AMAZON S3

1. What is Amazon S3, and what are its primary use cases?

Answer:
Amazon S3 (Simple Storage Service) is an object storage service that allows you to store, retrieve, and manage any amount of data. Its primary use cases include:

- Backup and recovery.
- Hosting static websites.
- Data archiving and compliance.
- Big data analytics.
- Content distribution and media storage.

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2. What is the maximum size of an object in S3?

Answer:
The maximum size of an object in S3 is **5 TB**.

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3. What is S3 versioning, and why would you use it?

Answer:
S3 versioning allows you to keep multiple versions of an object in the same bucket. It is used to:

- Protect against accidental overwrites or deletions.
- Maintain an audit trail for object changes.
- Recover previous versions of objects.

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4. What are the different storage classes in Amazon S3, and when should you use them?

Answer:
Amazon S3 offers several storage classes:

- **S3 Standard**: For frequently accessed data.
- **S3 Intelligent-Tiering**: Automatically moves data between access tiers based on usage.
- **S3 Standard-IA**: For infrequently accessed data that requires quick retrieval.
- **S3 One Zone-IA**: Lower-cost option for non-critical, infrequently accessed data stored in one AZ.
- **S3 Glacier**: For archival storage with varying retrieval times.
- **S3 Glacier Deep Archive**: For long-term, low-cost archival storage.

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5. What is the default durability and availability of Amazon S3?

Answer:
Amazon S3 provides:

- **Durability**: 99.999999999% (11 nines).

- **Availability**: 99.99% (four nines) for the Standard storage class.

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6. How does Cross-Region Replication (CRR) work in Amazon S3?

Answer:
CRR automatically replicates objects from one S3 bucket to another bucket in a different AWS region. It is used for:

- Disaster recovery.
- Data redundancy.
- Low-latency access in other regions.

CRR requires versioning to be enabled on both source and destination buckets.

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7. What is a pre-signed URL, and how is it used?

Answer:
A pre-signed URL grants temporary access to a specific S3 object without needing full bucket permissions. It is commonly used to:

- Share objects securely.
- Allow temporary file uploads or downloads.

You can generate a pre-signed URL using AWS SDKs or the CLI.

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8. What is the difference between a bucket policy and an access control list (ACL)?

Answer:

- **Bucket Policy**: Provides fine-grained access controls at the bucket or object level using JSON policy documents.
- **ACL**: Grants basic permissions (read/write) to specific users or AWS accounts.

Bucket policies are more flexible and preferred over ACLs for access control.

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9. What is static website hosting in Amazon S3, and how does it work?

Answer:
S3 allows you to host static websites (HTML, CSS, JS) by enabling the "Static Website Hosting" option. You upload your files to a bucket and configure the index document (e.g., index.html). A public endpoint is provided to access the website.

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10. What are lifecycle policies in Amazon S3?

Answer:
Lifecycle policies allow you to automate transitions and deletions of objects based on their age. For example:

- Move data to S3 Glacier after 30 days.
- Delete old versions of objects after 90 days.

This helps reduce storage costs by optimizing data placement.

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11. How does Amazon S3 secure data?

Answer:
S3 secures data using:

1. **Encryption**:
    - Server-side encryption (SSE-S3, SSE-KMS, SSE-C).
    - Client-side encryption.
2. **Access Control**:
    - Bucket policies, ACLs, and IAM roles.
3. **Network Security**:
    - SSL/TLS for secure data transfer.

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12. What is the purpose of S3 Intelligent-Tiering?

Answer:
S3 Intelligent-Tiering automatically moves data between access tiers based on usage patterns, reducing storage costs without sacrificing performance.

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13. How does S3 ensure strong consistency?

Answer:
Amazon S3 provides **strong read-after-write consistency** for PUT and DELETE operations. This means that once an object is written or deleted, subsequent read requests will reflect the change immediately.

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14. What are multipart uploads in S3, and why are they used?

Answer:
Multipart uploads divide a large file into smaller parts and upload them in parallel, improving performance. They are used for:

- Uploading files larger than 5 GB (required).
- Faster and more reliable uploads.

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15. How do you enforce compliance in Amazon S3?

Answer:
Compliance can be enforced using:

- **Bucket Versioning**: To keep records of all object changes.
- **Object Lock**: To prevent deletion or modification of objects for a specified time.
- **S3 Access Analyzer**: To identify and mitigate public or external access risks.
- **Lifecycle Policies**: To archive or delete data according to compliance needs.