AWS S3 Storage Classes

Amazon S3 offers several storage classes, each designed for specific use cases and access patterns. These classes help optimize storage costs by letting you choose the right trade-off between cost, availability, and retrieval times. Below is a detailed explanation of each S3 storage class, along with examples to clarify their use:

1. S3 Standard (General Purpose)

- Use Case: Frequently accessed data.
- Durability: 99.999999999% (11 nines).
- Availability: 99.99% availability SLA.
- Cost: Higher storage cost than other classes but no retrieval fees.
- Performance: Low latency and high throughput.

Example:

Hosting a website with frequently accessed media files like images or videos.
Storing mobile app data that needs to be retrieved quickly by users.

2. S3 Intelligent-Tiering
- Use Case: Data with unpredictable access patterns.
- Durability: 99.999999999%.
- Availability: 99.9% or 99% depending on the tier.
- Cost: Automatically moves objects to the most cost-efficient tier based on access patterns.
- Tiers: Frequent, Infrequent, Archive, Deep Archive.
- Performance: Instant retrieval for frequent and infrequent tiers, longer for archive tiers.

Example:
Log files or analytics data where access frequency changes over time.
Machine learning datasets used sporadically.

3. S3 Standard-IA (Infrequent Access)
- Use Case: Infrequently accessed data but requires rapid retrieval.
- Durability: 99.999999999%.
- Availability: 99.9% SLA.
- Cost: Lower storage cost than Standard; retrieval costs apply.
- Performance: Milliseconds latency.

Example:

Backup files for business continuity planning.
Media files that are rarely accessed but need quick access when required.

4. S3 One Zone-IA
- Use Case: Infrequent access but stored in a single Availability Zone (less durable).
- Durability: 99.999999999% in a single zone.
- Availability: 99.5% SLA.
- Cost: Lower cost than Standard-IA; retrieval fees apply.
- Performance: Milliseconds latency.

Example:

Data that can be recreated easily if lost, like processing pipelines' intermediate results.

Non-critical development or test data.

5. S3 Glacier Instant Retrieval
- Use Case: Archive data with occasional access needing immediate retrieval.
- Durability: 99.999999999%.
- Availability: 99.9%.
- Cost: Lower storage cost than S3 Standard-IA; retrieval costs apply.
- Performance: Milliseconds retrieval time.

Example:

Medical records that are occasionally accessed.
Archived financial records for compliance.

6. S3 Glacier Flexible Retrieval (formerly S3 Glacier)
- Use Case: Archive data with infrequent access and flexible retrieval needs.
- Durability: 99.999999999%.
- Availability: No SLA (designed for rarely accessed data).
- Cost: Very low storage cost; retrieval fees apply.
- Performance:
Standard: Retrieval in 3-5 hours.
Bulk: Retrieval in 5-12 hours.
Expedited: Retrieval in 1-5 minutes.

Example:

Archiving scientific research data.
Storing historical logs or compliance records.

7. S3 Glacier Deep Archive
- Use Case: Long-term data archiving (e.g., regulatory compliance).
- Durability: 99.999999999%.
- Availability: No SLA.
- Cost: Lowest storage cost; high retrieval costs.
- Performance:
- Standard: Retrieval in 12 hours.
- Bulk: Retrieval in 48 hours.
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Example:

Retention of healthcare or financial records for decades.
Archiving legal documents for long-term compliance.

8. S3 Reduced Redundancy Storage (Deprecated)
This storage class was used for non-critical, easily re-creatable data but is now deprecated. It is recommended to use other storage classes instead.

Storage Class	Storage Cost (Per GB)	Retrieval Cost	Availability	Retrieval Speed
S3 Standard	High	None	99.99%	Milliseconds
S3 Intelligent-Tiering	Variable	None/Varies	99.9% or 99%	Varies by tier
S3 Standard-IA	Lower than Standard	Retrieval fees	99.9%	Milliseconds
S3 One Zone-IA	Lower than Standard-IA	Retrieval fees	99.5%	Milliseconds
S3 Glacier Instant Retrieval	Low	Retrieval fees	99.9%	Milliseconds
S3 Glacier Flexible Retrieval	Very Low	Retrieval fees	No SLA	Minutes to Hours
S3 Glacier Deep Archive	Lowest	Retrieval fees	No SLA	Hours to Days