogenous database migration?



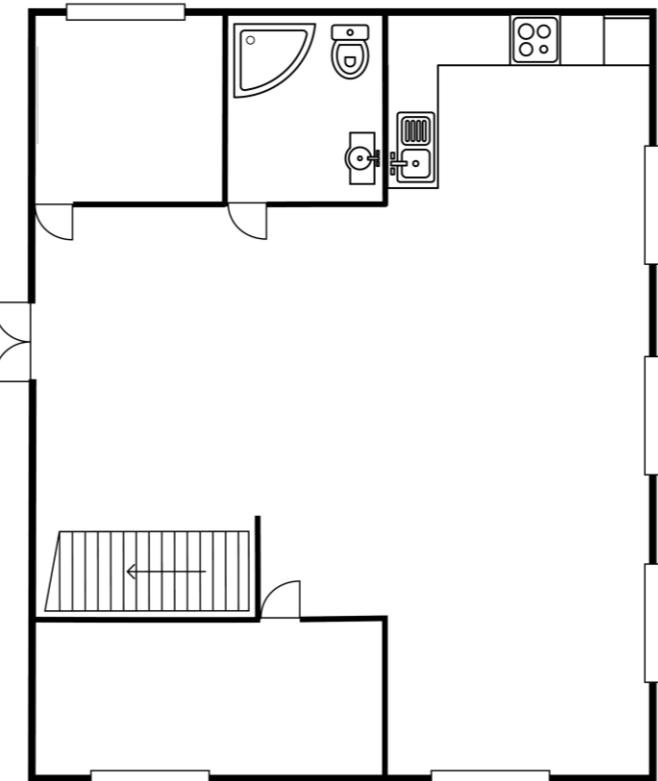
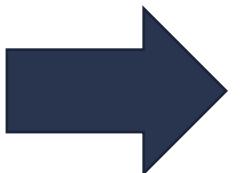
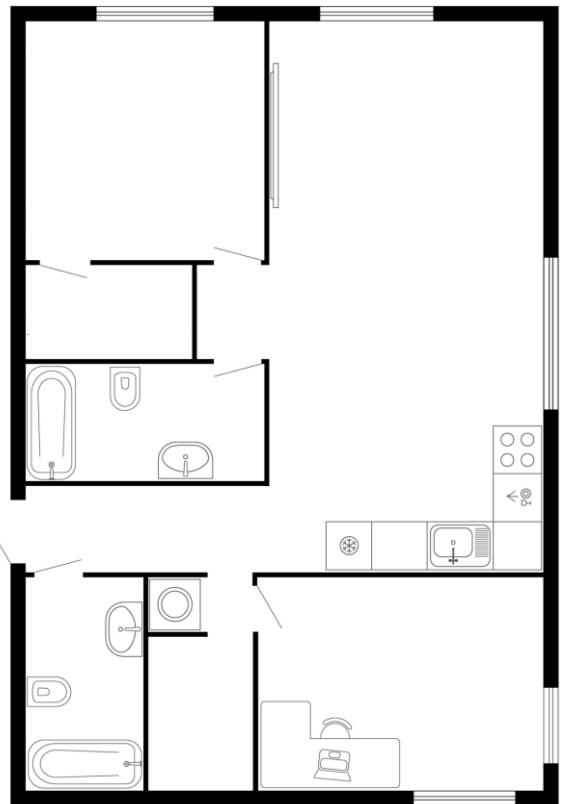


Database Schema
Conversion

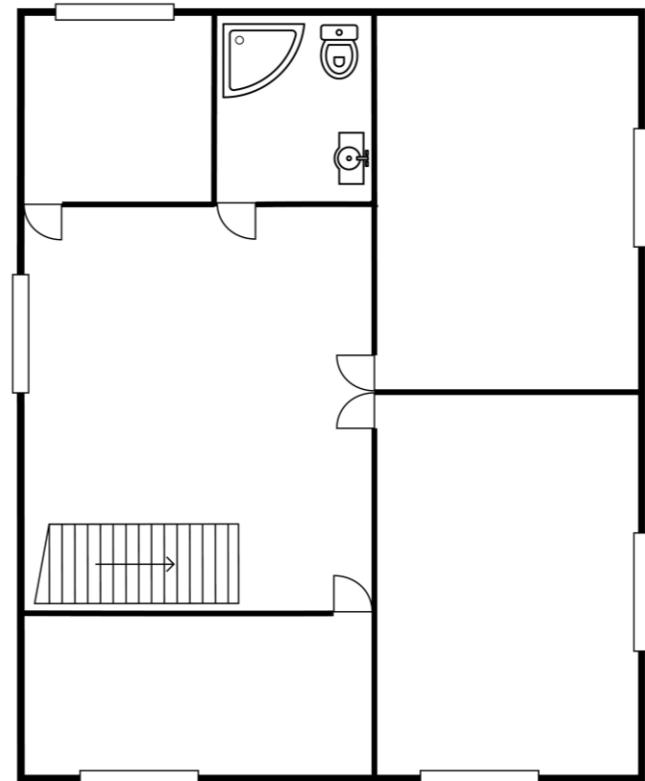
Have you been into situations like this?



Have you been into situations like this?



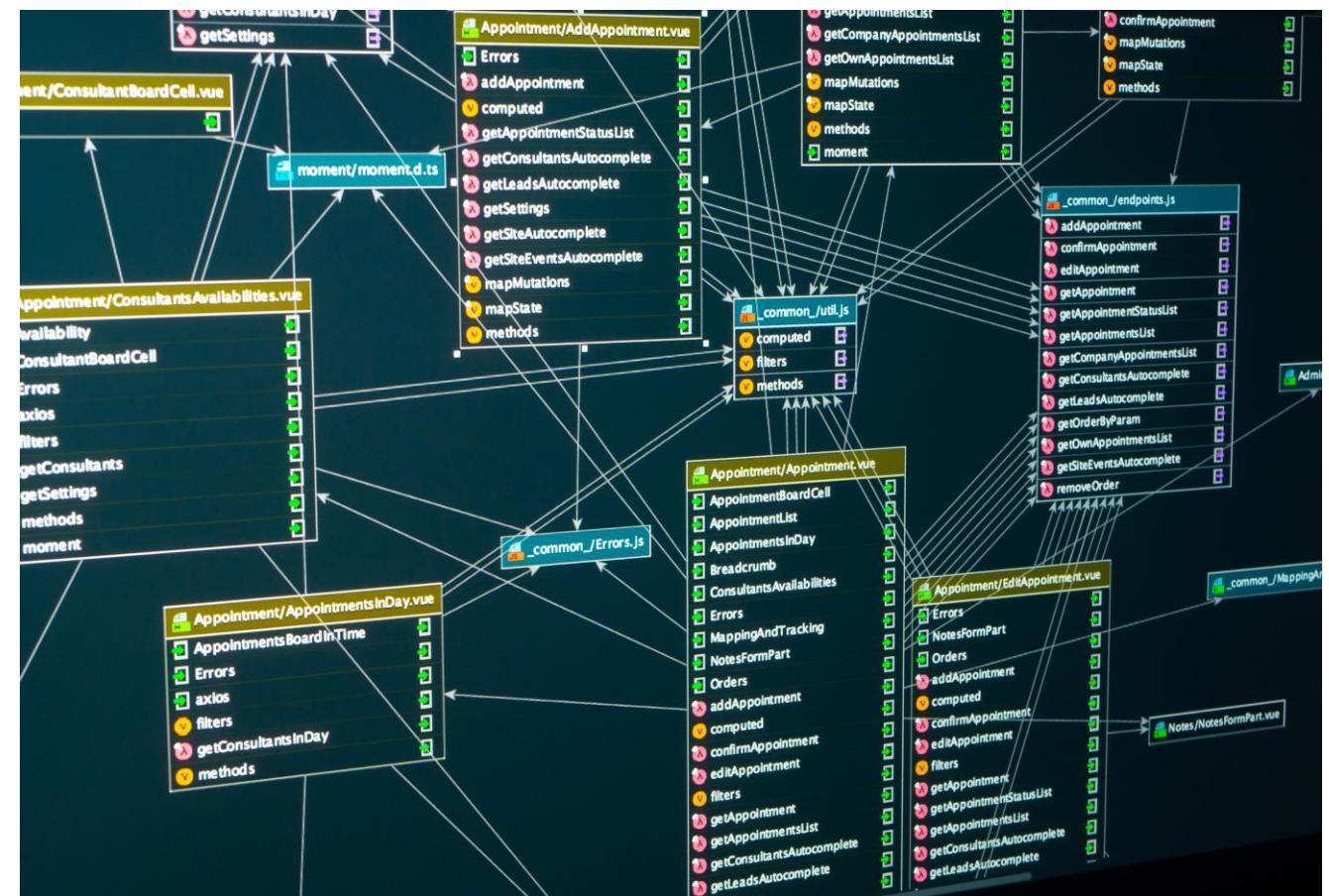
1st FLOOR



2nd FLOOR

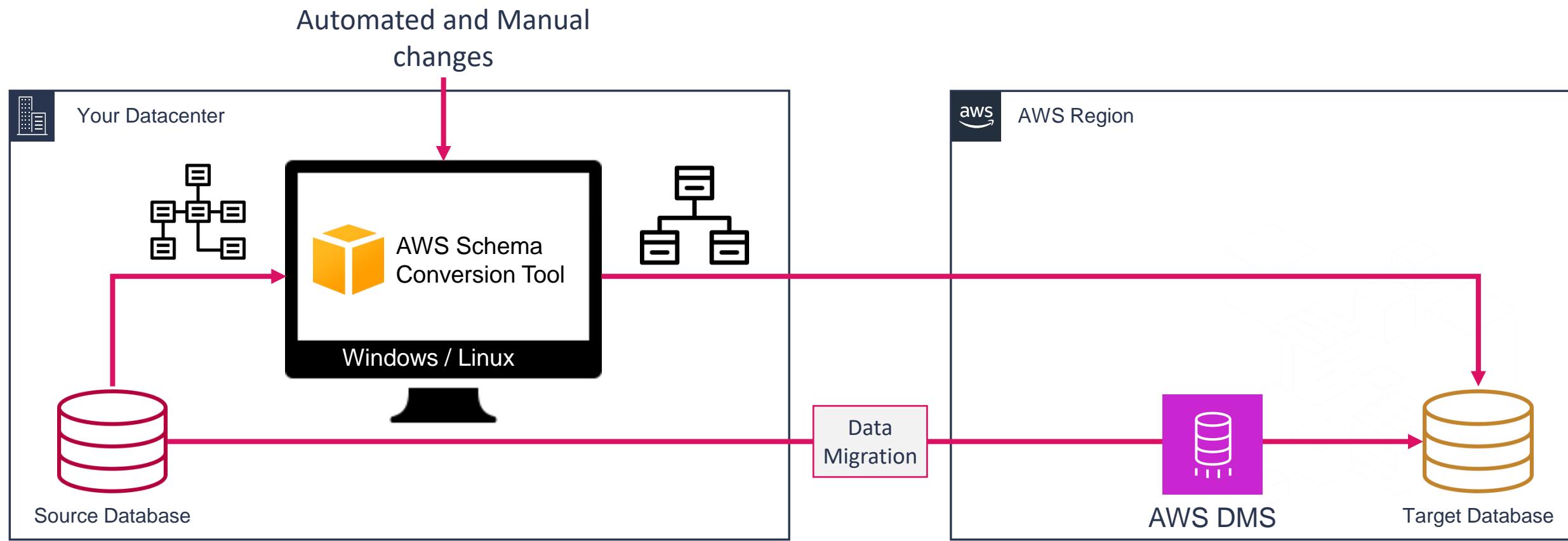
Database Schema

- Each database has a different way of storing data.
- A structure and its corresponding relationship of the data is called Schema.
- Schema represents any kind of structure that we define around that data. Which includes Table, views, fields, relationship, packages, procedures, indexes, function, type, material, sequences, materialized views, queues, triggers, synonyms, database links, directories, and other elements.

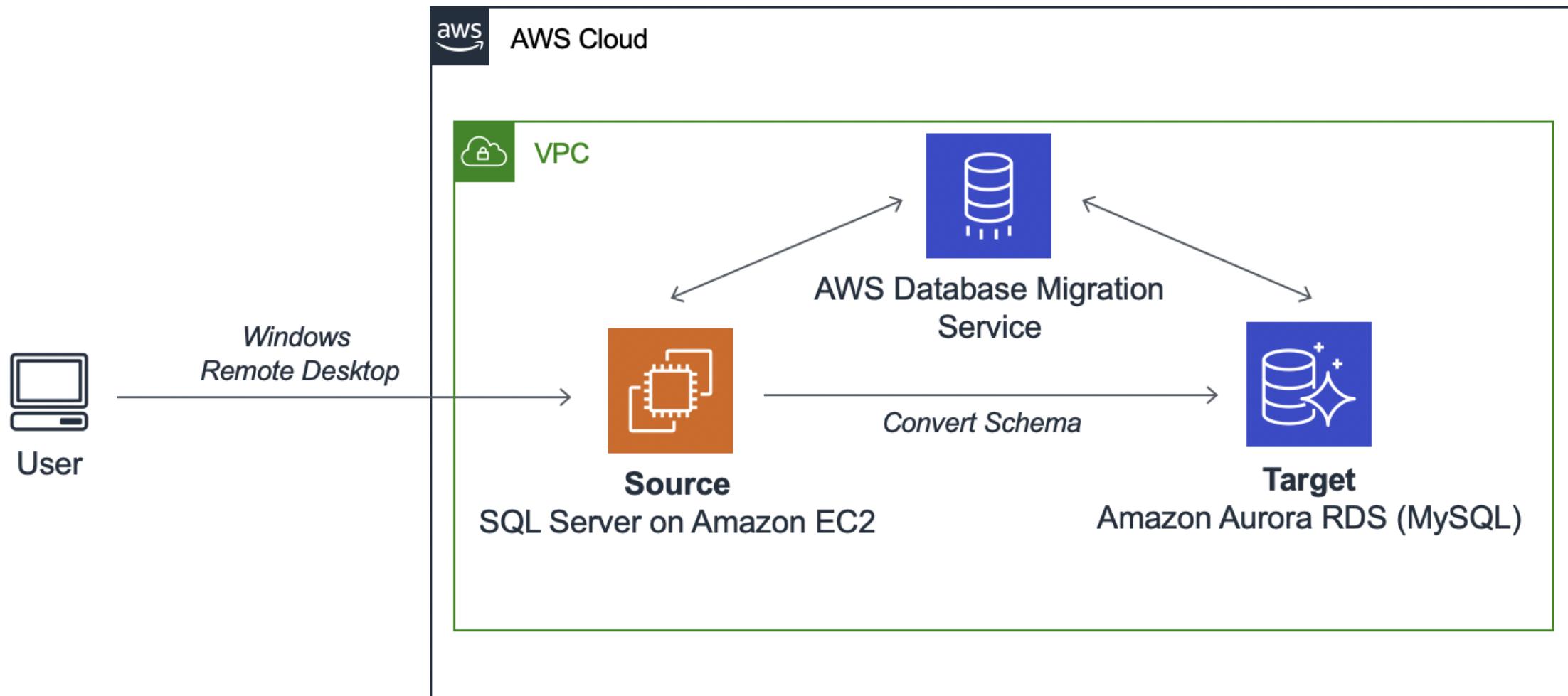


AWS Schema Conversion Tool (AWS SCT)

- AWS SCT is a stand-alone utility that allows you to convert your existing database schema from one database engine to another.
- If no direct conversion is possible, AWS SCT provides an assessment report with a list of possible actions for you to take.

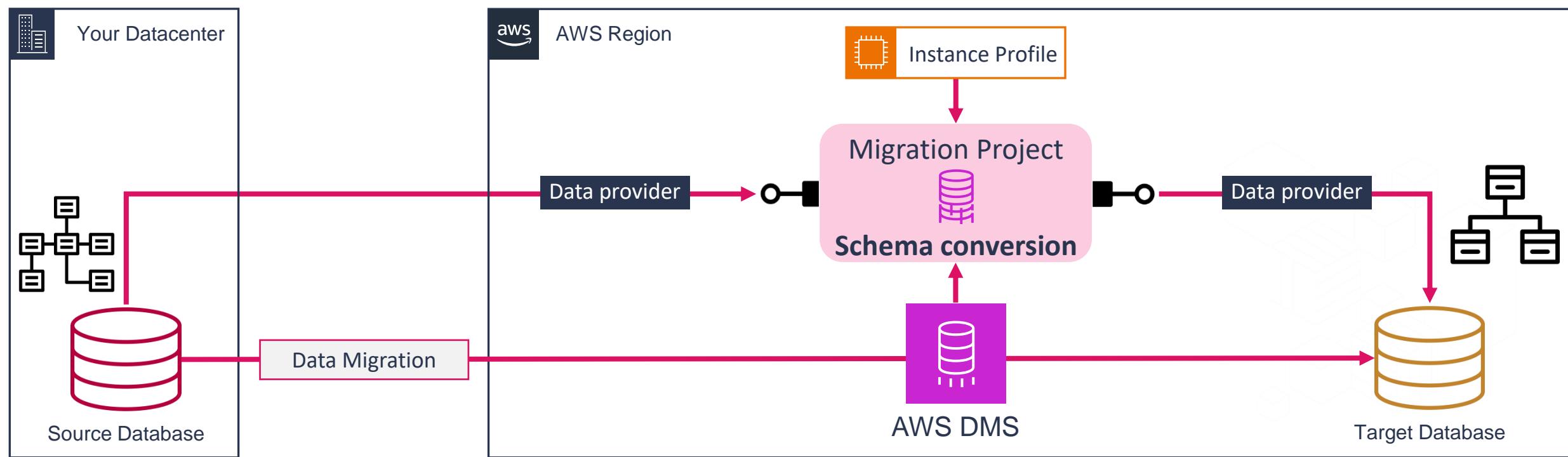


AWS Schema Conversion Tool (AWS SCT) – Demo



AWS DMS Schema Conversion (DMS SC)

- DMS Schema Conversion is a web-version of the AWS Schema Conversion Tool (AWS SCT).
- DMS Schema Conversion automatically manages the AWS Cloud resources that are required for your database migration project.

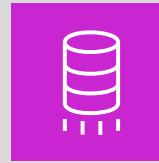


Database Migration Service

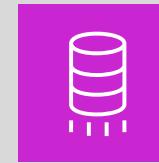
Assess

Mobilize

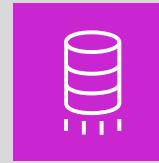
Migrate and Modernize



AWS Database Migration
Service – Fleet Advisor



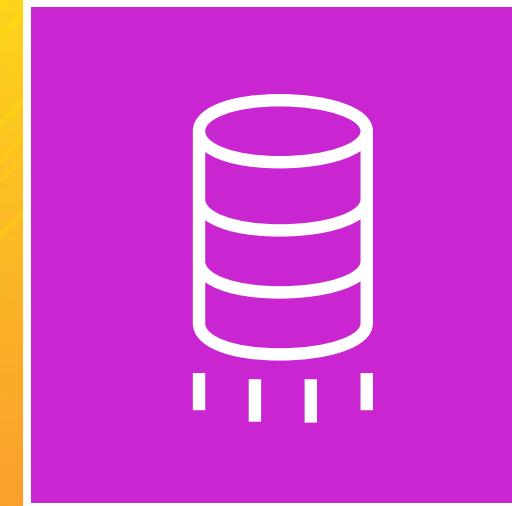
AWS Database Migration
Service – Schema Conversion



AWS Database Migration
Service (AWS DMS)



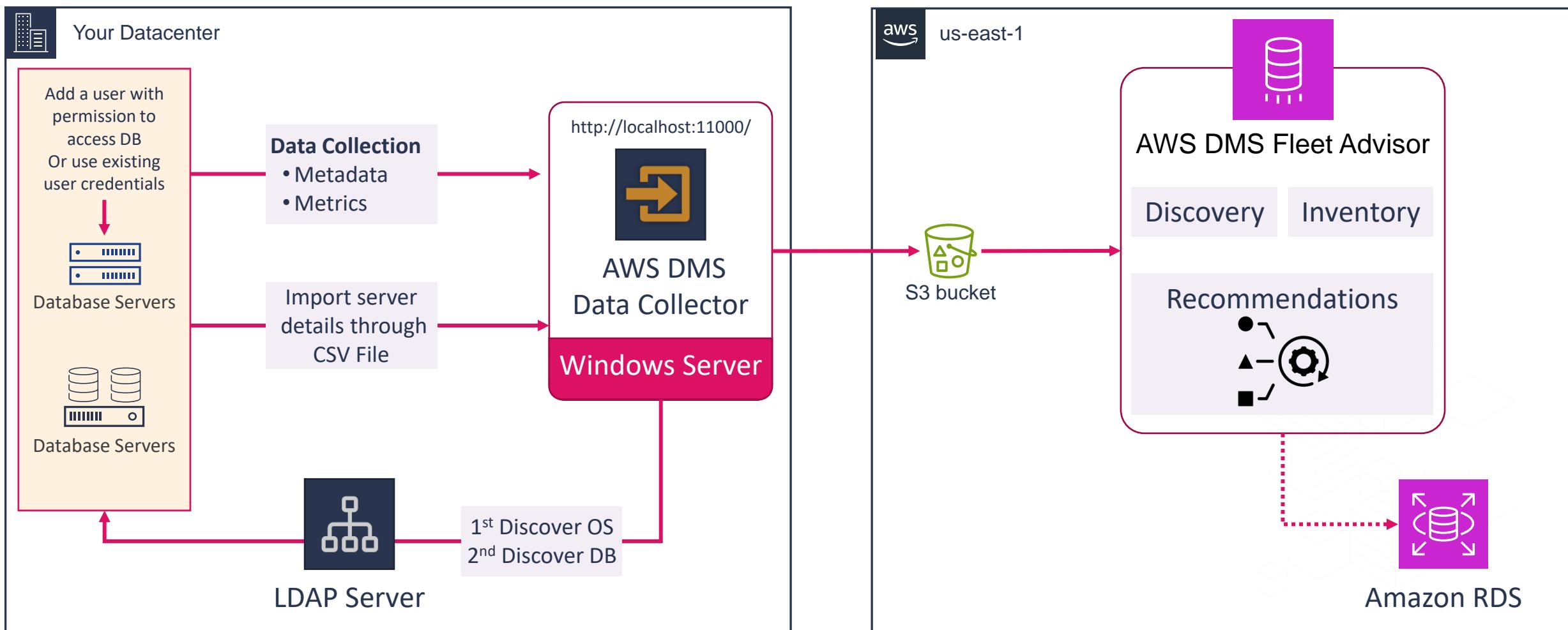
AWS Schema Conversion
Tool (AWS SCT)



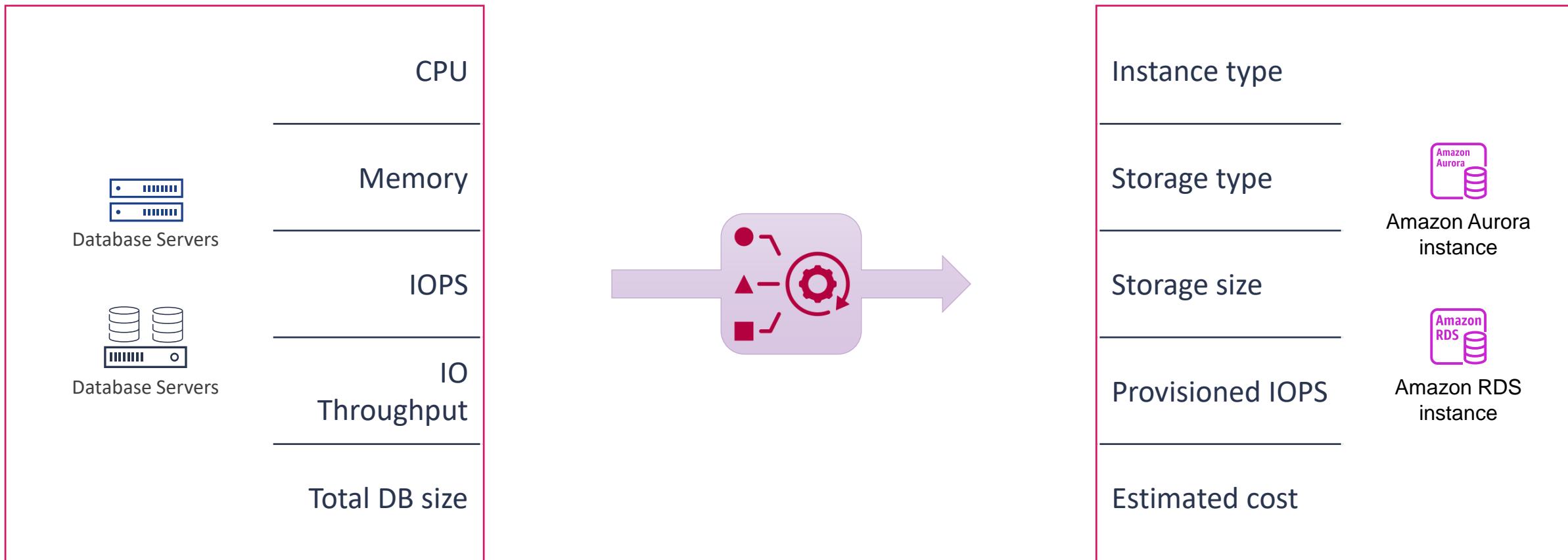
AWS DMS – Fleet Advisor

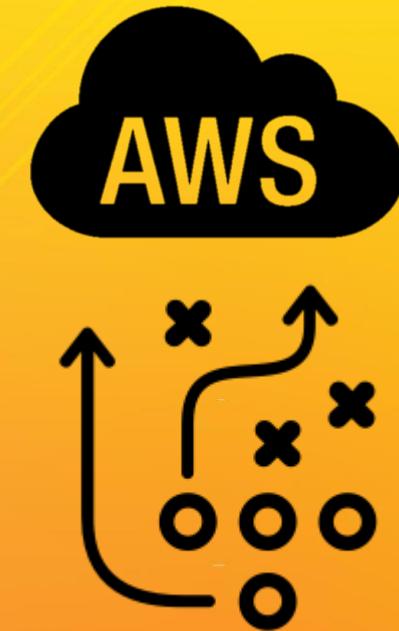
AWS DMS – Fleet Advisor

- Allows you to access your on-premises infrastructure and estimate costs savings in running those workloads on AWS.



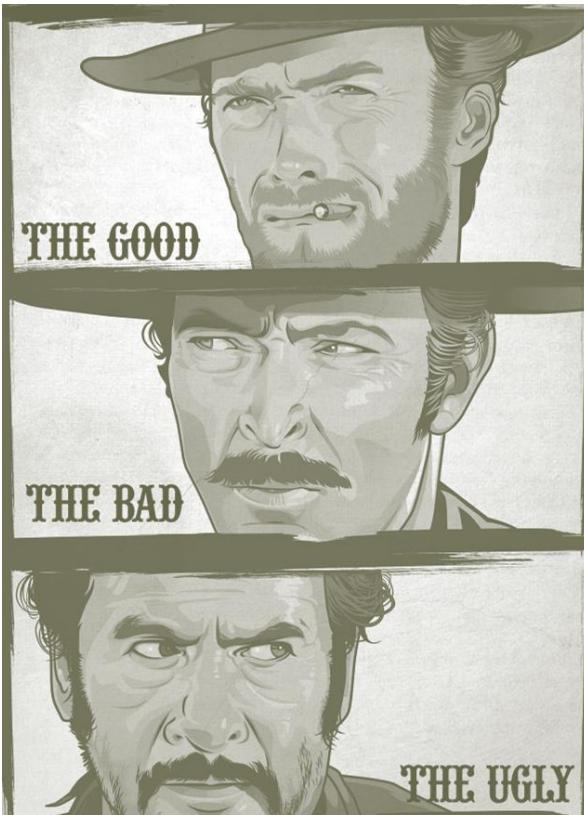
DMS Fleet Advisor – Recommendation Algorithm





Migration Strategies
(7 Rs of migration)

- Refactoring helps break down a monolithic application into microservices to achieve high availability and enhanced levels of automation.
- Also referred as Redesign or Rearchitect.



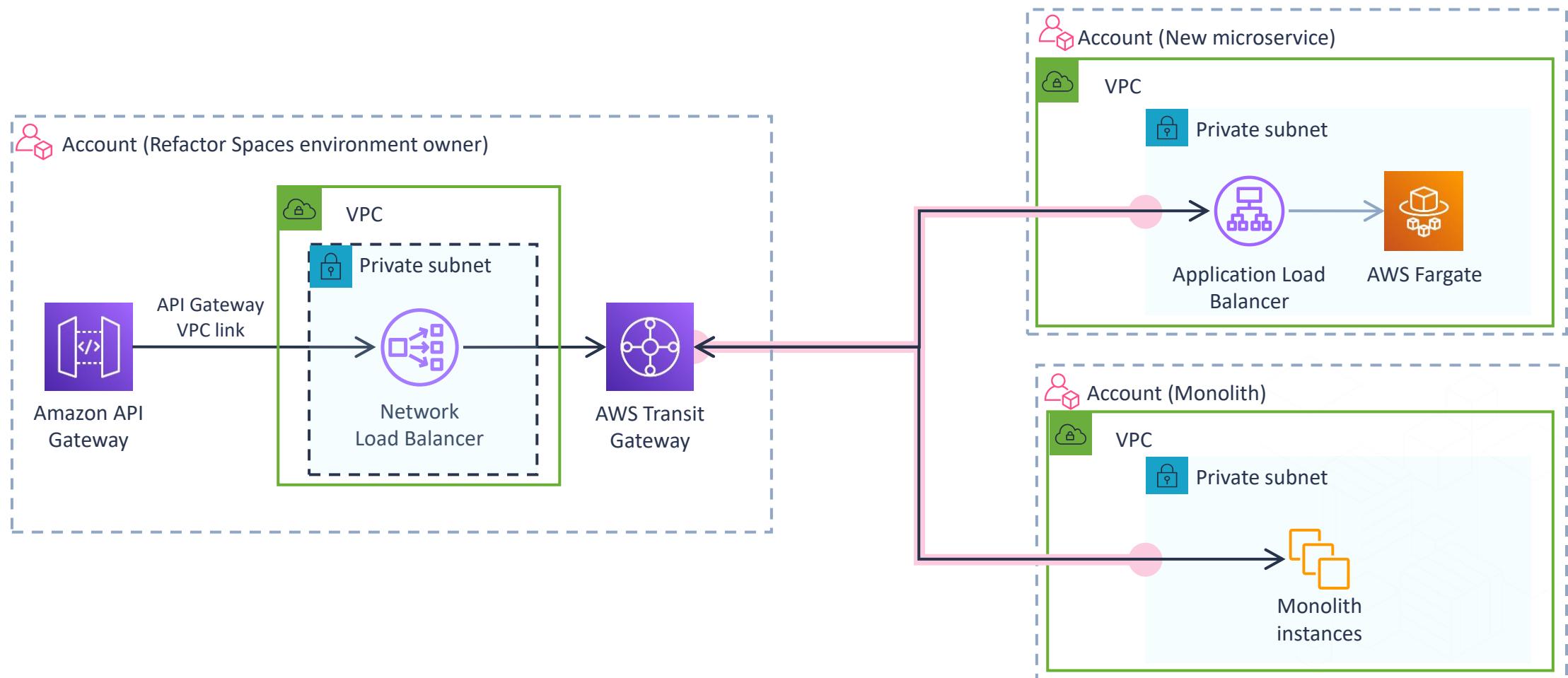
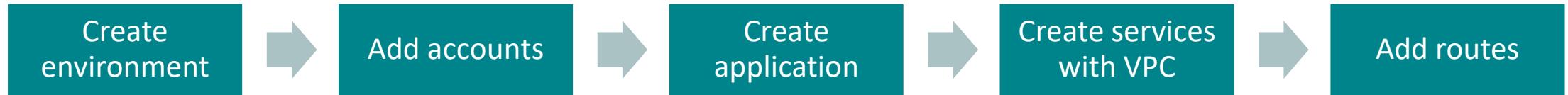
- High ROI due to scalability, reducing consumption of resources (and therefore costs) by aligning the cloud infrastructure with the requirements.
- The most future-proof migration approach.
- The process requires thorough planning, execution, and testing to prevent errors from causing cloud security, performance, and cost problems.
- Applications can partially become locked into certain public cloud providers due to reliance upon cloud-native features.
- Often considered the most complex migration option as executing it takes the most time, effort, and money.
- Extensive planning, training, cloud expertise is required for refactoring.

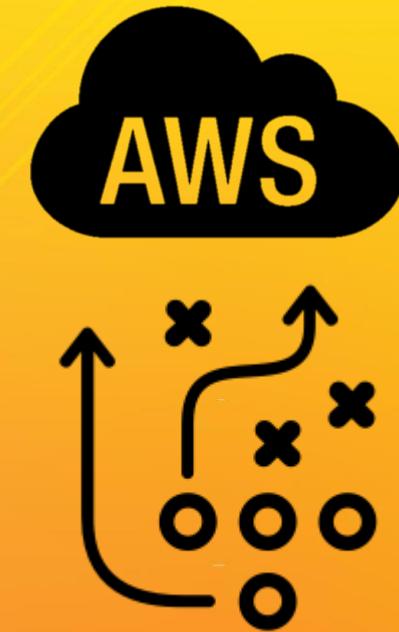
AWS Migration Hub Refactor Spaces

- An application transformation feature
- What does it solve?
 - Setting up an infrastructure for refactoring, rewriting, and rearchitecting apps
 - Operating apps at scale while they are changing
- What does it orchestrate?
 - AWS Transit Gateway and VPCs to bridge networking across accounts to simplify old and new communication services
 - API Gateway and VPC link for external API access to transparently add new services and incrementally route traffic from old to new



AWS Migration Hub Refactor Spaces





Migration Strategies
(7 Rs of migration)

- Repurchasing aims to replace legacy systems and move to a consumption-based, SaaS subscription in cloud leveraging cloud-native capabilities.
- Also referred as Drop and Shop.



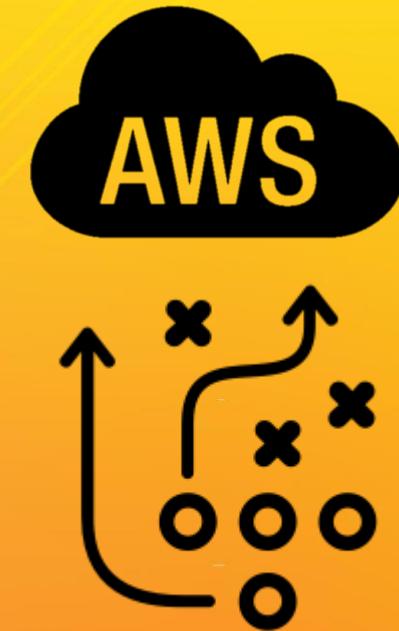
- Adopt a cloud-optimized solution quickly and reduce migration costs drastically.
- Leverage the advantages of a proven solution without the need for extensive development efforts.



- There's nothing you can do about service outages other than wait for a fix.
- Often, you cannot make significant changes to the platform because someone else owns it.
- You may have to train your team and users with the new system.



- You have to wait for the SaaS provider to release updates at their own pace to fix security, compatibility, and performance issues.



Migration Strategies
(7 Rs of migration)

- Retire is a cloud migration strategy option where we turn off services that are redundant or legacy and no longer in use or needed.
- Also referred as decommissioning or archiving.



- The passive migration strategy requires the least funds, time, unique expertise, and effort.
- Reduces expenditure on idle resources by retiring enables the organization to focus on areas that provide more business value and saves resources.



- A careful analysis is required to ensure that retiring any component does not adversely impact other business processes.
- You must be aware of all the upstream dependencies of a workload before retiring them.

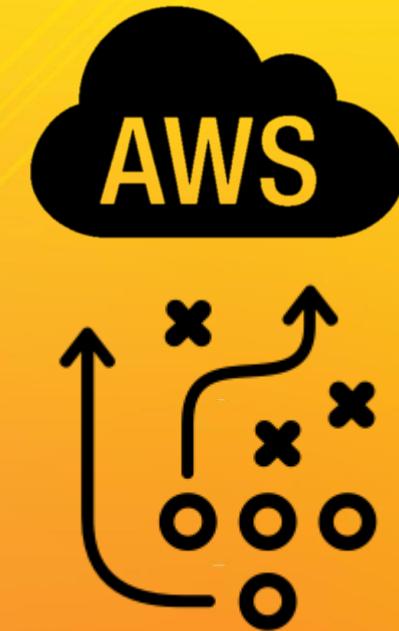


- Deciding if applications should be retired can often become complex and involves a level of risk. This can result in action being postponed, especially if subject matter experts (SMEs) have left an organization.
- Also, documentation about legacy systems can be sparse.

Best practices

- Capture dependencies
- Communicate your decommissioning plan to stakeholders
- Schedule a controlled stop
- Shut down applications in a controlled manner
- Preserve settings and data when you uninstall applications
- Follow change management processes
- Disconnect operational tools
- Update asset information





Migration Strategies
(7 Rs of migration)

- Retain certain applications on-premises while migrating others to the cloud with a plan to revisit them later for further decision-making.
- Also referred as revisit, reassess or co-locate to a service provider.



- Allows for evaluation of (recently upgraded) applications in order to identify those that require immediate migration or those that could be migrated in the future.
- Saves cloud resources by retaining inefficiencies on-premises.



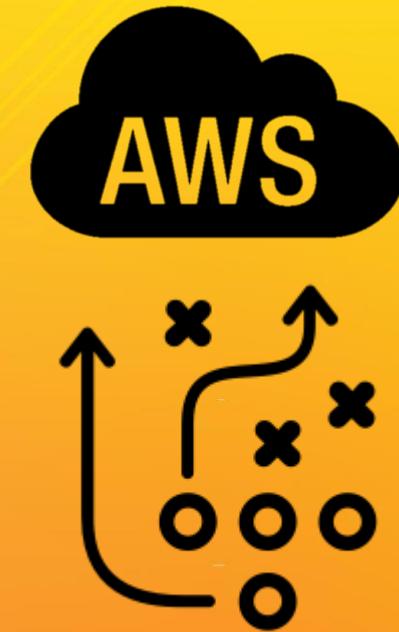
- The longer you keep the workload on-premises, the more resources you may waste supporting it.
- Maintaining the status quo may mean not exploring more efficient, secure, cost-effective, and productive practices in a new environment.



- Lack of cloud-native capabilities, meaning no automated scaling or improved performance.
- Requires costly and continuous maintenance of the on-premises hardware.

Why Retain?

- This is the migration strategy for applications that you want to keep in your source environment or applications that you are not ready to migrate. You might choose to migrate these applications in the future.
- The following are common use cases for the retain strategy:
 - Security and compliance
 - High risk
 - Dependencies
 - Applications that are recently upgraded
 - No business value to migrate
 - Plans to migrate to software as a service (SaaS)
 - Unresolved physical dependencies
 - Mainframe or mid-range applications and non-x86 Unix applications
 - Performance

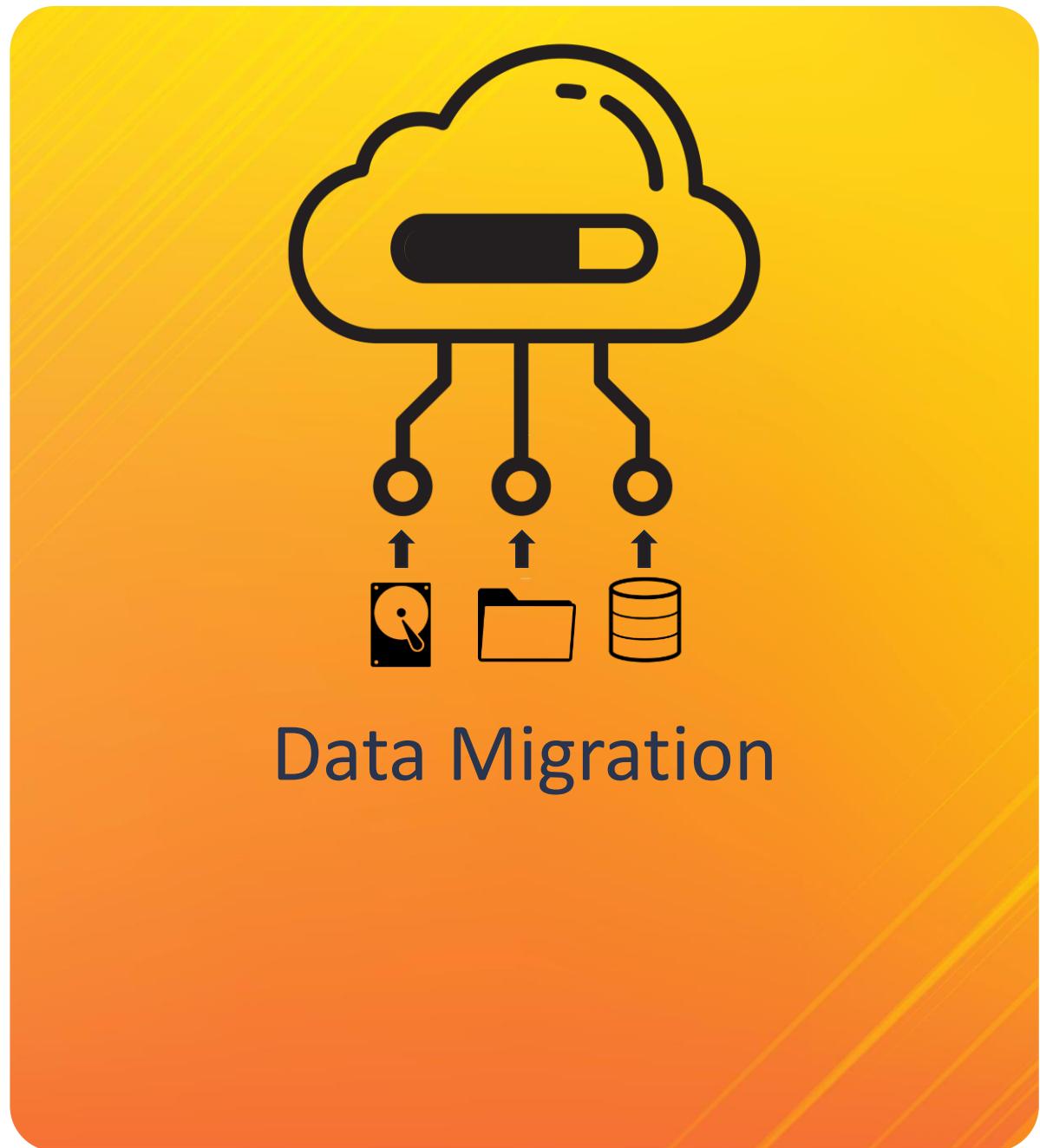


Migration Strategies
(7 Rs of migration)

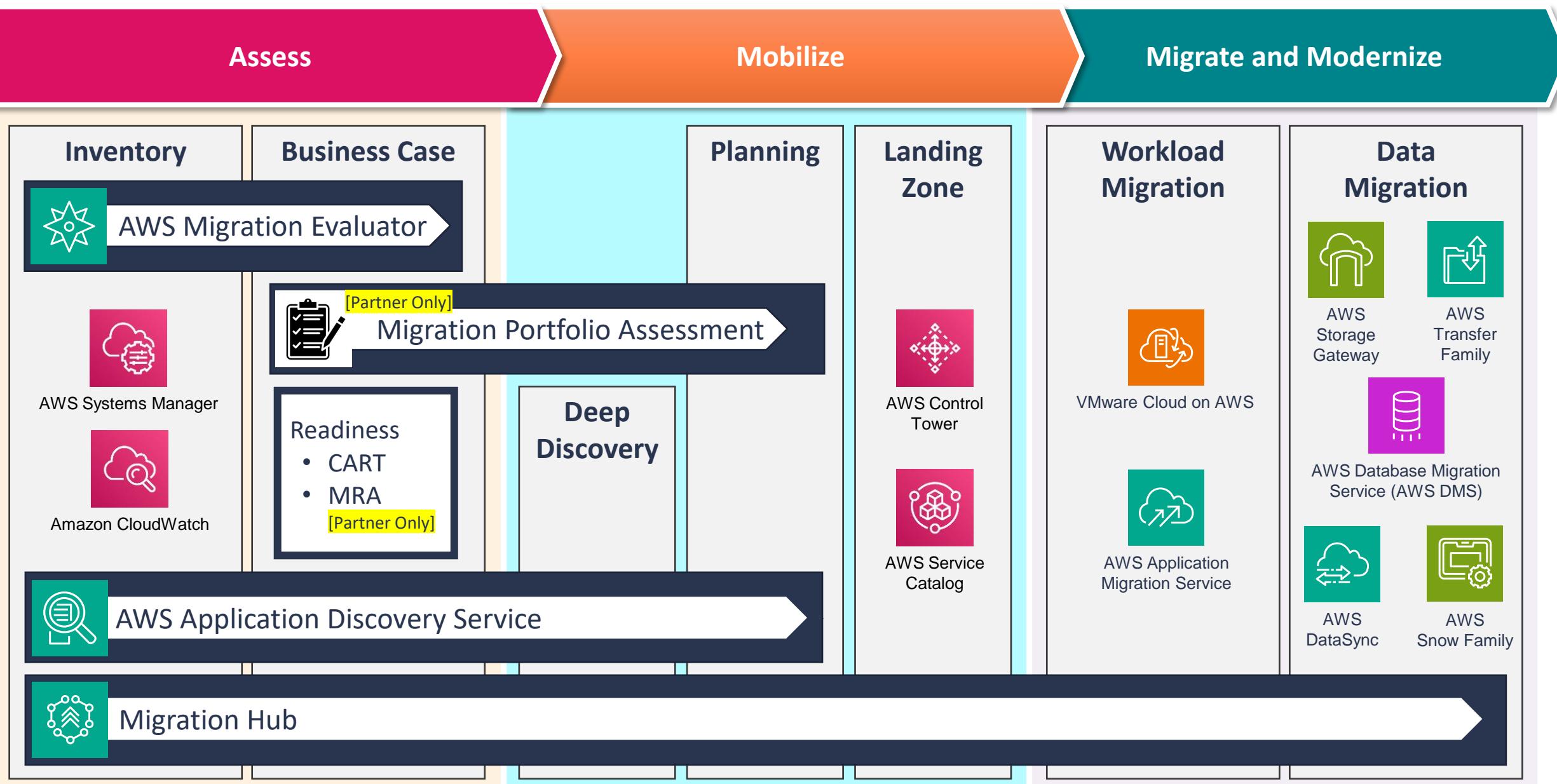
Determining the R type for migration

Strategy	Migration Complexity	Time and Cost	Optimization
Retain	Low	Low	Low
Retire			
Re-host			
Relocate			
Re-platform			
Re-purchase			
Refactor	High	High	High





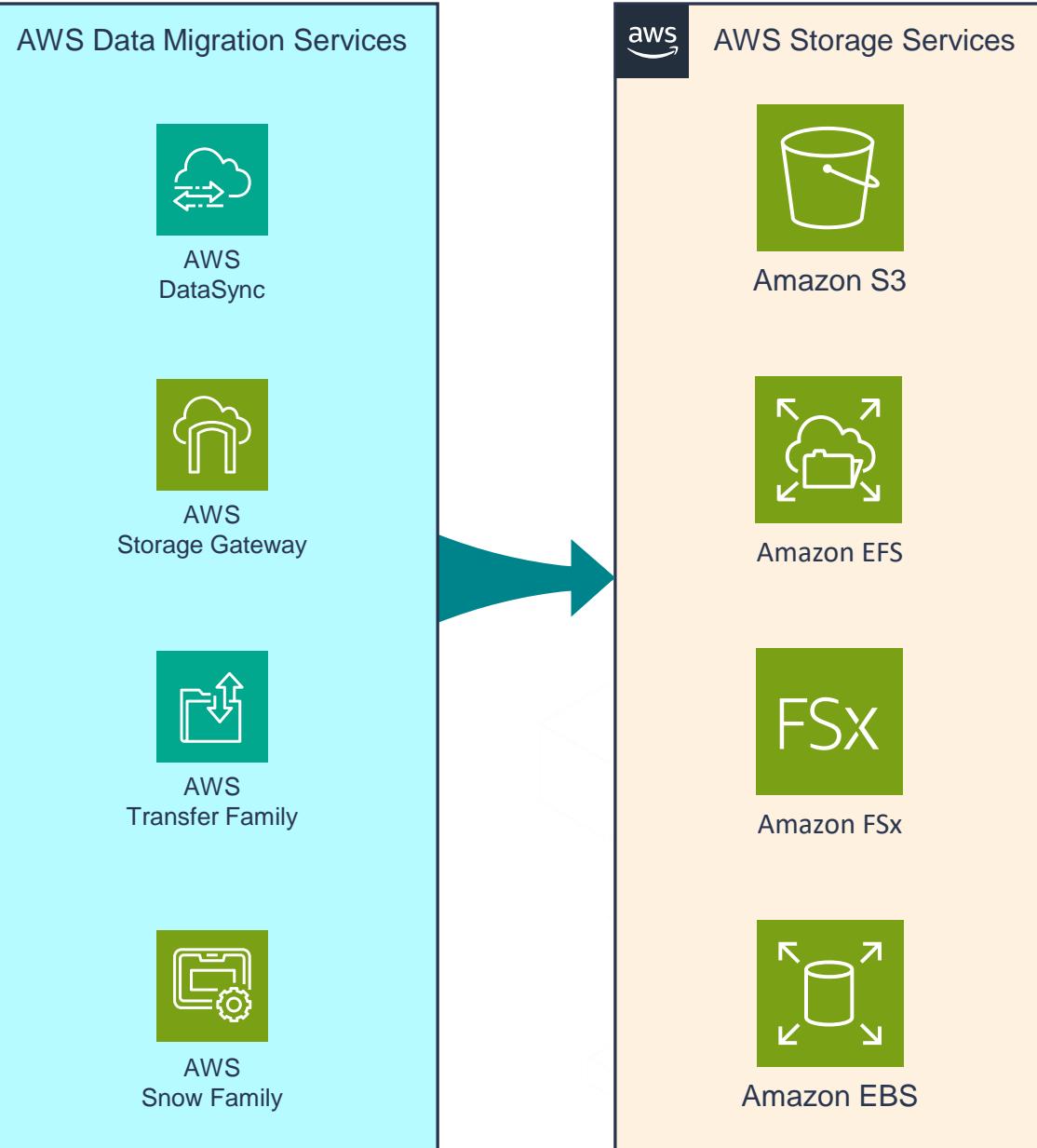
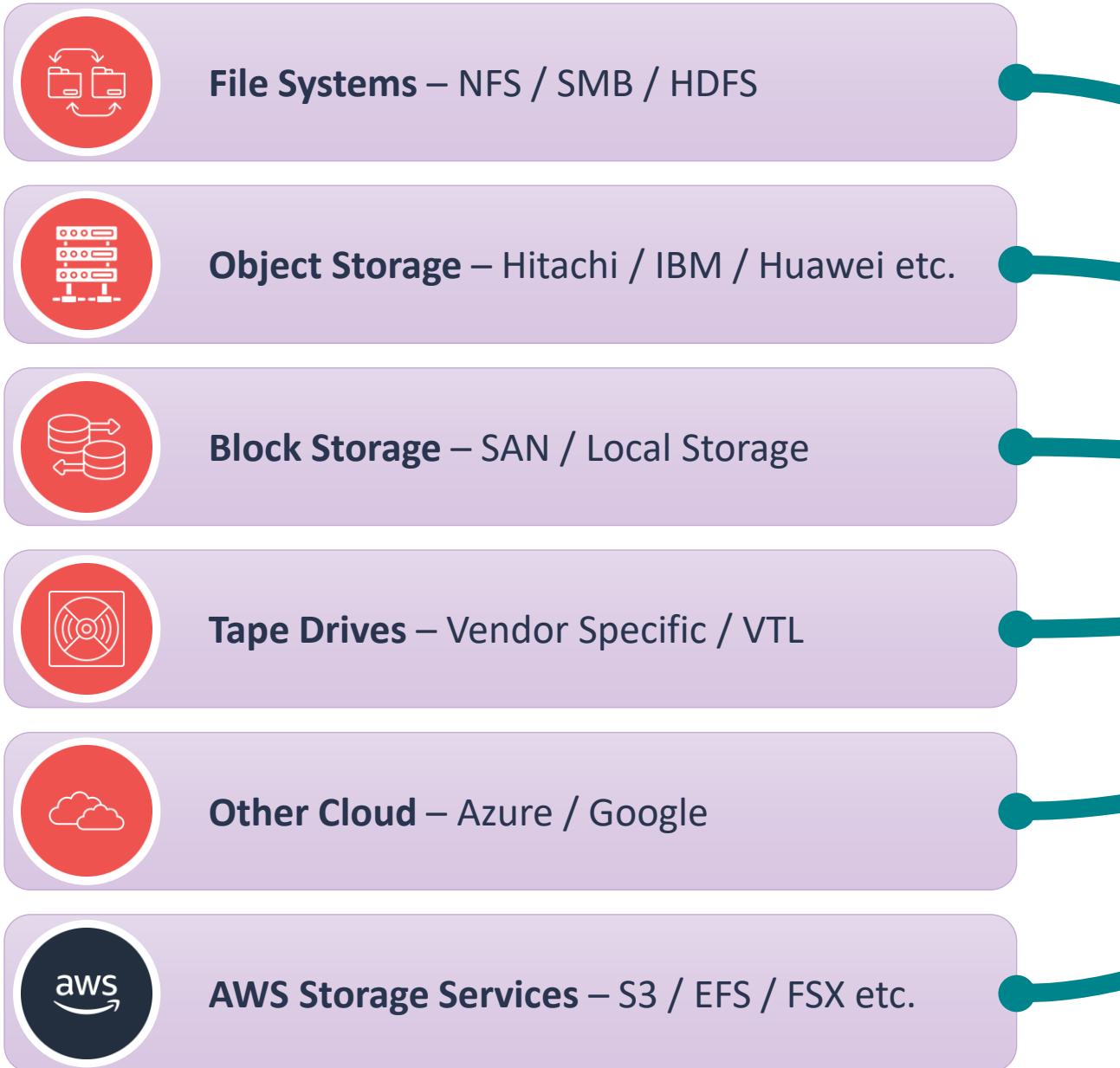
Data Migration





Data Migration

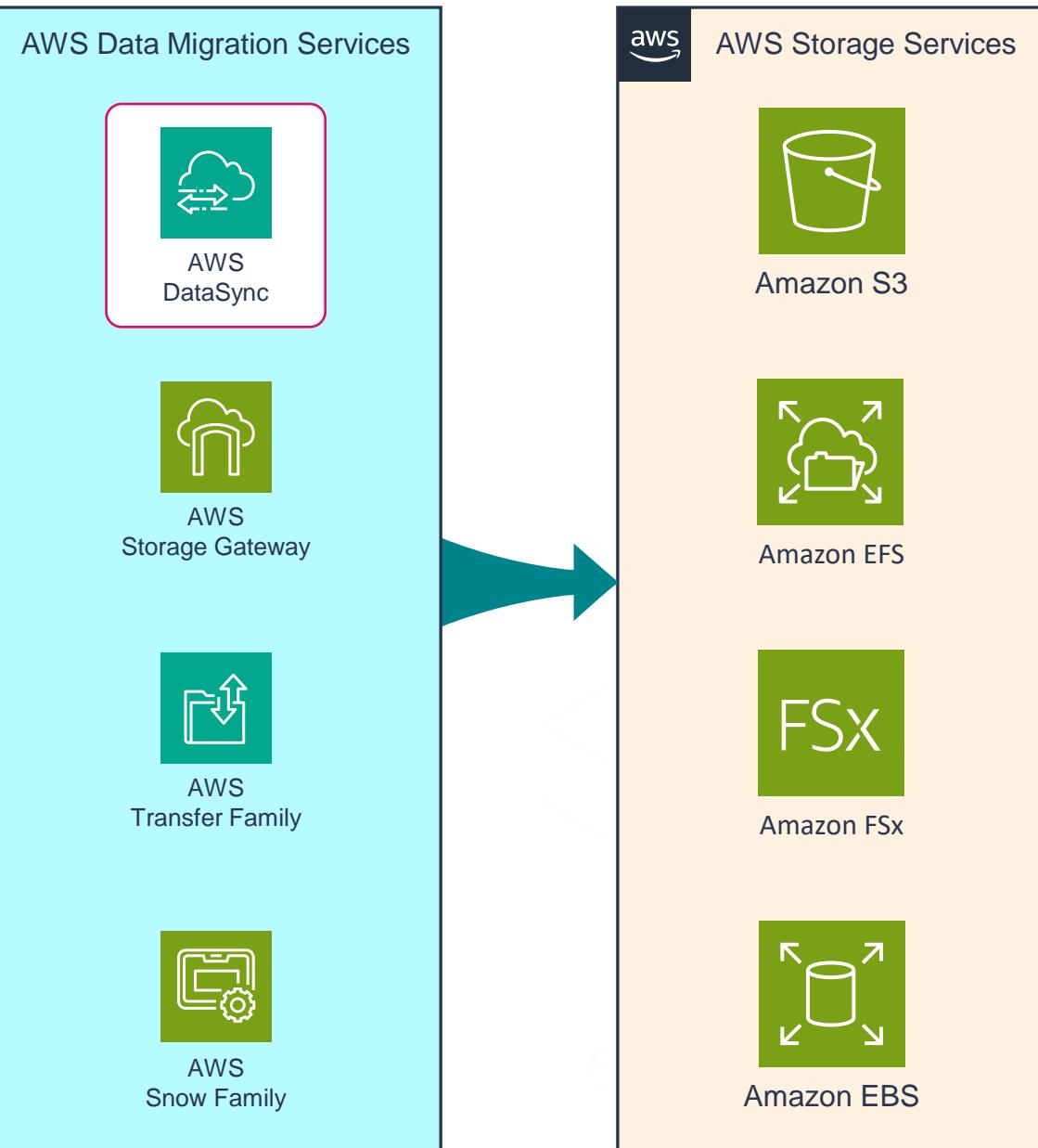
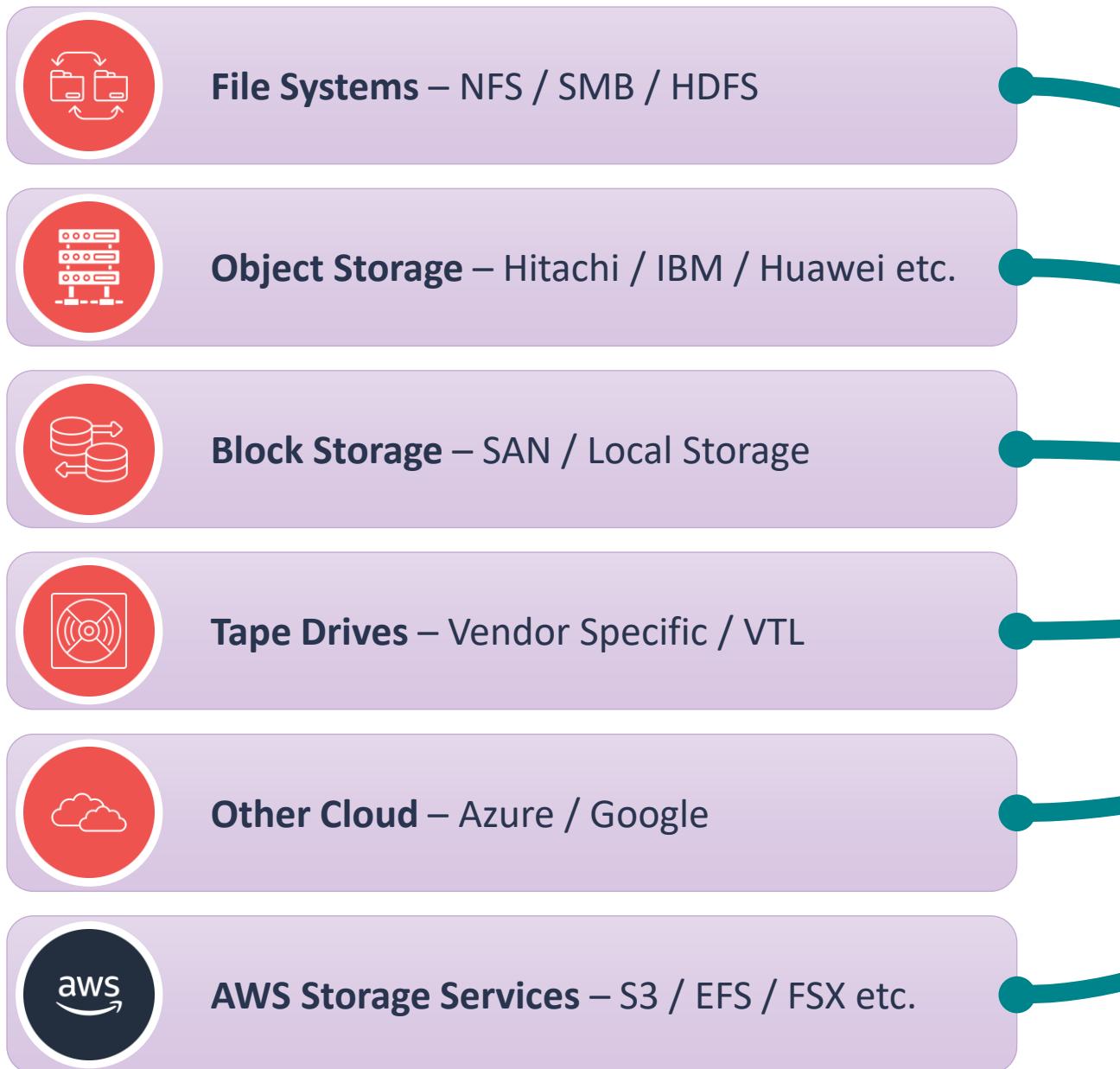
Your Data Portfolio



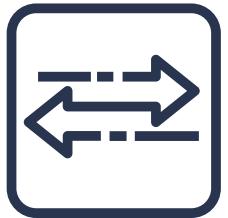


AWS DataSync

AWS DataSync

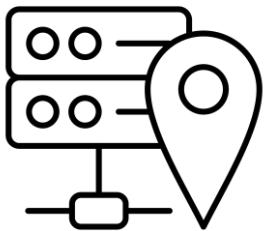


AWS DataSync – Architecture Components



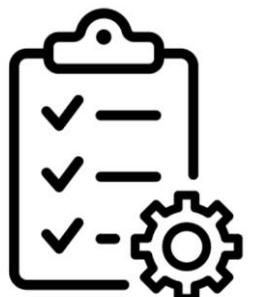
Agent (A Virtual Machine)

- Agents read data from or write to your on-premises locations.
- Can be deployed on VMware, Hyper-V, KVM and as EC2 instance



Locations (Source or Target)

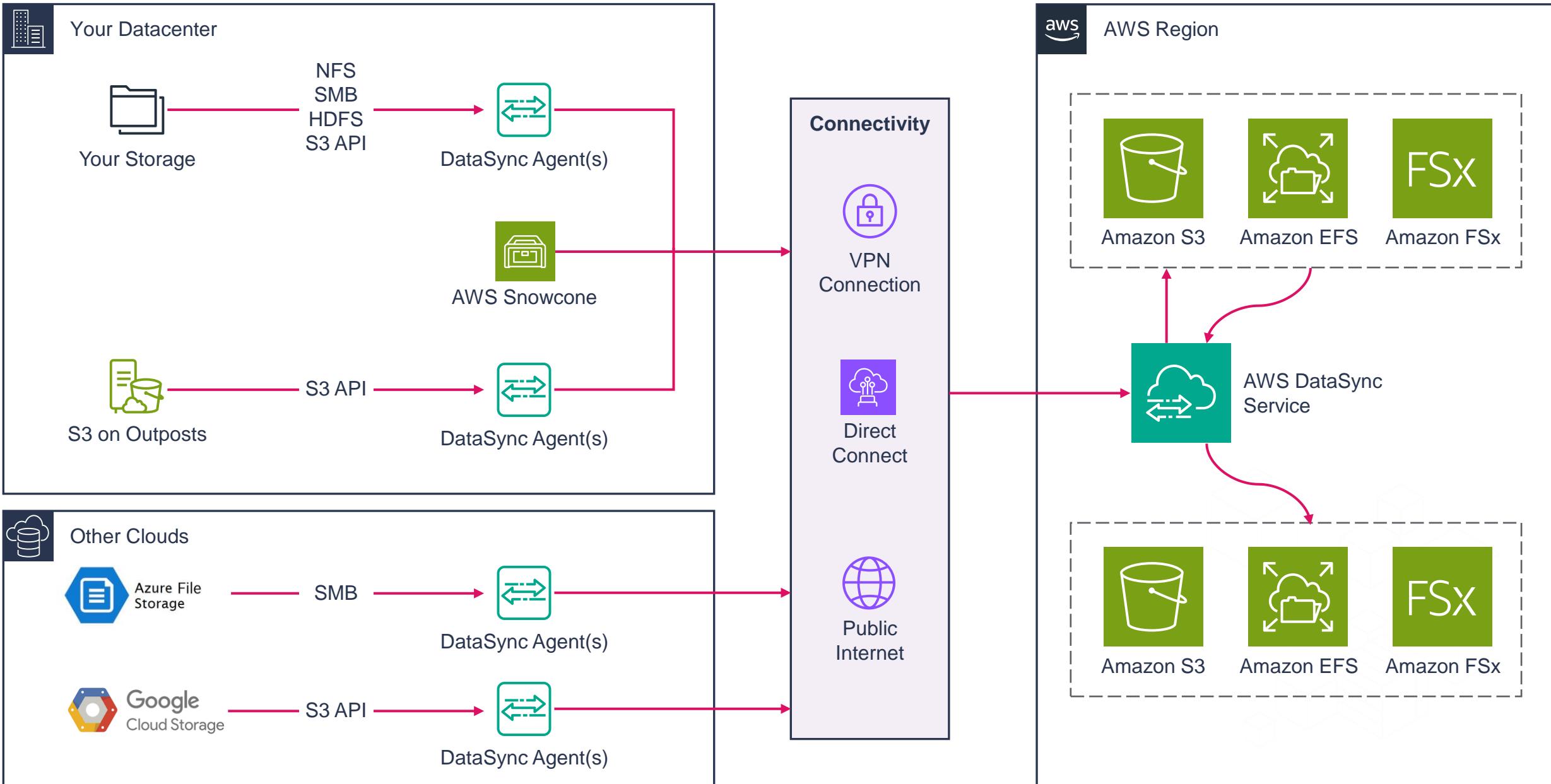
- Locations are endpoints for tasks, such as an on-premises file system or AWS storage service.
- NFS, SMB, HDFS, Object storage, Amazon EFS, Amazon FSx, Amazon S3

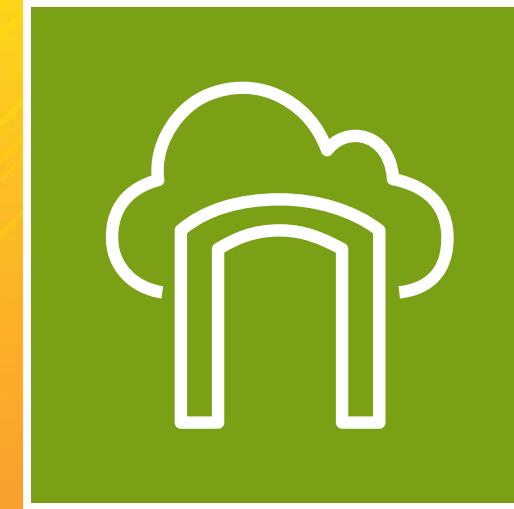


Tasks (Data migration job)

- Tasks are configurations for data transfer and synchronization between two locations e.g. Schedule, Exclusion, Bandwidth, Logging
- DataSync Task = Source location + Target Location + Configuration

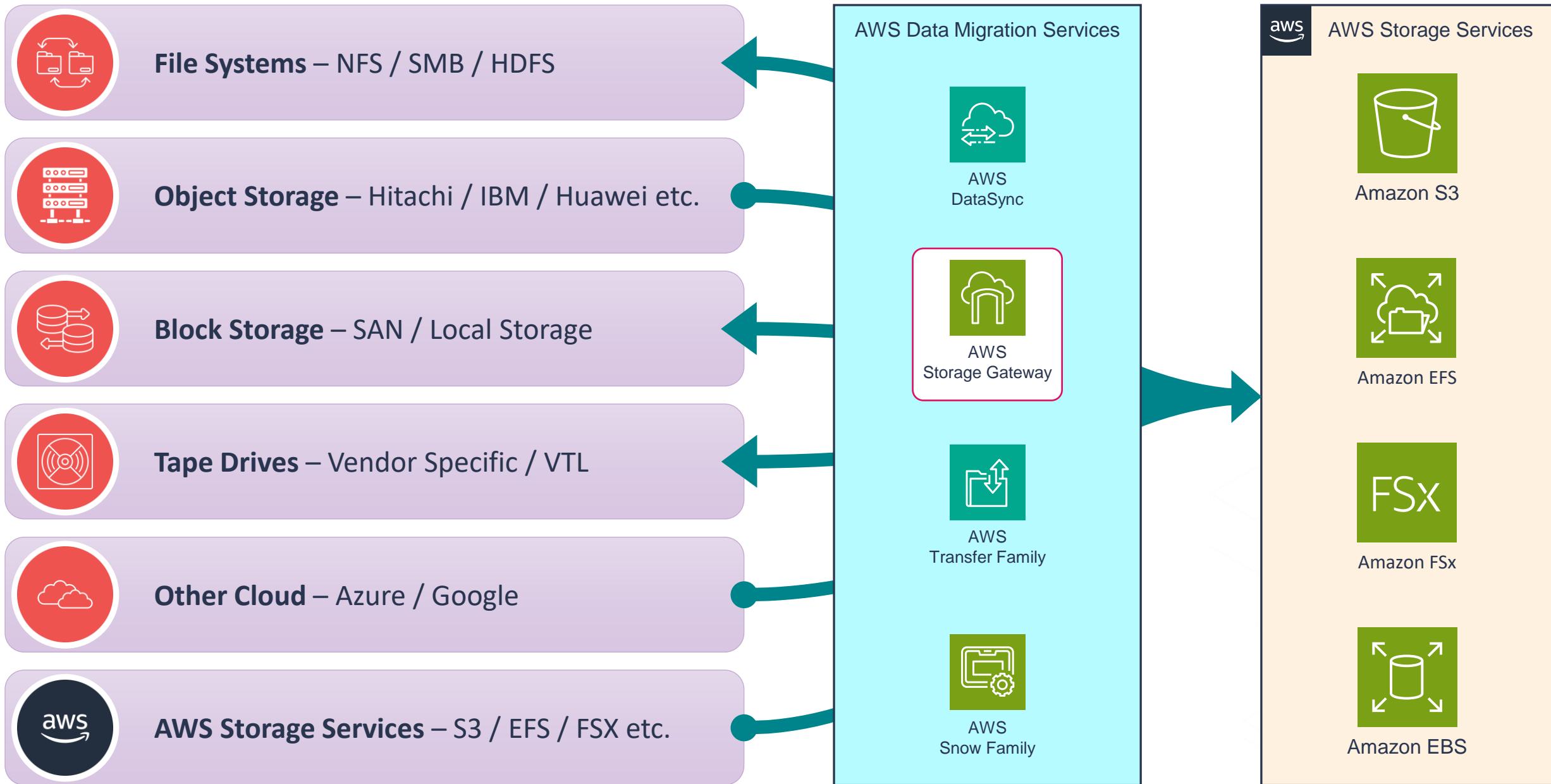
AWS DataSync Architecture



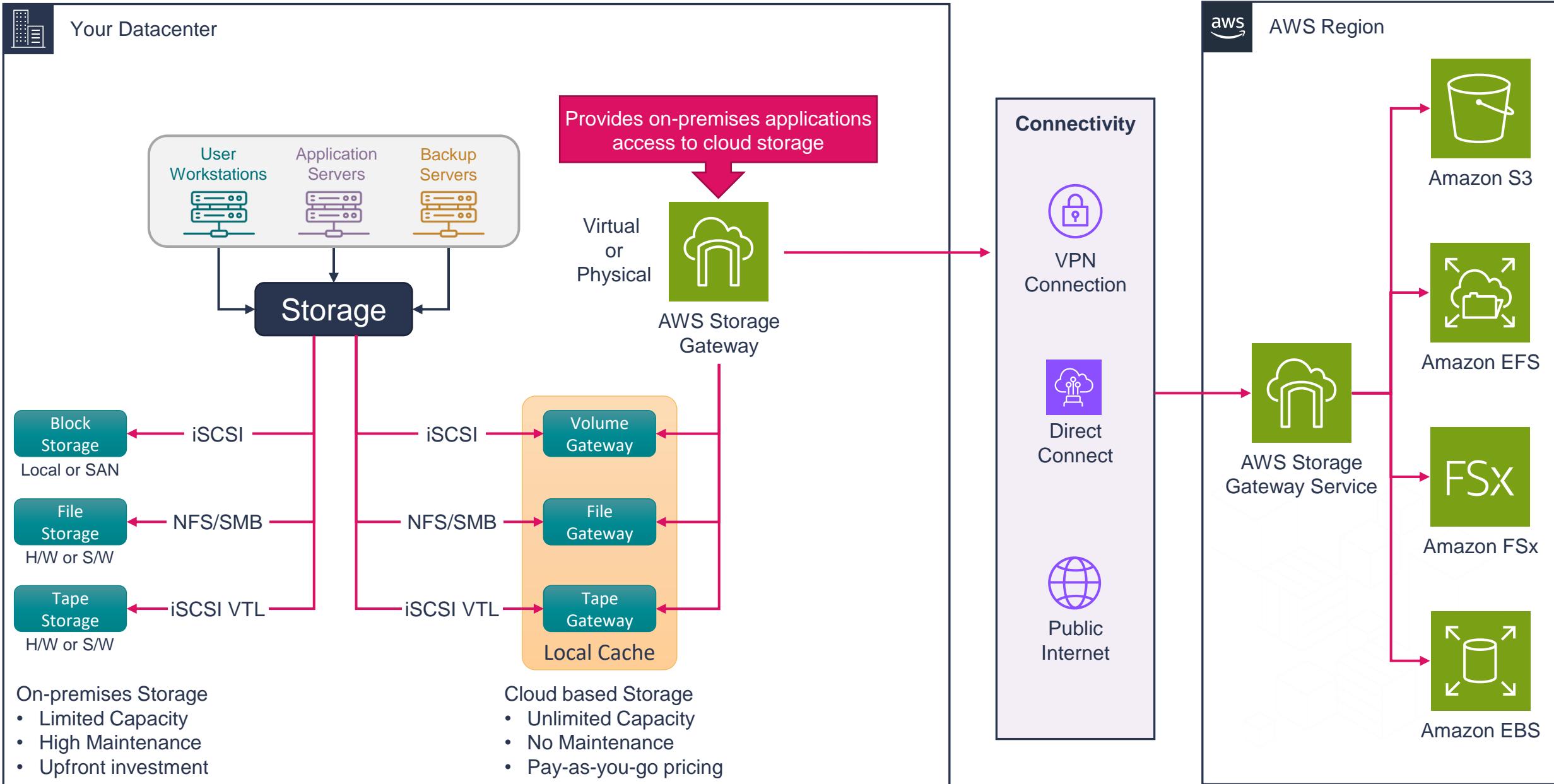


AWS Storage Gateway

AWS Storage Gateway – A Hybrid Storage Solution

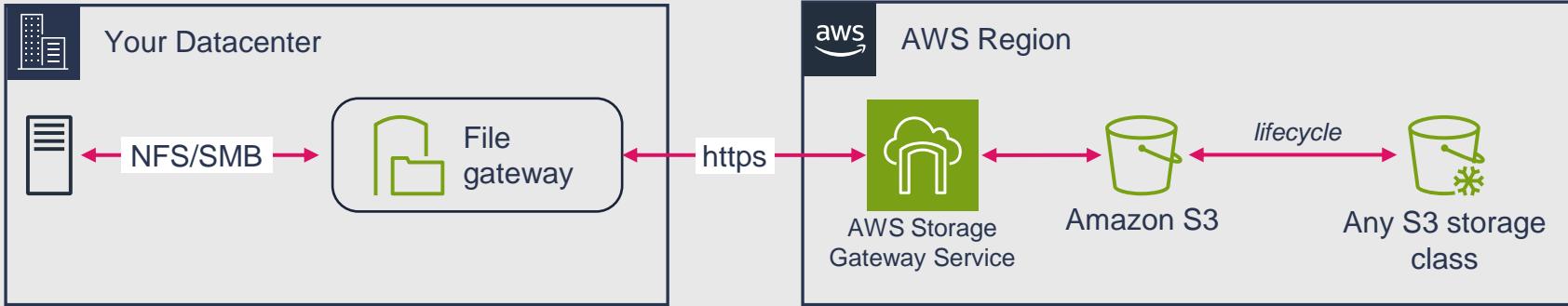


AWS Storage Gateway Architecture



Storage Gateway Types

File Gateway - Store and access objects in Amazon S3 from file-based applications with local caching



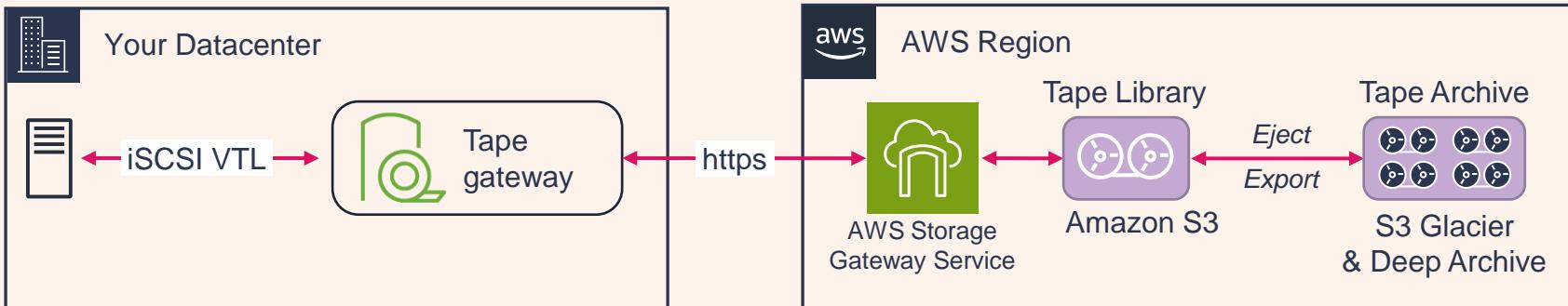
Use Cases:

- Repository for machine generated data such as Backups, Archives, Data Lakes

Features:

- Mount shares directly on database and application servers
- Bandwidth-optimized, only changes are transferred

Tape Gateway - Virtual tapes presented to on-premises backup applications



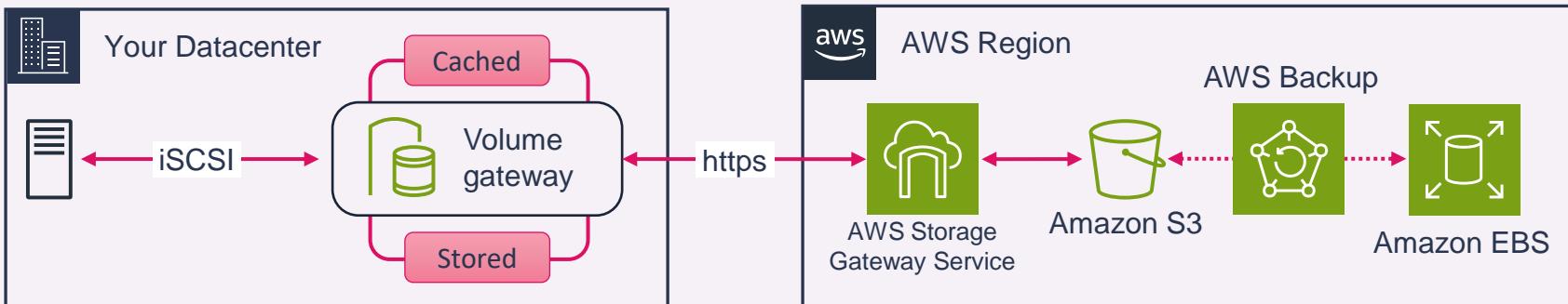
Use Cases:

- On-premises backup to cloud
- Replacement for physical tape libraries
- Archive to Glacier or Glacier Deep Archive

Features:

- iSCSI VTL interface compatible with leading backup applications
- WORM and Tape Retention Lock

Volume Gateway - Block storage on-premises backed by cloud storage

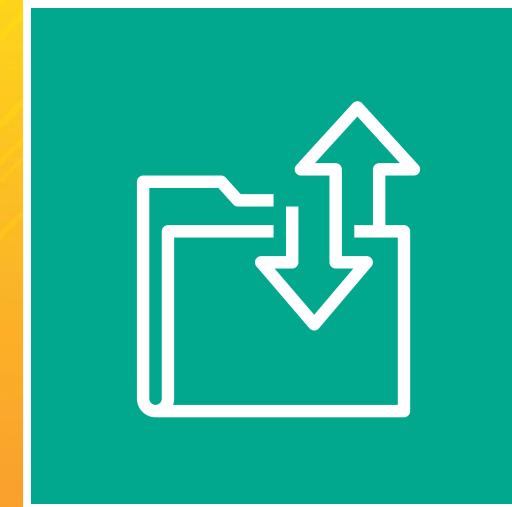


Use Cases:

- Backup on-premises data to the cloud
- Migration of volumes to the cloud
- DR to the cloud

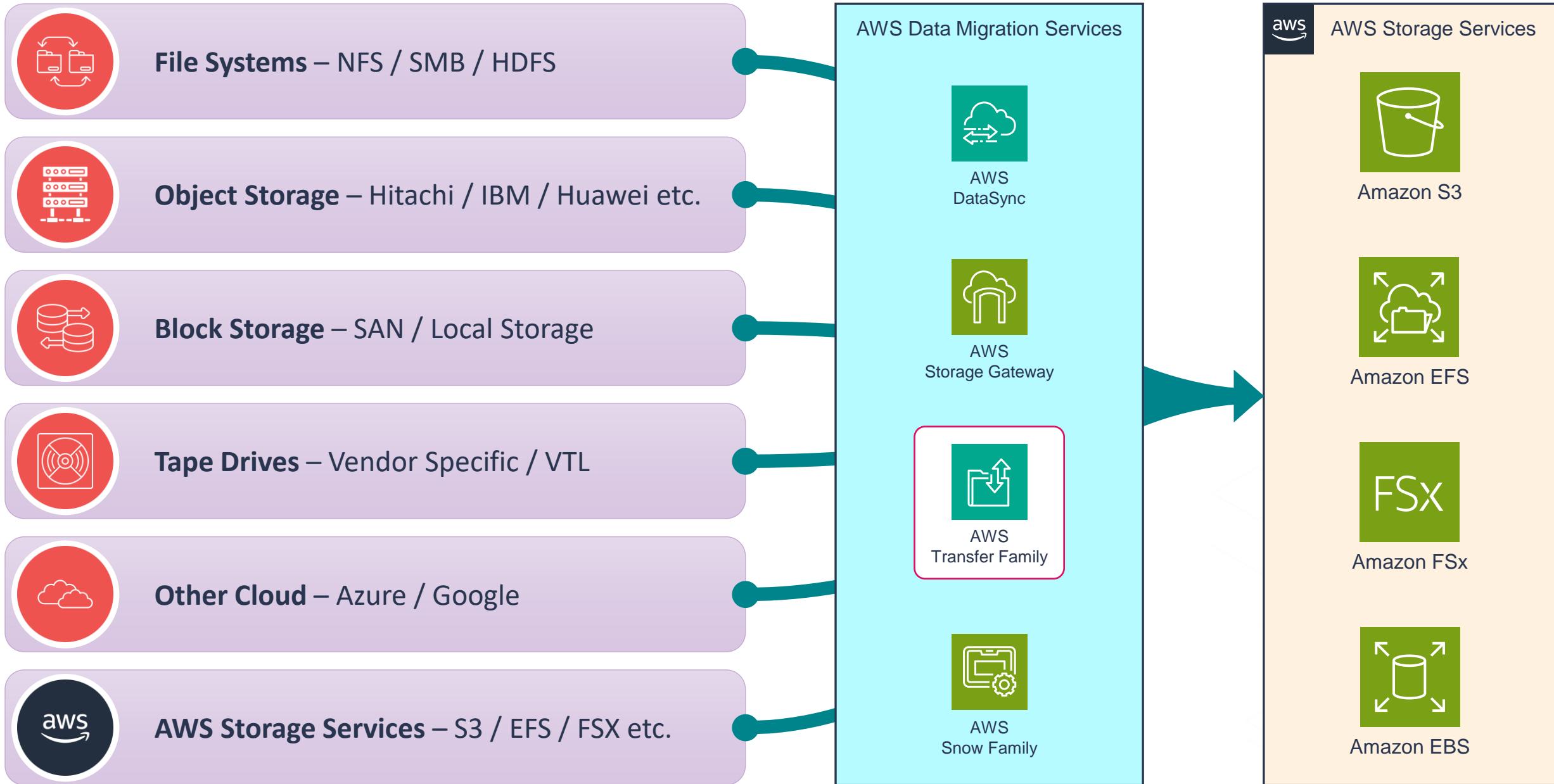
Features:

- Present cloud-based iSCSI block storage volumes to on-premises applications
- Backup volumes as EBS snapshots



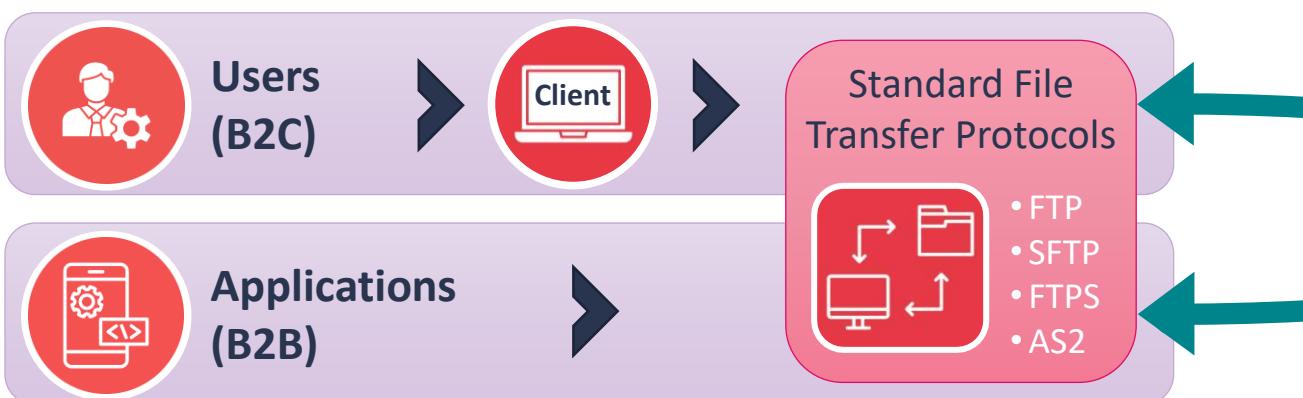
AWS Transfer Family

AWS Transfer Family – A cloud based Managed File Transfer (MFT)

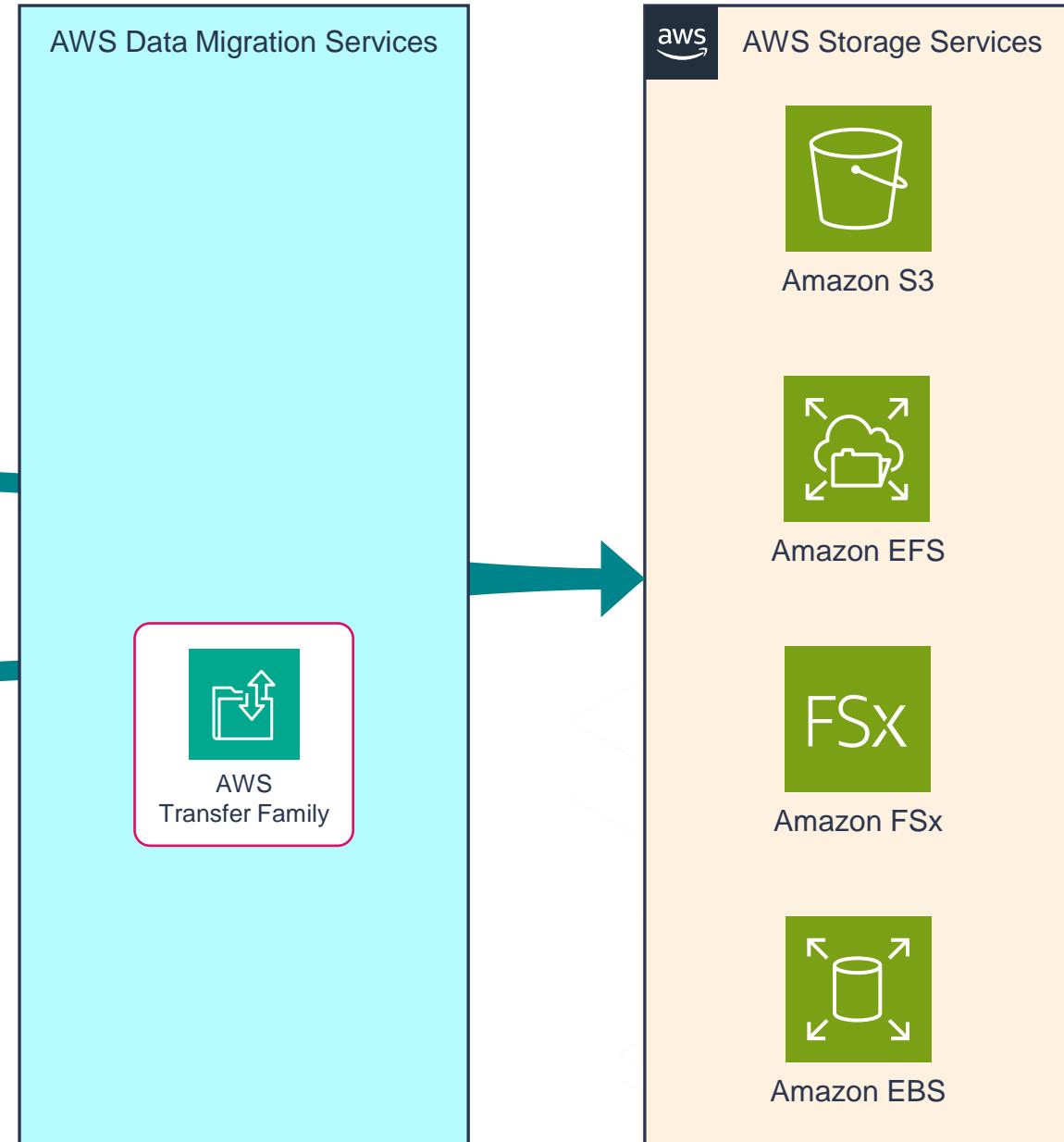


AWS Transfer Family – A cloud based Managed File Transfer (MFT)

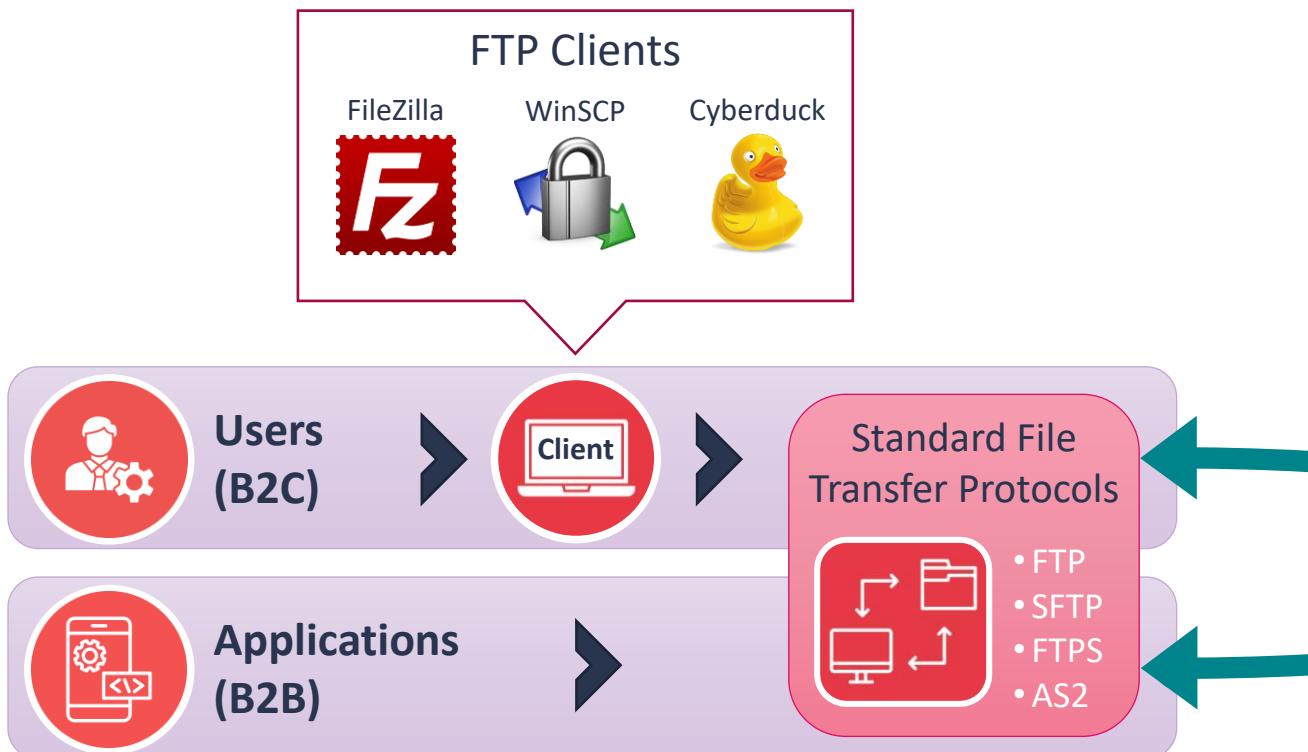
- The AWS Transfer Family offers you a managed file transfer (MFT) service used for transferring files over common file transfer protocols.



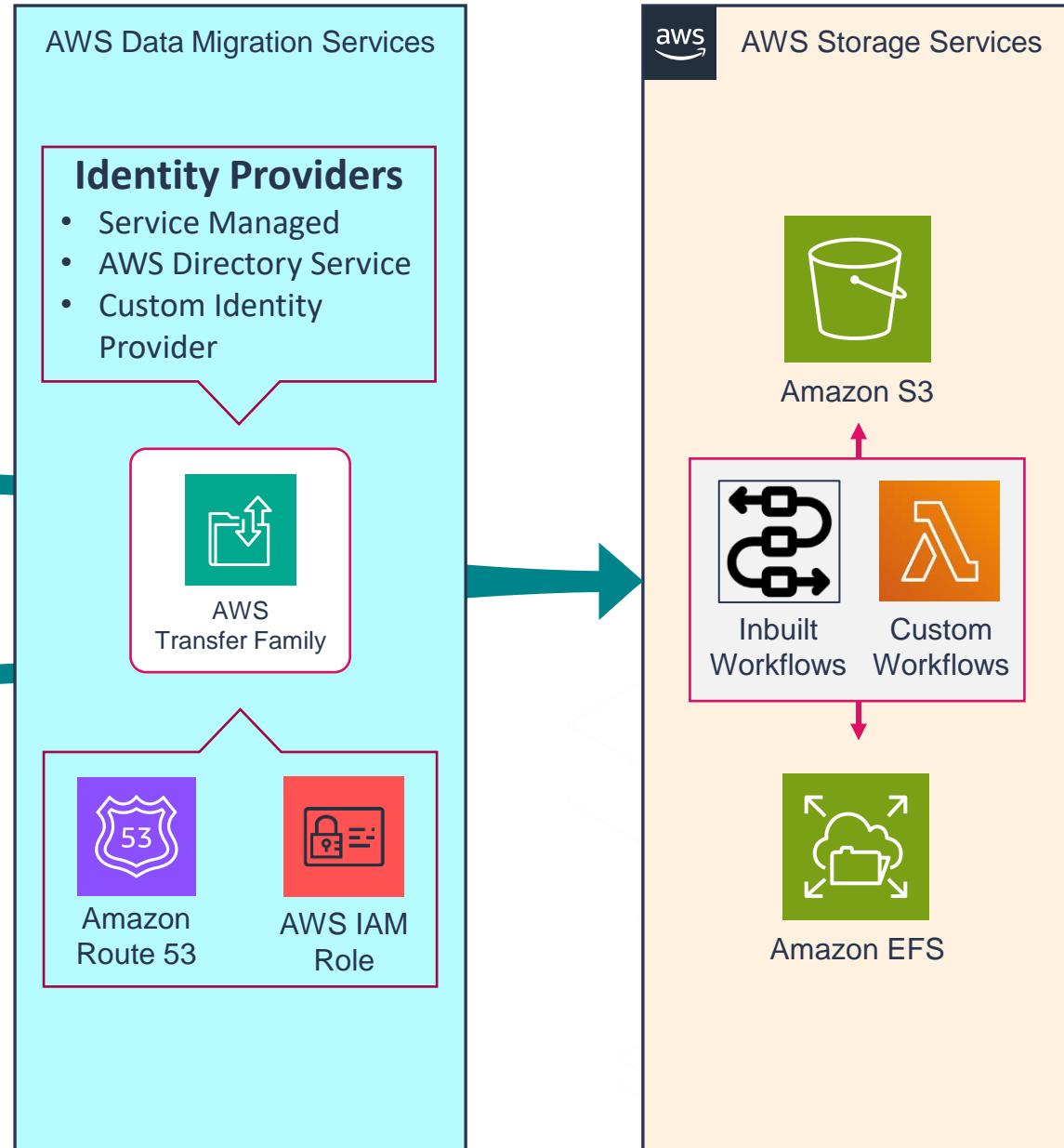
- Files are transferred directly into and out of AWS Storage services without any management overhead of maintaining servers and storage.



AWS Transfer Family – A cloud based Managed File Transfer (MFT)



- FTP (File Transfer Protocol) - unencrypted file transfer protocol
- SFTP (SSH File Transfer Protocol) - file transfer over Secure Shell
- FTPS (File Transfer Protocol Secure) - file transfer protocol with TLS encryption
- AS2 (Applicability Statement 2) - messaging protocol for exchanging business-to-business data

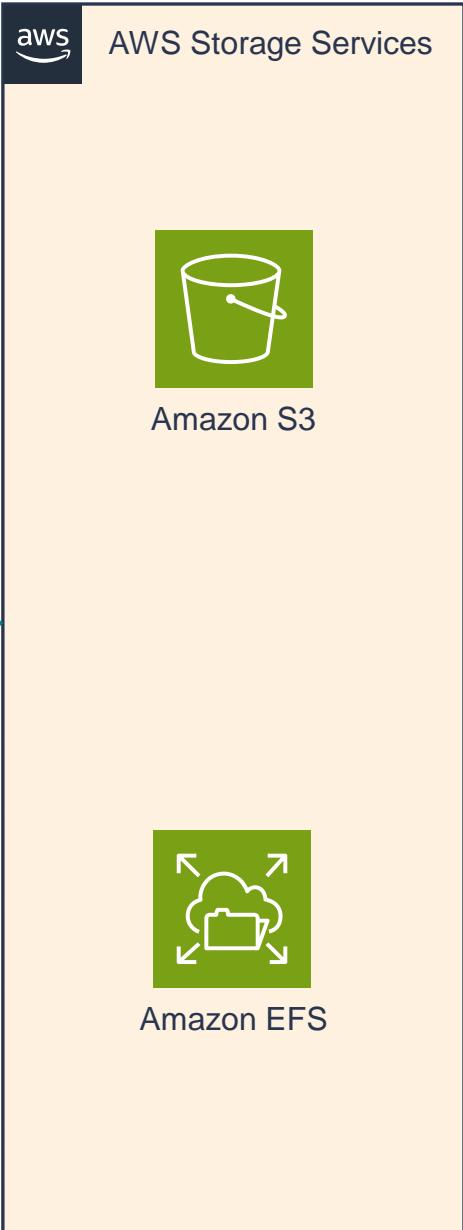
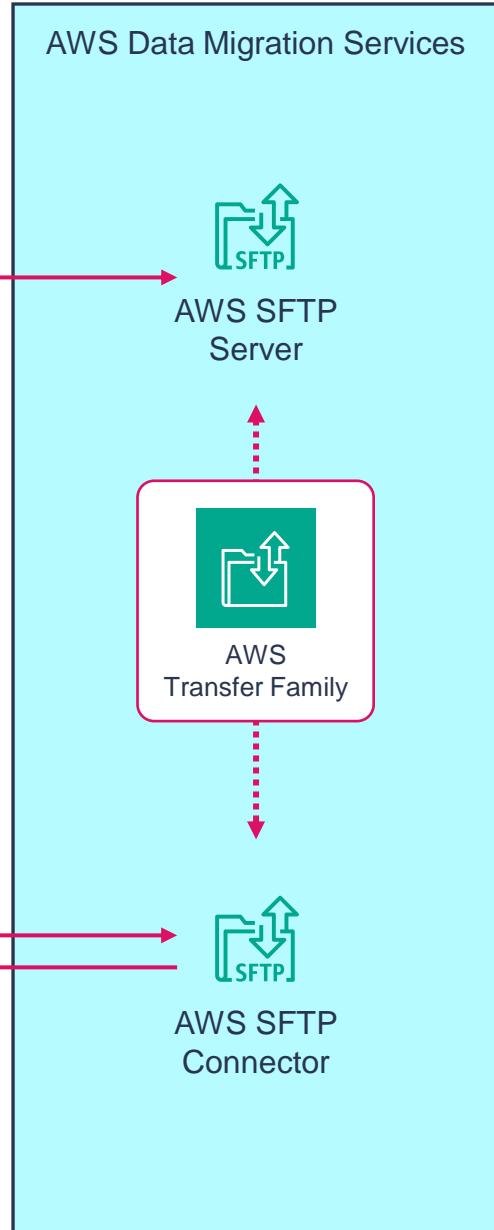


AWS Transfer Family – A cloud based Managed File Transfer (MFT)



Remote SFTP source

Pull
Push





AWS Snow Family

AWS Snow Family

- Physical devices offering compute and offline data transfer capabilities in rugged edge locations.



AWS Snowcone



Compact and portable device,
purpose-build for use outside of
a traditional data centre



AWS Snowball Edge

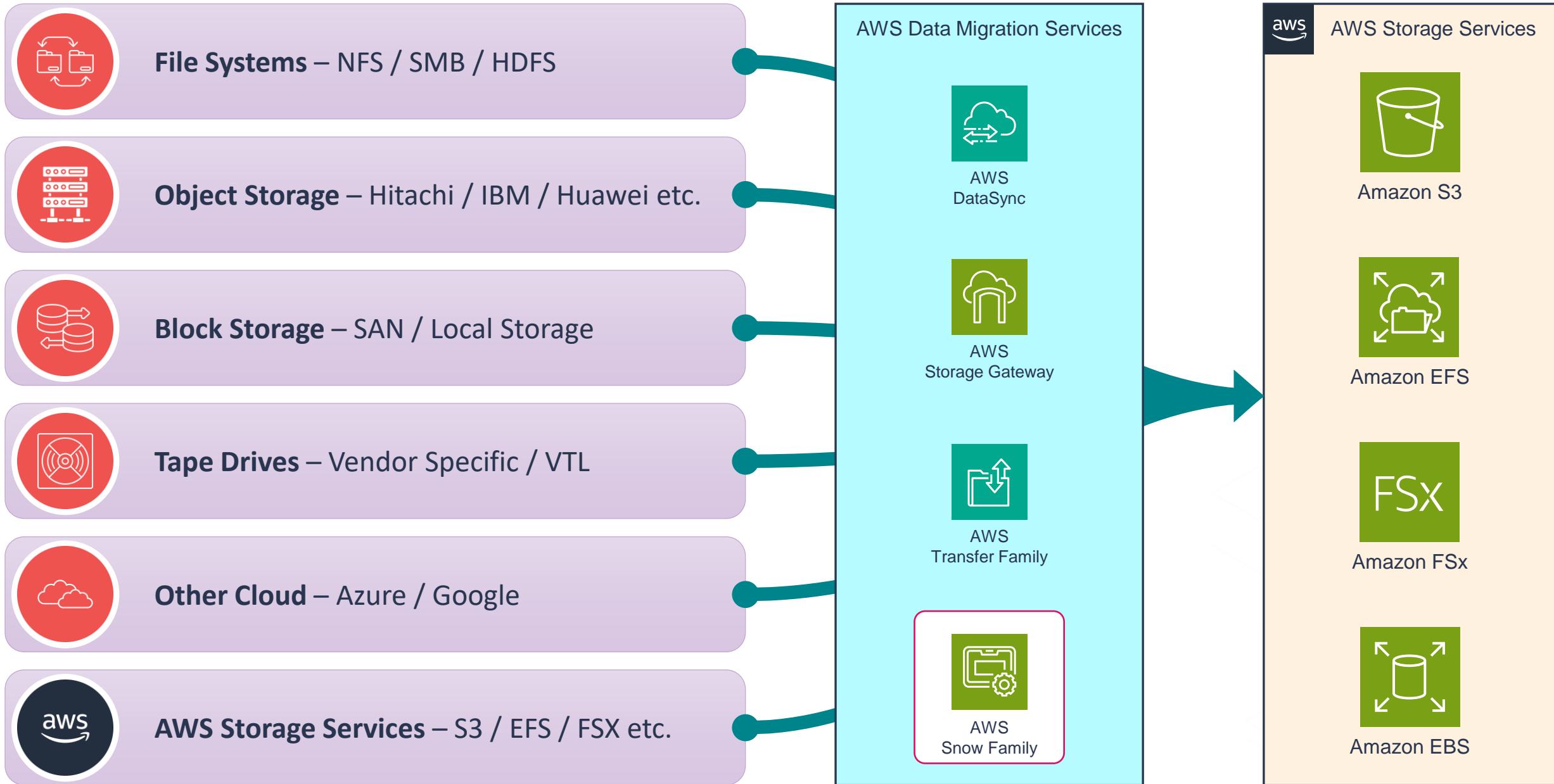


Compute-optimized or storage-
optimized device for use outside
a traditional data centre

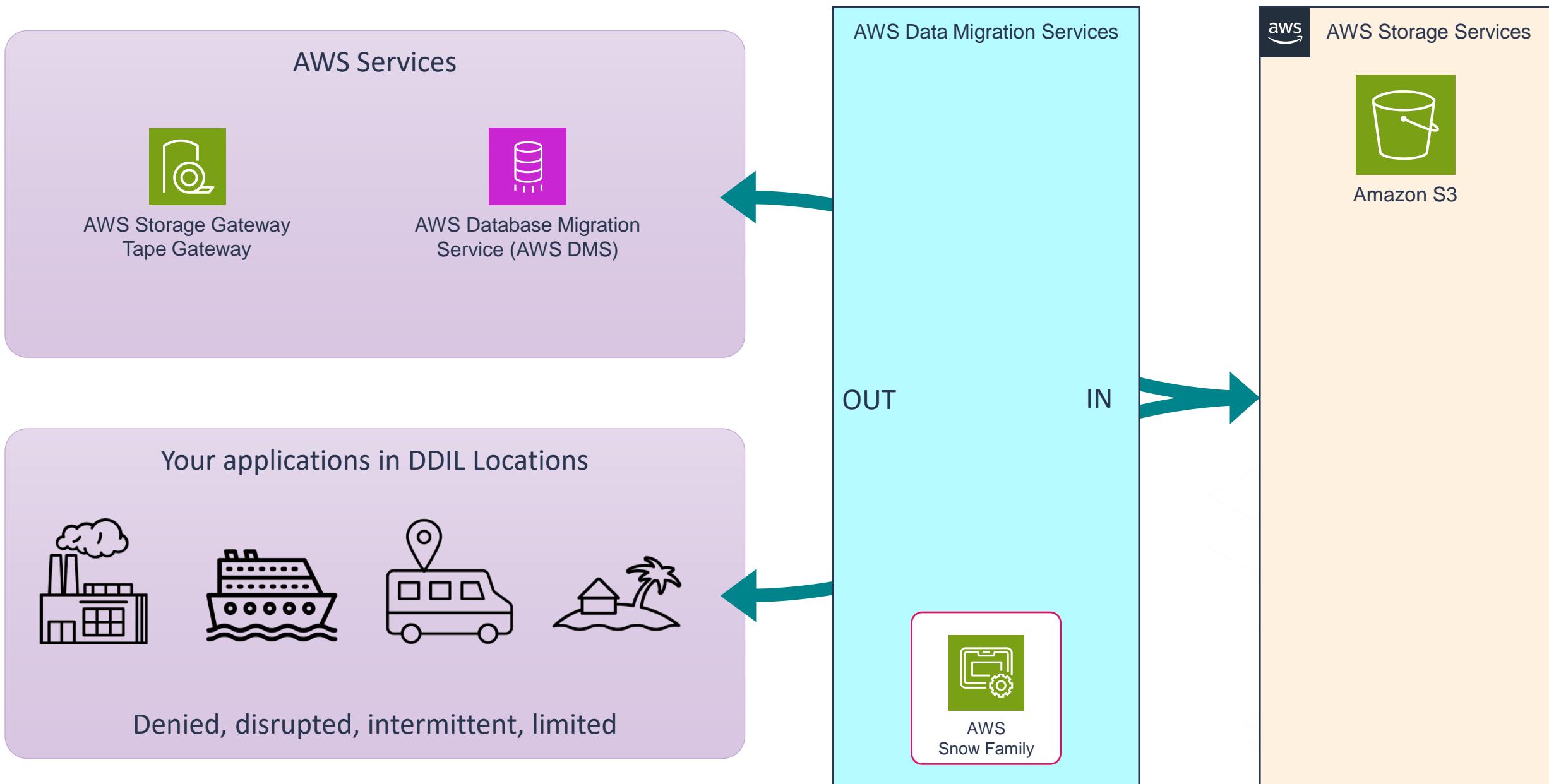
Available for clustering, scaling, and connectivity



AWS Transfer Family – A cloud based Managed File Transfer (MFT)



AWS Transfer Family – A cloud based Managed File Transfer (MFT)



AWS OpsHub for AWS Snow Family

AWS OpsHub Dashboard for AWS Snow Family

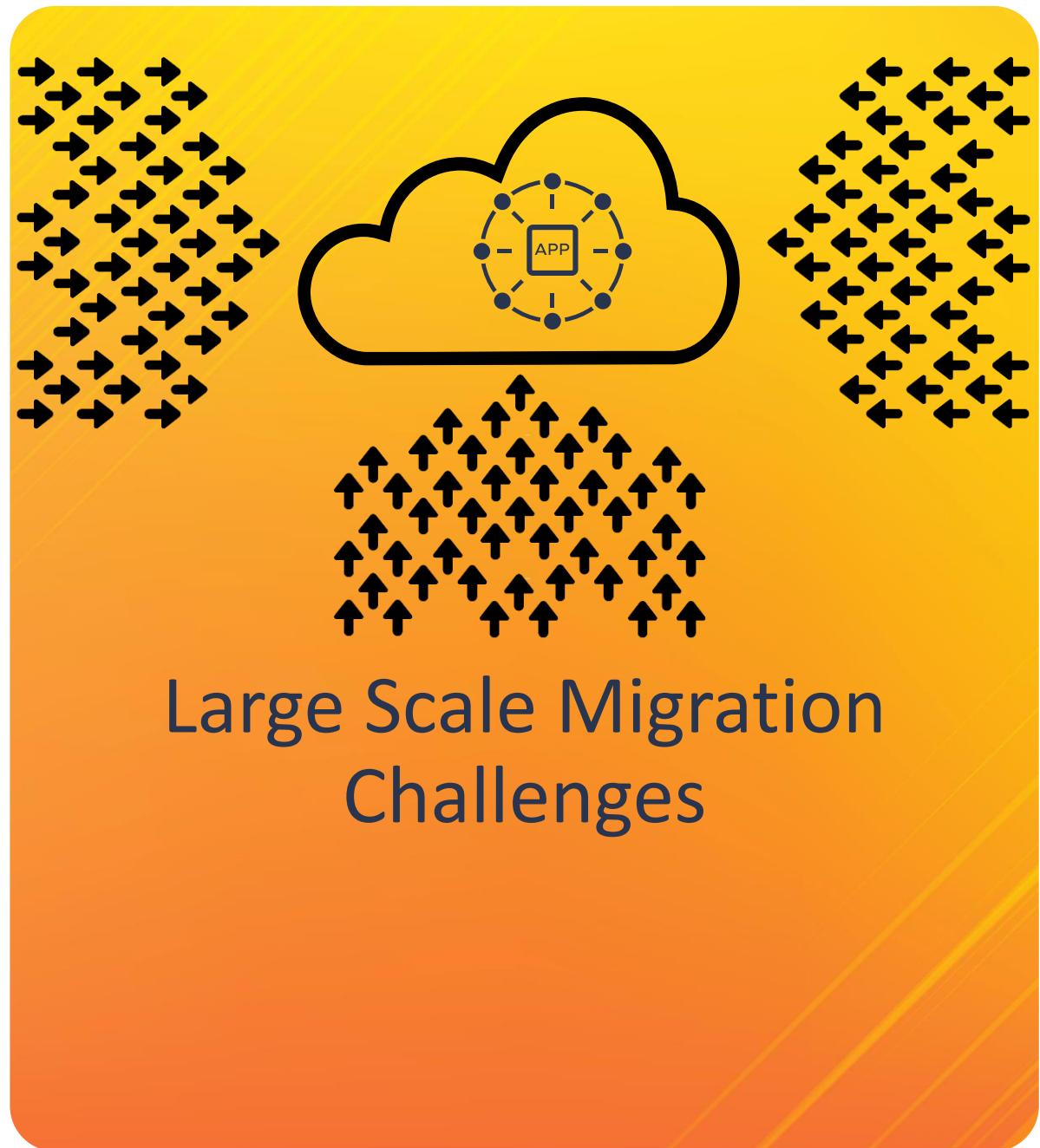
Key features displayed:

- Transfer data:** Upload files to the device so that they can be physically moved to another location or back to the AWS cloud when the device is returned. (Enable & start)
- Sync data:** Sync data on your Snowcone with Amazon S3, Amazon Elastic File System (Amazon EFS), or Amazon FSx for Windows File Server. (Stop)
- Start computing:** Run pre-installed software on virtual servers (instances) locally on the device. (Get started)
- Transfer data (Inactive):** Transfer data to the device.
- Sync with cloud (Syncing):** Sync with cloud using DataSync Console.
- Compute (1 of 1 instances running):** 1 instance running.

Devices (1):

- MySNC-10.111.60.176 (IP address: 10.111.60.176):
 - 4 GB Memory (RAM) available: 80% (progress bar)
 - 2 Available CPU: 67% (progress bar)





Large Scale Migration
Challenges

Large Scale Migration Challenges

Time Constraint

Multiple Team Coordination

Scaling

Manual error

Small Repetitive Tasks

Centralized Tracking





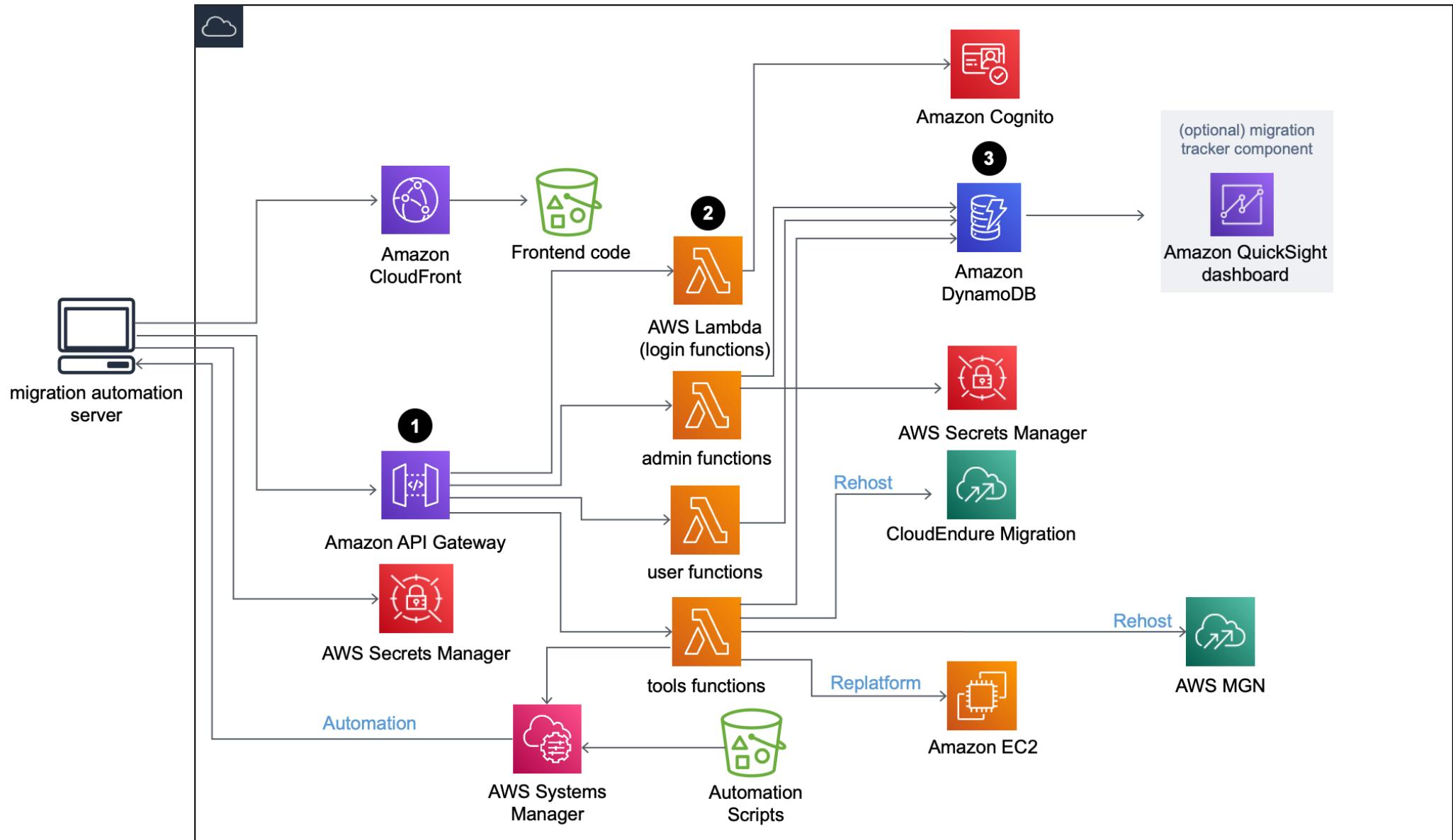
Cloud Migration Factory
on AWS

Cloud Migration Factory on AWS

- This solution is an orchestration platform powered by AWS Application Migration Service for rehosting servers to AWS at scale.
- The solution is designed to coordinate and automate many of the manual processes involved with migration, helping customers with their medium-scale to large-scale migrations.
- This solution is used by AWS Professional Services, AWS Partners, and other enterprises.



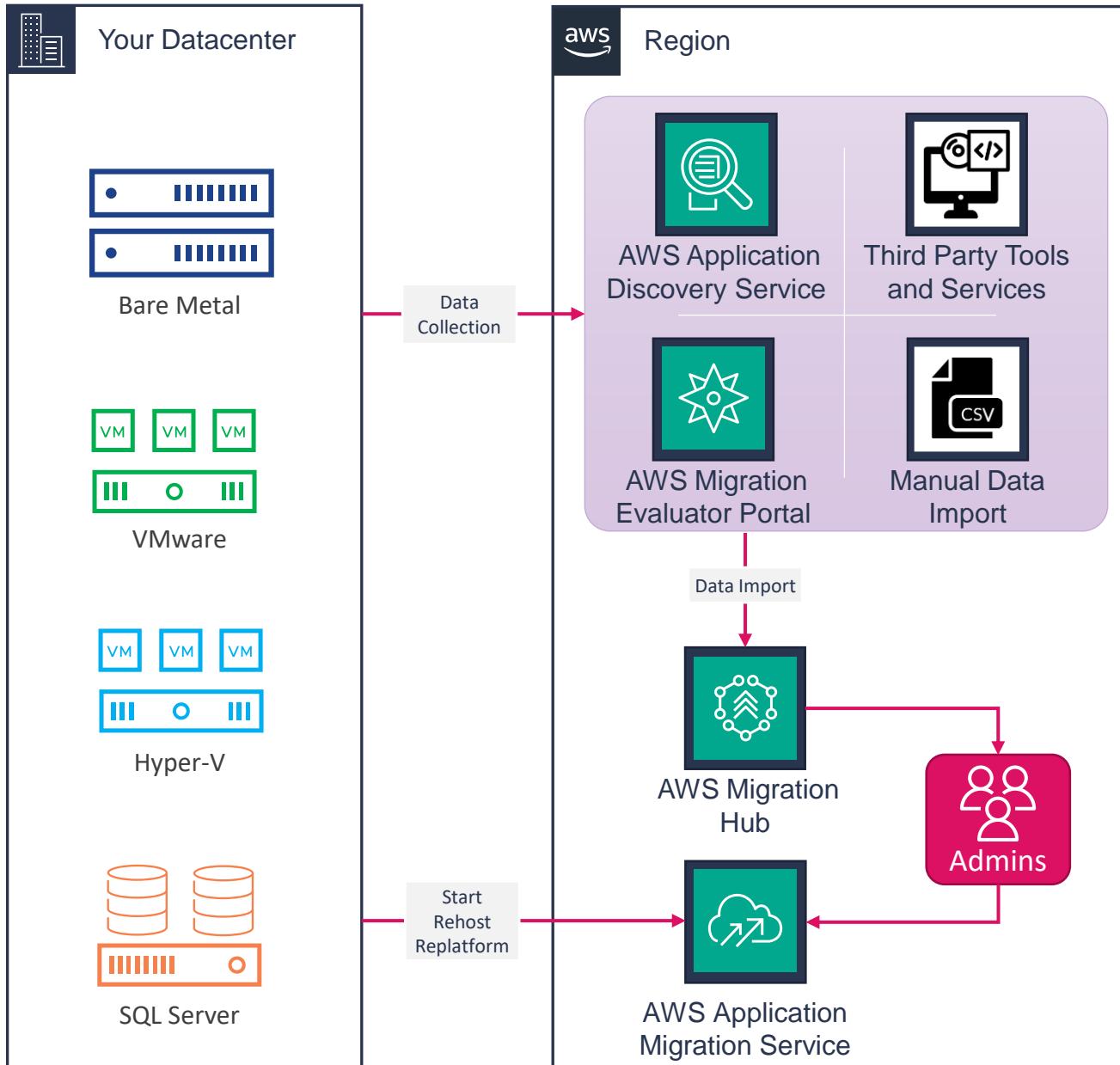
Cloud Migration Factory on AWS - Architecture





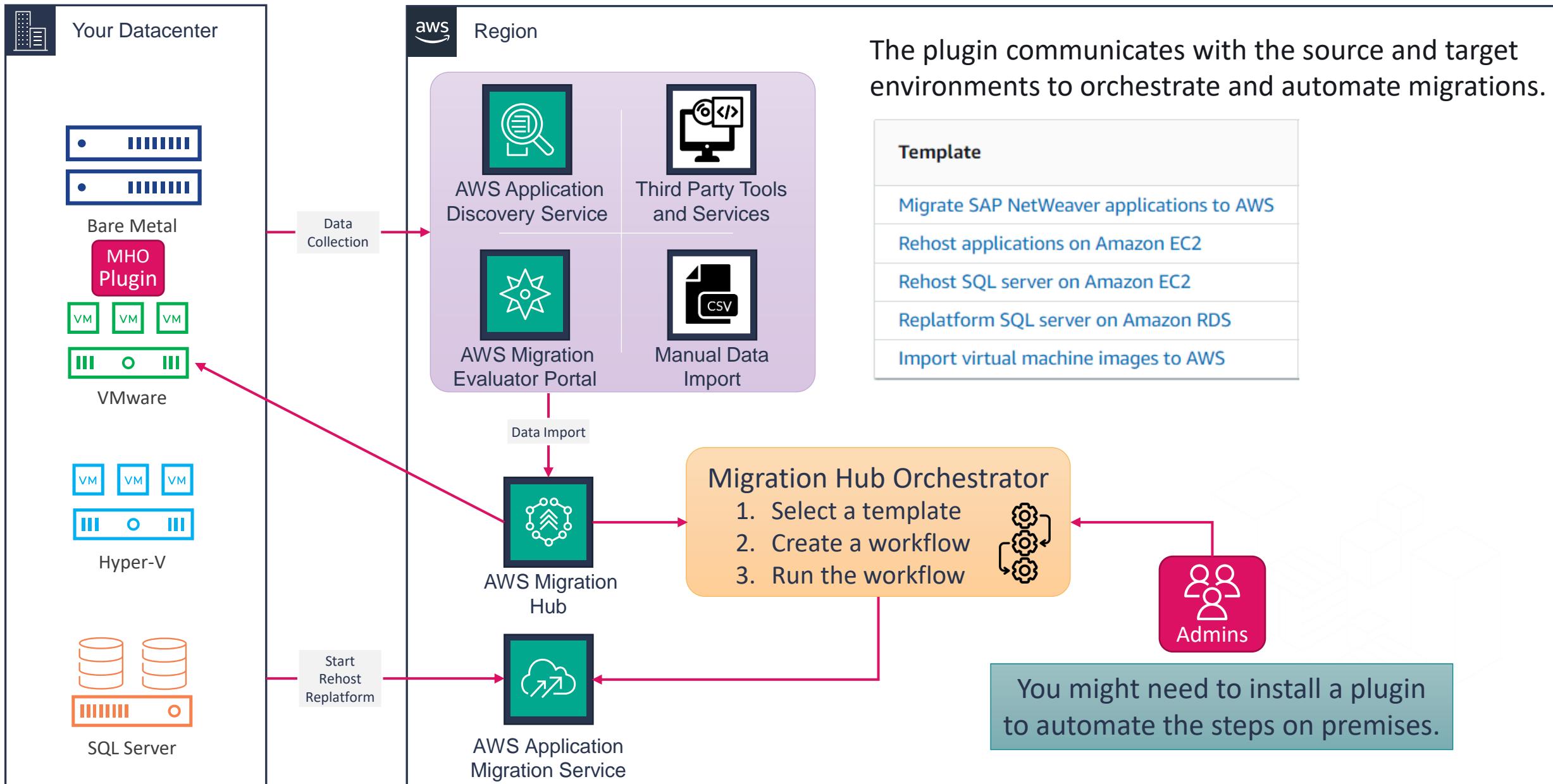
AWS Migration Hub
Orchestrator

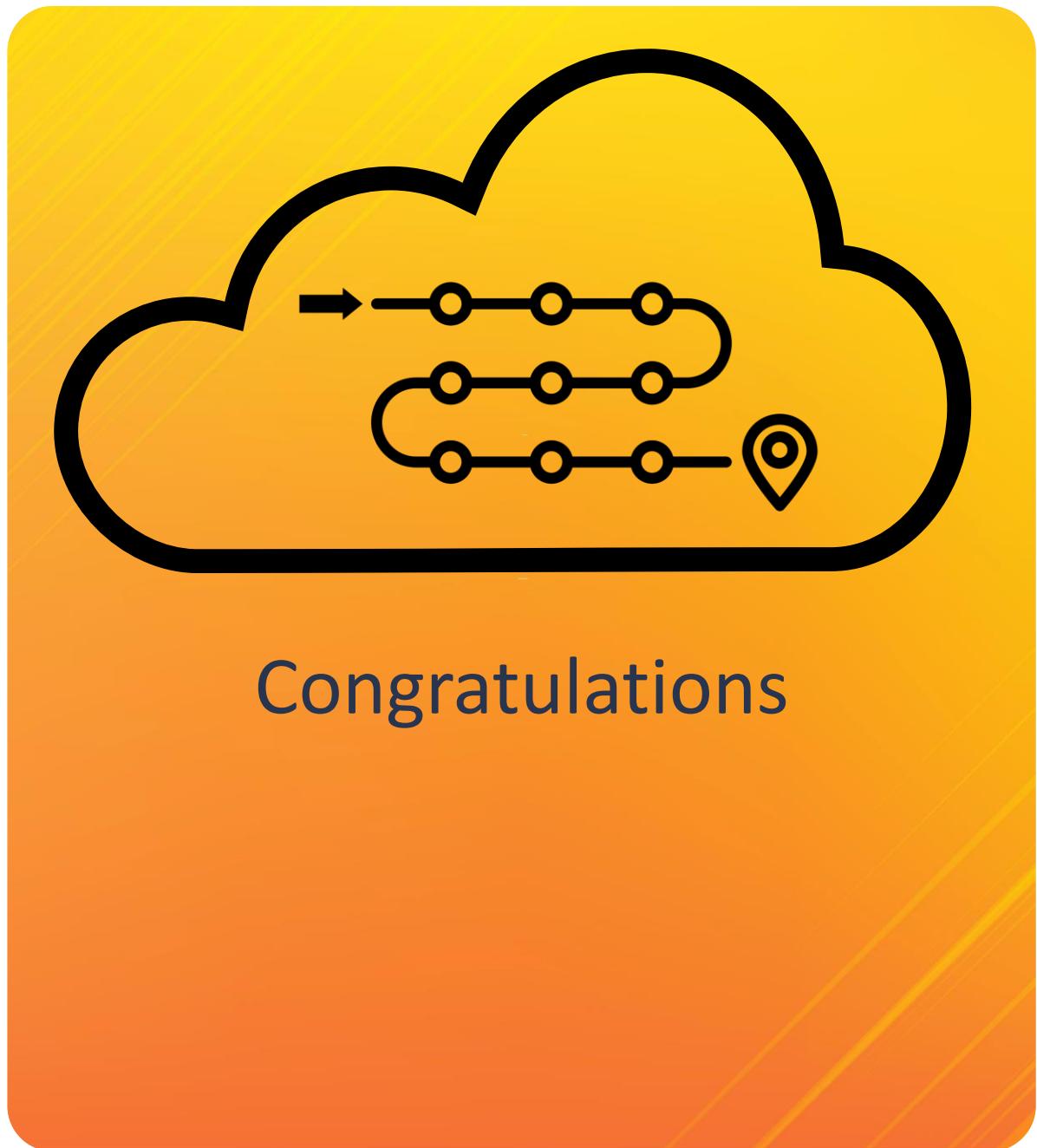
A Typical Migration



1. Install Replication Agent
2. Let replication finish
3. Mark it 'Ready for test'
4. Launch a test instance
5. Test the instance
6. Mark it 'Ready for cutover'
7. Start cutover
8. Validate the application
9. Complete the cutover
10. Archive the replication task

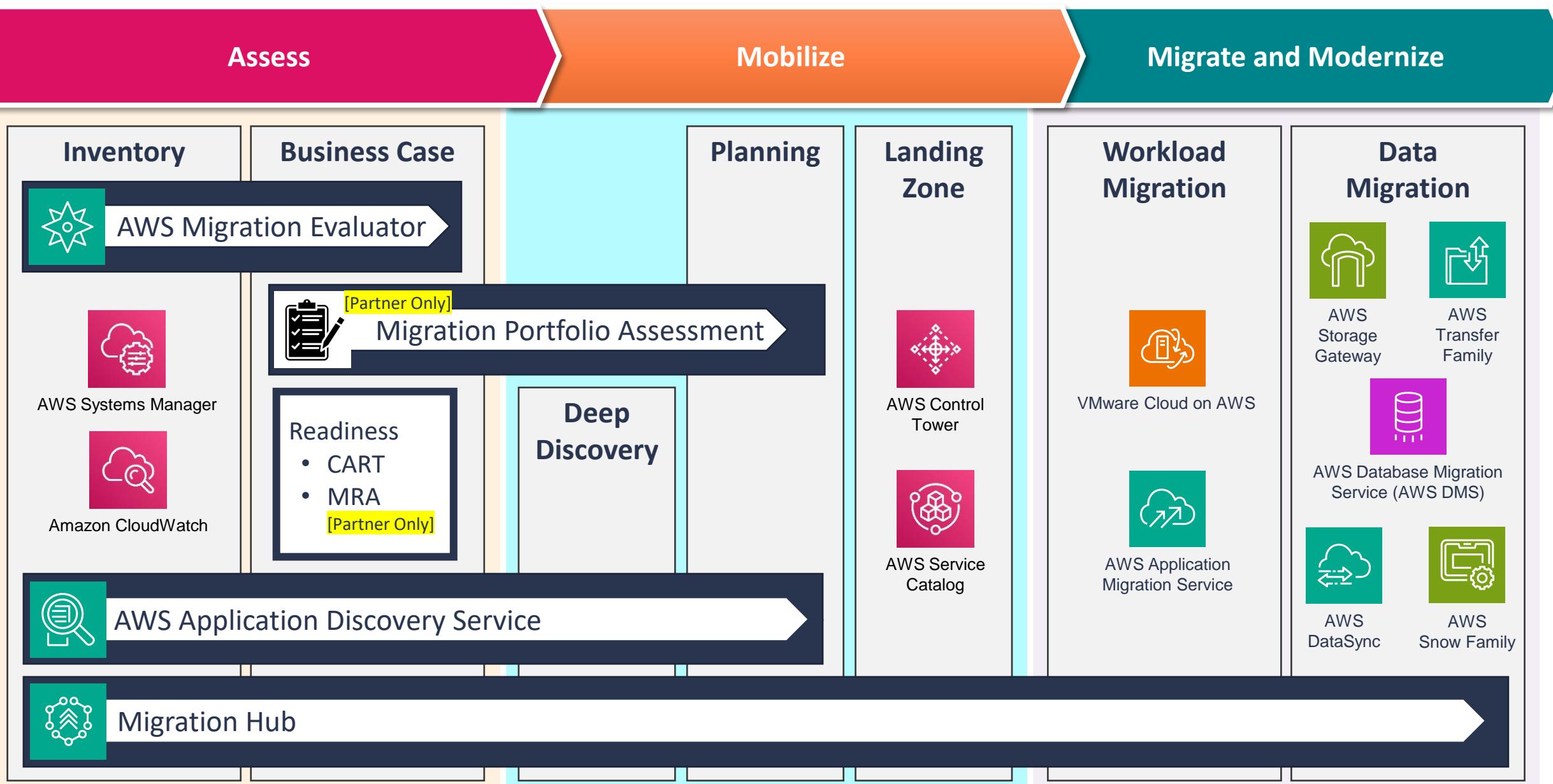
A Typical Migration with Migration Hub Orchestrator

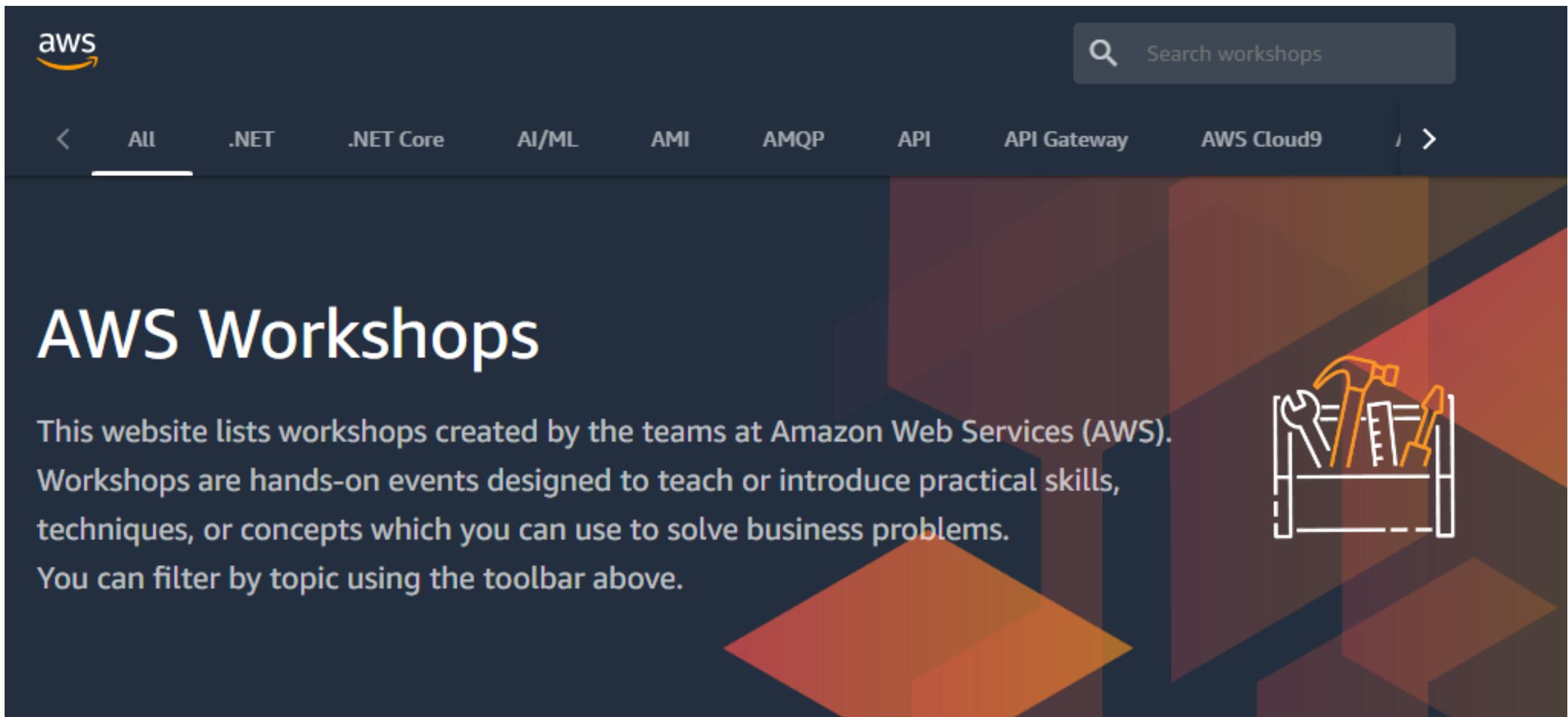




Congratulations

Cloud Migration – AWS Tools and Services Portfolio





The image shows the AWS Workshops landing page. At the top left is the AWS logo. To its right is a search bar with a magnifying glass icon and the placeholder text "Search workshops". Below the search bar is a navigation toolbar with several tabs: "All" (which is underlined), ".NET", ".NET Core", "AI/ML", "AMI", "AMQP", "API", "API Gateway", "AWS Cloud9", and two arrows pointing left and right. The main content area features a large, bold title "AWS Workshops" in white and orange. Below the title is a descriptive paragraph: "This website lists workshops created by the teams at Amazon Web Services (AWS). Workshops are hands-on events designed to teach or introduce practical skills, techniques, or concepts which you can use to solve business problems." To the right of this text is a graphic of various tools (a wrench, a hammer, a saw, a drill) arranged in a grid. The background of the page has a dark blue header and a dark grey body with abstract geometric shapes in shades of orange, red, and brown.

This website lists workshops created by the teams at Amazon Web Services (AWS). Workshops are hands-on events designed to teach or introduce practical skills, techniques, or concepts which you can use to solve business problems.

You can filter by topic using the toolbar above.





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Thank you