

S3 Storage Classes

- Amazon S3 Standard - General Purpose
- Amazon S3 Standard-Infrequent Access (IA)
- Amazon S3 One Zone-Infrequent Access
- Amazon S3 Glacier Instant Retrieval
- Amazon S3 Glacier Flexible Retrieval
- Amazon S3 Glacier Deep Archive
- Amazon S3 Intelligent Tiering

Can move between classes manually or using S3 Lifecycle configurations

S3 Durability & Availability

Durability:

- High durability (99.999999999%, 11 9's) of objects across multiple AZ
- If you store 10,000,000 objects with Amazon S3, you can on average expect to incur a loss of a single object once every 10,000 years
- Same for all storage classes

Availability:

- Measures how readily available a service is
- Varies depending on storage class
- Example: S3 standard has 99.99% availability = not available 53 minutes a year

S3 Standard - General Purpose

- 99.99% Availability
- Used for frequently accessed data

- Low latency and high throughput
- Sustain 2 concurrent facility failures

Use Cases: Big Data analytics, mobile & gaming applications, content distribution...

S3 Storage Classes - Infrequent Access

- For data that is less frequently accessed, but requires rapid access when needed
- Lower cost than S3 Standard

Amazon S3 Standard-Infrequent Access (S3 Standard-IA)

- 99.9% Availability
- Use cases: Disaster Recovery, backups

Amazon S3 One Zone-Infrequent Access (S3 One Zone-IA)

- High durability (99.999999999%) in a single AZ; data lost when AZ is destroyed
- 99.5% Availability

Use Cases: Storing secondary backup copies of on-premise data, or data you can recreate

Amazon S3 Glacier Storage Classes

- Low-cost object storage meant for archiving / backup
- Pricing: price for storage + object retrieval cost

Amazon S3 Glacier Instant Retrieval

- Millisecond retrieval, great for data accessed once a quarter
- Minimum storage duration of 90 days

Amazon S3 Glacier Flexible Retrieval (formerly Amazon S3 Glacier):

- Expedited (1 to 5 minutes), Standard (3 to 5 hours), Bulk (5 to 12 hours) – free
- Minimum storage duration of 90 days
- Amazon S3 Glacier Deep Archive – for long term storage: • Standard (12 hours), Bulk (48 hours)
- Minimum storage duration of 180 days

S3 Intelligent-Tiering

- Small monthly monitoring and auto-tiering fee
- Moves objects automatically between Access Tiers based on usage
- There are no retrieval charges in S3 Intelligent-Tiering
- Frequent Access tier (automatic): default tier
- Infrequent Access tier (automatic): objects not accessed for 30 days
- Archive Instant Access tier (automatic): objects not accessed for 90 days
- Archive Access tier (optional): configurable from 90 days to 700+ days
- Deep Archive Access tier (optional): config. from 180 days to 700+ days

Shared Responsibility Model for S3:

AWS	Customer
Infrastructure (global security, durability, availability, sustain concurrent loss of data in two facilities)	S3 Versioning

Configuration and vulnerability analysis	S3 Bucket Policies
Compliance validation	S3 Replication Setup
	Logging and Monitoring
	S3 Storage Classes
	Data encryption at rest and in transit

AWS Snow Family

Highly-secure, portable devices to collect and process data at the edge, and migrate data into and out of AWS

Data Migration:

- Snowcone
- Snowball Edge
- Snowmobile

Edge Computing

- Snowcone
- Snowball Edge

Challenges for Data Migrations:

- Limited Connectivity
- Limited Bandwidth
- High Network Cost
- Shared Bandwidth (Can't maximize the line)
- Connection Stability

Data Migration with Snow Family:

Offline devices to perform data migrations If it takes more than a week to transfer over the network, use Snowball devices!

Snowball Edge (for data transfers)

- Physical data transport solution: move TBs or PBs of data in or out of AWS
- Alternative to moving data over the network (and paying network fees)
- Pay per data transfer job
- Provide block storage and Amazon S3 -compatible object storage

Snowball Edge Storage Optimized

- 80 TB of HDD capacity for block volume and S3 compatible object storage

Snowball Edge Compute Optimized

- 42 TB of HDD or 28TB NVMe capacity for block volume and S3 compatible object storage

Use cases: large data cloud migrations, DC decommission, disaster recovery

AWS Snowcone & Snowcone SSD:

- Small, portable computing, anywhere, rugged & secure, withstands harsh environments
- Light (4.5 pounds, 2.1 kg)
- Device used for edge computing, storage, and data transfer
- Snowcone – 8 TB of HDD Storage
- Snowcone SSD – 14 TB of SSD Storage
- Use Snowcone where Snowball does not fit (space - constrained environment)
- Must provide your own battery / cables

- Can be sent back to AWS offline, or connect it to internet and use AWS DataSync to send data

AWS Snowmobile

- Transfer exabytes of data (1 EB = 1,000 PB = 1,000,000 TBs)
- Each Snowmobile has 100 PB of capacity (use multiple in parallel)
- High security: temperature controlled, GPS, 24/7 video surveillance
- Better than Snowball if you transfer more than 10 PB

Snow Family Usage Process:

- Request Snowball devices from the AWS console for delivery
- Install the snowball client / AWS OpsHub on your servers
- Connect the snowball to your servers and copy files using the client
- Ship back the device when you're done (goes to the right AWS facility)
- Data will be loaded into an S3 bucket
- Snowball is completely wiped

What is Edge Computing:

- Process data while it's being created on an edge location
- These locations may have
 - Limited / no internet access
 - Limited / no easy access to computing power
- We setup a Snowball Edge / Snowcone device to do edge computing

- Use cases of Edge Computing:
 - Preprocess data
 - Machine learning at the edge
 - Transcoding media streams
- Eventually (if need be) we can ship back the device to AWS (for transferring data for example)

Snow Family - Edge Computing

- Snowcone & Snowcone SSD (smaller)
 - 2 CPUs, 4 GB of memory, wired or wireless access
 - USB-C power using a cord or the optional battery

Snowball Edge – Compute Optimized

- 104 vCPUs, 416 GiB of RAM
- Optional GPU (useful for video processing or machine learning)
- 28TB NVMe or 42TB HDD usable storage
- Storage Clustering available (up to 16 nodes)

Snowball Edge – Storage Optimized

- Up to 40 vCPUs, 80 GiB of RAM, 80 TB storage

All: Can run EC2 Instances & AWS Lambda functions (using AWS IoT Greengrass)

Long-term deployment options: 1 and 3 years discounted pricing

AWS OpsHub

- Historically, to use Snow Family devices, you needed a CLI (Command Line Interface tool)

- Today, you can use AWS OpsHub (a software you install on your computer / laptop) to manage your Snow Family Device
 - Unlocking and configuring single or clustered devices
 - Transferring files
 - Launching and managing instances running on Snow Family Devices
 - Monitor device metrics (storage capacity, active instances on your device)
 - Launch compatible AWS services on your devices (ex: Amazon EC2 instances, AWS DataSync, Network File System (NFS))

AWS Storage Cloud Native Options:

- Block → Amazon EBS & EC2 Instance Store
- File → Amazon EFS
- Object → Amazon S3 & Glacier

Amazon S3 - Summary

- Buckets vs Objects:
 - global unique name, tied to a region
- S3 security:
 - IAM policy, S3 Bucket Policy (public access), S3 Encryption
- S3 Websites:
 - host a static website on Amazon S3
- S3 Versioning:
 - multiple versions for files, prevent accidental deletes
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- S3 Replication:
 - same-region or cross-region, must enable versioning
- S3 Storage Classes:
 - Standard, IA, 1Z-IA, Intelligent, Glacier (Instant, Flexible, Deep)
- Snow Family:
 - Import data onto S3 through a physical device, edge computing
- OpsHub:
 - desktop application to manage Snow Family devices
- Storage Gateway:
 - hybrid solution to extend on-premises storage to S3

