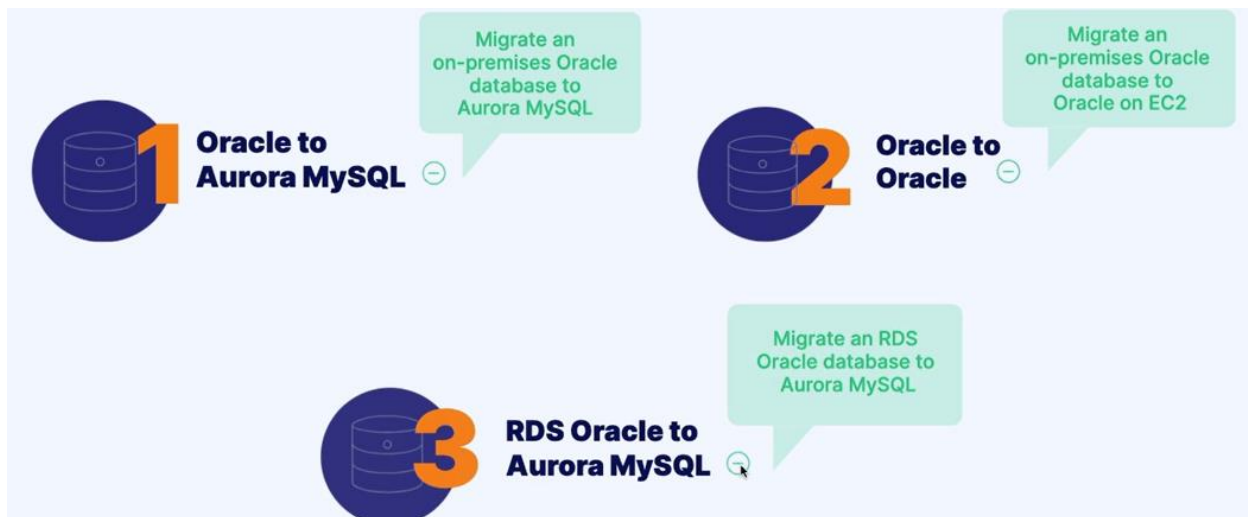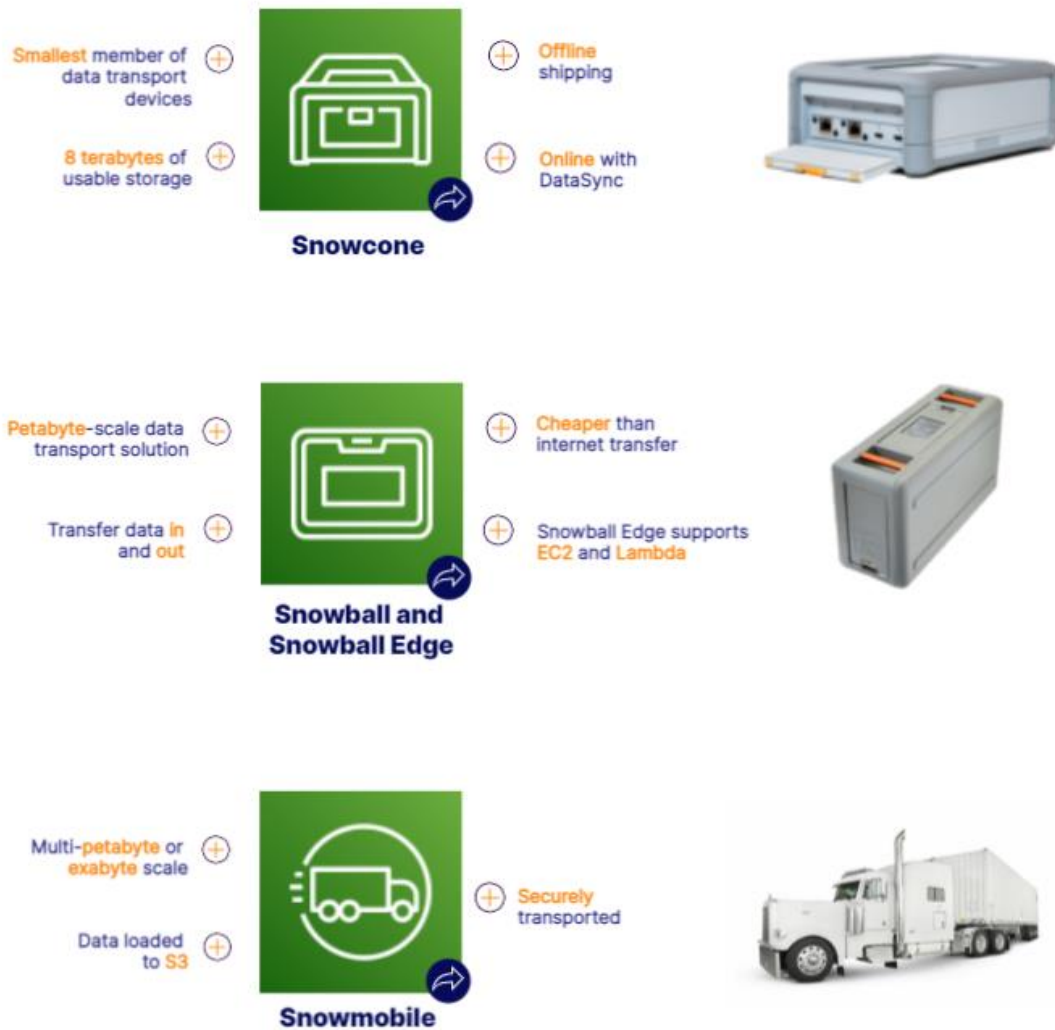# Migration

>Migrating Data with AWS Snow family

You can use the internet, direct connect and physical to migrate things over

- Database migration service (DMS)
    - Database Migration Service (DMS) makes it easy to migrate data from one database to another, whether it's in the cloud or on-premises. DMS supports both relational databases such as Aurora, Oracle, Microsoft SQL Server, MariaDB, and PostgreSQL, as well as nonrelational databases including MongoDB, DocumentDB, and DynamoDB. DMS also supports migrating data to S3, Elasticsearch, and Kinesis Data Streams. For more information, visit https://docs.aws.amazon.com/dms/.
        - Supports homogeneous and heterogeneous migrations
        - Continuous data replication.

Migrate an on-premises Oracle database to Aurora MySQL

1 Oracle to Aurora MySQL ⊖

Migrate an on-premises Oracle database to Oracle on EC2

2 Oracle to Oracle ⊖

Migrate an RDS Oracle database to Aurora MySQL

3 RDS Oracle to Aurora MySQL ⊖

- Server migration service (SMS)
    Automates migrating on-premises servers to AWS
    Server saved as a new Amazon Machine Image (AMI)
    Supports vSphere, Hyper-V, SCVMM, and Azure VMs
    Incremental replications of server VMs over to AWS AMIs that can be deployed on EC2 instances.
- AWS Snow Family https://aws.amazon.com/snow/

Smallest member of data transport devices

8 terabytes of usable storage

Offline shipping

Online with DataSync

Snowcone

Petabyte-scale data transport solution

Transfer data in and out

Cheaper than internet transfer

Snowball Edge supports EC2 and Lambda

Snowball and Snowball Edge

Multi-petabyte or exabyte scale

Data loaded to S3

Securely transported

Snowmobile

- AWS Snowball—A hardware storage appliance designed to physically move massive amounts of data to or from S3, particularly when transferring the data over a network would take days or weeks.
- AWS Snowball is a hardware appliance designed to move massive amounts of data between your site and the AWS cloud in a short time. Some common use cases for Snowball include the following:

■✓ Migrating data from an office or data center to the AWS cloud

■✓ Quickly transferring a large amount of data to or from S3 for backup or recovery purposes

■✓ Distributing large volumes of content to customers and partners

- The idea behind Snowball is that it's quicker to physically ship a large amount of data than it is to transfer it over a network.
- But instead, for a nominal fee, AWS will send you a Snowball device. You simply transfer your files to it and ship it back. When AWS receives it, AWS transfers the files from Snowball to one or more S3 buckets. You're not charged any transfer fees for importing

files into S3, and once there, they're immediately available for use by other AWS services.

- Once you receive your Snowball, you can keep it for 10 days without incurring any additional costs. If you hold onto it longer than that, you'll be charged an extra $15 per day. You're allowed to keep Snowball for up to 90 days, which is more than enough time to fill it up.

o Snowball uses two layers of encryption. First, when you transfer data to or from

o Snowball, the data is encrypted in transit using SSL. Second, the data you put on a Snowball is always encrypted at rest. Snowball enforces data encryption by requiring you to transfer data to it using only either the Snowball Client or the more advanced S3 SDK Adapter for Snowball. The former doesn't require any coding knowledge. Both run on Linux, macOS, and Windows operating systems.

o Data is encrypted using AES 256-bit encryption that's enforced by the Snowball Client or S3 SDK Adapter for Snowball, ensuring that the device never stores your AWS Snowball

- Data Sync
  o Allows for online data transfer from on-prem to AWS storage services like S3 or EFS
    - Copy data over direct connect or the internet. Which also copy data between AWS services
  o Replicate data cross-region or cross-account

>Storage Gateway

- Storage gateway
  o This is a hybrid storage service which connects on-premises and cloud data
  o Recommended for moving backups to the cloud reducing cost for hybrid cloud storage
  o Low latency
  o AWS Storage Gateway makes it easy to connect your existing on-premises servers to storage in the AWS cloud. Because it uses industry-standard storage protocols, there's no need to install special software on your existing servers. Instead, you just provision an AWS Storage Gateway virtual machine on-premises and connect your servers to it. Storage Gateway handles the data transfer between your servers and the AWS storage infrastructure. The virtual machine can run on a VMware ESXi or Microsoft Hyper-V hypervisor.
  o AWS Storage Gateway offers the following three virtual machine types for different use cases:
    - File gateways
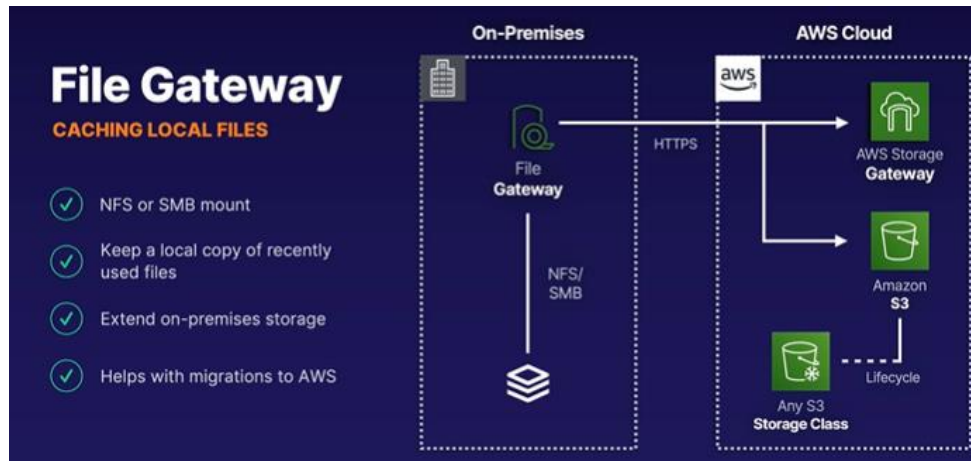
- **Volume gateways**
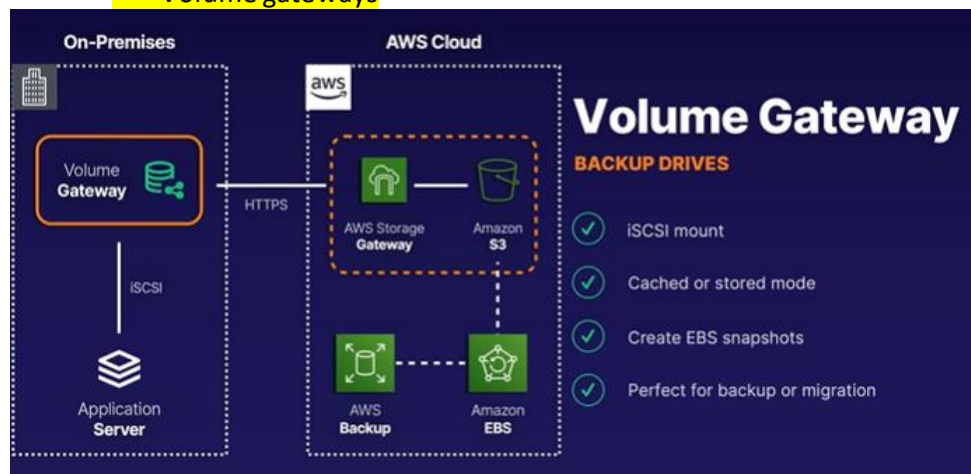
- **Tape gateways**

- o Stored volumes - With a stored volume, Storage Gateway stores all data locally and asynchronously backs it up to S3 as Elastic Block Store (EBS) snapshots.
  - When it comes to local storage, AWS Storage Gateway lets you access your data by going through a virtual machine that automatically synchronizes your data with S3.

>AWS DataSync

Agent-based solution for migrating on-prem storage to AWS. Uses NFS and SMB shares and AWS storage solutions. Provides secure transmission of your data over the internet, which this is encrypted of course.

This section is short. More information here: https://aws.amazon.com/datasync/

>AWS Transfer Family

Allows you to easily move files in and out S3 or EFS using Secure File Transfer Protocol (SFTP), FTPS, or FTP.
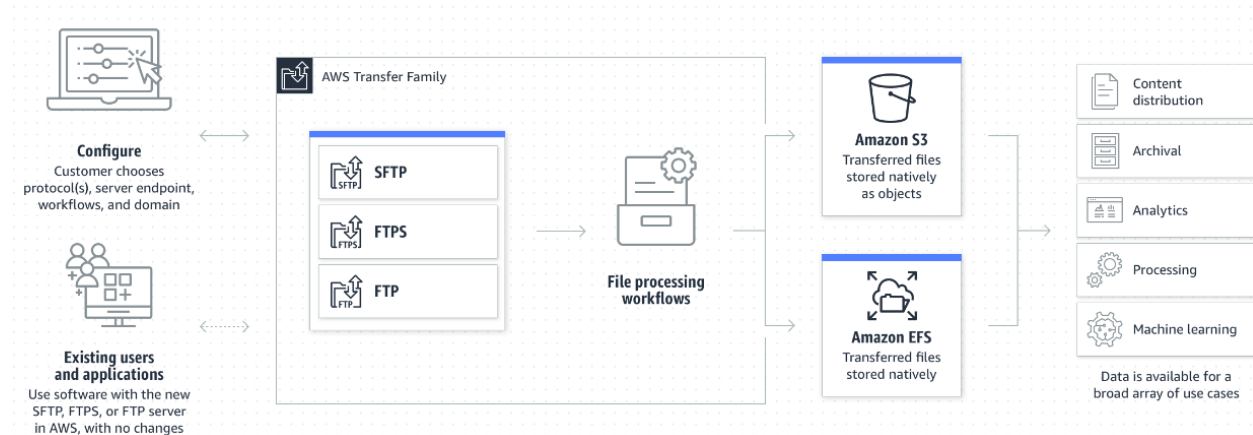
For FTP… It only supports transfers internally inside your VPC for security reasons.

Another short section. For more information look here: https://aws.amazon.com/aws-transfer-family/#
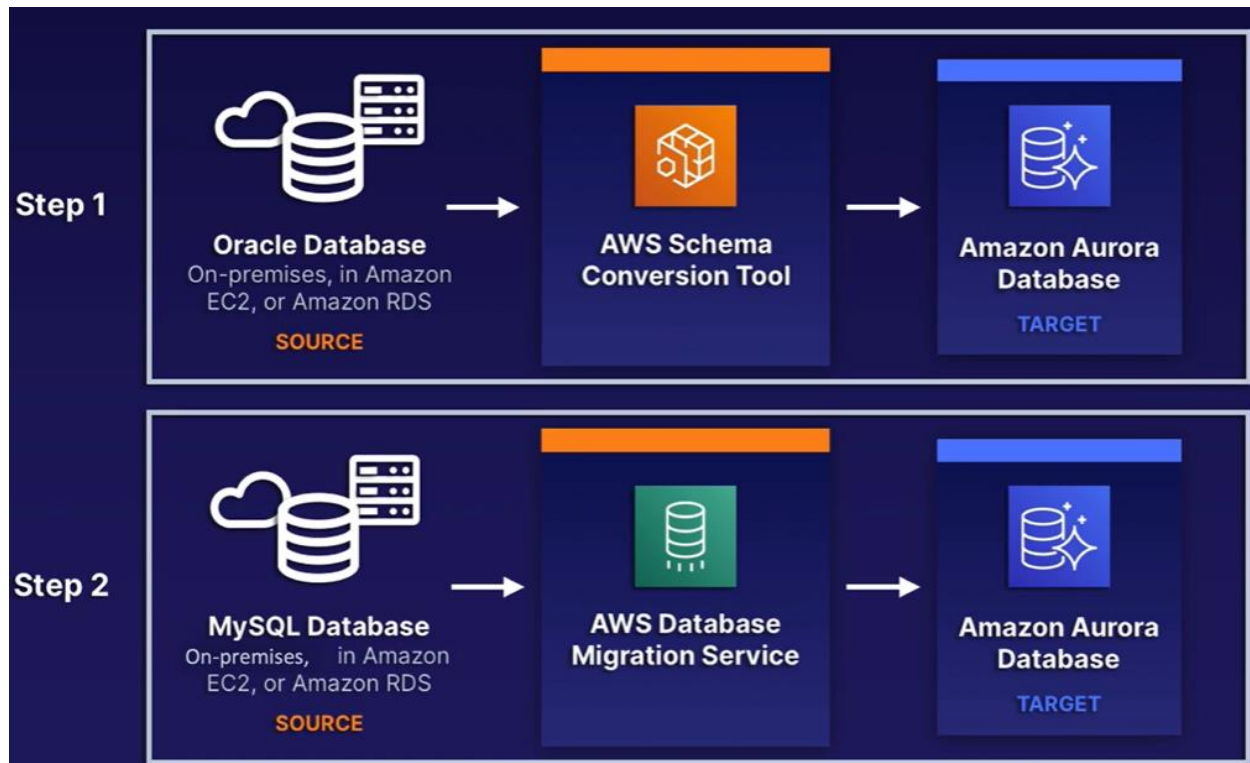
>Migration Hub

Single place to track progress of your application migration to AWS. Integrates with SMS and DMS

- SMS
  - Schedule when you'd like copies to happen
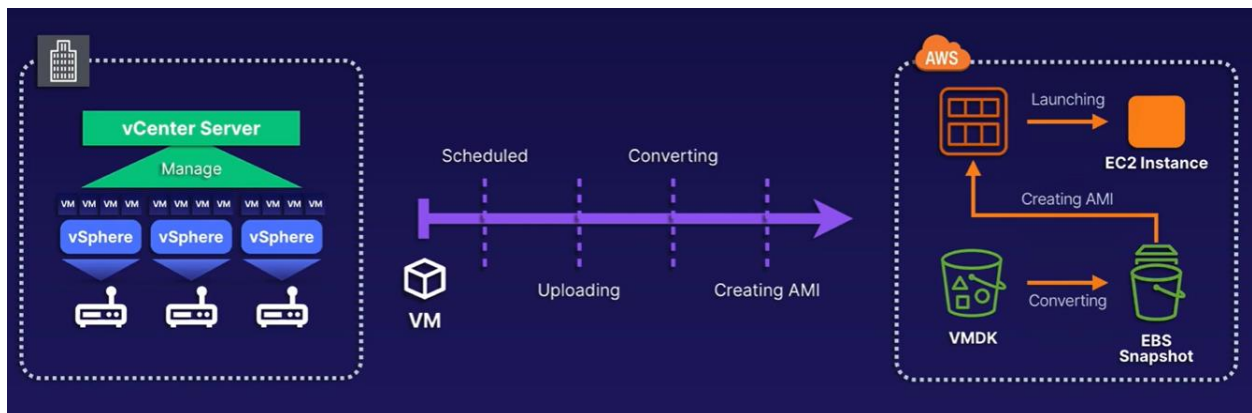
- DMS
  - Kinda does the same thing as SMS but this has a database

>Migrating Workloads to AWS Using AWS Application Discovery Service or AWS Application Migration Service (AWS MGN)

- AWS Application Discovery Service
    - Plan
        - Helps plan migrations to AWS via collection of usage and configuration data from on-premises servers
    - Simplify
        - Integrates with AWS migration hub, simplifying migrations and tracking migration statuses
    - Track
        - Helps you easily view all discovered servers, group them by application, and track each application migration

The AWS Application Discovery Service (AWS ADS) offers 2 types of discoveries

1. Agentless
    a. Performed via agentless collector. The collector is an OVA file within VMware vCenter. The OVA file is simply a deployable file for a new type of VM appliance that you can deploy in vCenter.
    b. Once the OVA is deployed, it helps you identify your different hosts and all of the VMs within that vCenter where you deployed it.
    c. Helps track and collect IP and MAC addresses, collect resource allocations, and hostnames

          d.   Collections utilization data metrics
2. Agent Based
          a.   Deployed AWS App Discovery Agent
          b.   Each VM and each physical server for windows and linux
          c.   Since this is agent based, it will collect static config data, network connections, and OS processes

AWS Application Migration Service (AWS MGN)

3. Lift and Shift
          a.   Automated life-and-shift service for expediting migration of apps to AWS
4. Flexible
          a.   Used for physical, virtual, or cloud servers to avoid cutover windows or disruptions
5. Replicate
          a.   Replicates source servers into AWS, and automatically converts and launches to AWS to migrate quickly

RTO – Recovery Time Objective: Typically, just in minutes dependent on OS boot time

RPT – Recovery Point Objective: Measured in the sub-second range

>Migrating Databases from On-Premises to AWS with AWS Database Migration Service (AWS DMS)

AWS DMS is a migration tool that allows you to easily migrate of relational databases, data warehouses, NoSQL Databases and other data stores. You can migrate in the cloud, or a combination into the cloud and on-prem. ==It is important to know that one of the endpoints must live in AWS so it can not migrate to on-prem to on-prem or between different cloud providers.==

- You can have the opton to perform a one-time migration or continuously replicate ongoing changes.
- If you want to migrate different database engines, you can use the SCT (Schema Conversion tool) which allows for translating database schemas into new platforms

DMS is simply a server running replication software. That create source and target ==(Also referred to as endpoints)== connections for loading from and to. Which schedules task to run on the DMS server to move data. AWS creates the tables and primary keys which give you options to create your target tables beforehand if desired. Leverage the SCT for creating some or all your tables, indexes and more.
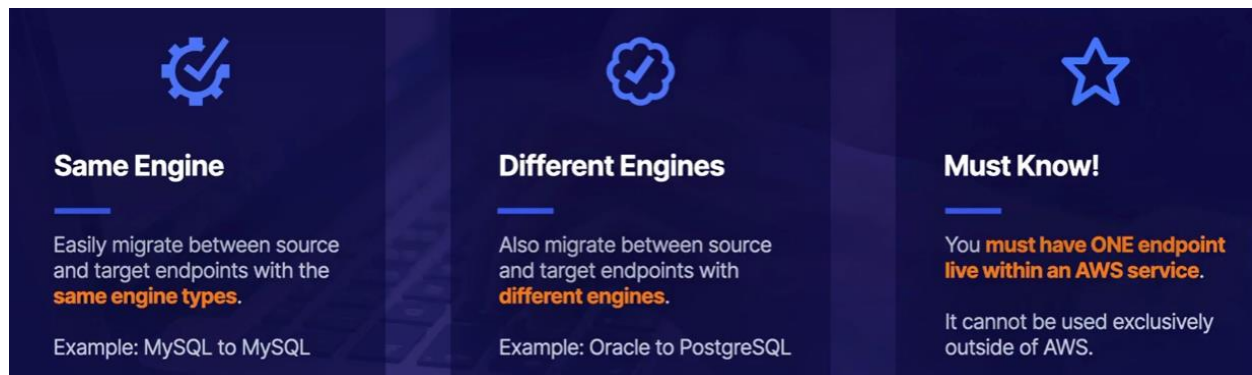
AWS Schema Conversion Tool (SCT)

A POWERFUL tool to convert existing database schemas from one engine to another. This supports many engine types. Converted schemas can be used for any supported Amazon RDS engine type, Amazon Aurora, or Redshift. You can even use the converted schemas with database running on EC2

3 different types of migrations

1. Full Load
    a. All existing data is moved from sources to targets in parallel
    b. While this is in process and any tables that are being loaded are cached on your replication server. Full Load and Change Data Capture (CDC)
2. Full Load and Change Data Capture (CDC)
    a. Capture changes to source tables during migration
    b. CDC guarantees transactional integrity of the target databases
3. CDC Only
    a. Replicates the data changes from the source database

Anything dealing with tera or petabytes with networking throttling. You might want to consider a snowball device and AWS DMS for any database migration portion of it.

> Replicating and Tracking Migrations with AWS Migration Hub and AWS Server Migration Service (AWS SMS)

Migration Phases

1. Discover: Find servers and databases to play your migrations
2. Migrate: Connect tools to migration hub, and begin migrating
3. Track: Follow migration statuses and progress

Exam Tips

1. Snow Family
   a. Snowball edge - When going into the exam, don't forget the services natively supported by Snowball Edge, like EC2 and Lambda.
   b. Snowball - Remember that Snowball transfers petabytes of data and is cheaper than transferring over the internet.
      i. Can hold up to 81 TB of data
   c. Snowmobile - Don't forget Snowmobile is the largest member of the transport family and supports exabyte-scale data.
      i. Holds up to 100 PB in a very large truck
   d. DataSync - Don't forget DataSync transfers data online and can be used to replicate data cross-Region or cross-account.
   e. Snowcone
      i. Holds up to 8 TB of data
   f. Snow family works to get data into AWS, as well as shipped back to you
   g. The turnaround is a week, but depends on the customer
2. Storage Gateway
   a. Storage gateway is hybrid storage
   b. Know the general use cases for each storage gateway type
   c. Out of space on-prem? Which storage gateway solutions solves the issue?
      i. File gateway is the perfect solution if your local network-attached storage is full
   d. Not Tape Gateway
      i. Have a high-level knowledge of Tape Gateway. The exam won't cover this as much as the other two
   e. File gateway and Volume gateway
      i. These are the primary focus for the exam.
   f. It is a VM
3. AWS DataSync
   a. DataSync is great for a one-time migration
   b. Storage Gateway is great for a hybrid architecture
   c. Agent based needs to be installed on the architecture on your end to get into AWS
   d. Endpoints – S3, EFS, and FSx are all supported locations for your data
      i. EFS and FSx are both viable locations for DataSync to transfer content into
4. Transfer Family
   a. Anything on the test for FTP related. Think Transfer Family
   b. Keep in mind of protocols
      i. FTPS & SFTP is from your outside AWS environment in
      ii. And inside your VPC will be FTP (For security reasons)
   c. DNS stays the same but the location for the storage becomes S3
5. Moving to the Cloud Migration Hub
   a. Anything about moving databases will be DMS
   b. And SMS is the best for moving servers

       c. ==Scheme conversion tool can help us migrate to Aurora or RDS==
           i. We want to migrate off of Oracle, off of SQL Server
       d. Anything related to tracking and planning migration efforts from either on-premises or another cloud vendor could involve Migration hub.
           i. ==Remember… this doesn't do the migrations for you. It works by integrating with other services that actually perform the actions.==

6. Migrating workloads to AWS using AWS ADS or AWS AMS
    a. AWS Application Discovery Service
       i. Application migrations makes it easy and efficiently migrate applications to AWS Cloud
       ii. Agentless Discovery performs via OVA files in vCenter. Easy to migrate VMs
       iii. Agent-Based Discovery is an installable agent for windows and Linux to collect detailed information on VMs and Physical host
    b. AWS Application Migration Service
       i. AWS MGN offers an automated lift and shift of migrated infrastructure to AWS
       ii. Replace source servers (VMs, physical, or cloud servers) into AWS for non-disruptive cutovers.
       iii. RTP is measured in mins and RPO is measured in sub-seconds

7. AWS DMS
    a. ==Understand the difference between full-load, full load with CDC, and CDC-only migrations==
    b. ==Learn to love the SCT tool since it is a powerful tool==
    c. ==One of the endpoints MUST be within AWS. You cannot leverage this for external-only migrations==
    d. Anything dealing with tera or petabytes with networking throttling. You might want to consider a snowball device and AWS DMS for any database migration portion of it.

8. AWS Server Migration Service (SMS)
    a. Perfect for senarios like simplifying migrations of critical VMs from on-prem, easily migrating VMs from other cloud providers, and minimizing downtimes during cutovers. And any other types of VMs