

## AWS S3 Service (Simple Storage Service)

AWS S3 is a cloud based storage service that allows you to store, manage and retrieve large amount of data like files, images, videos and backups securely and at scale.

- It provides highly reliable, scalable object storage, making your data accessible from anywhere, anytime, via the Internet.
- Fully managed object storage service by AWS
- Built for infinite scalability, high durability, and availability.
- Stores files as objects inside buckets.
- Need globally unique name of Bucket.
- AWS S3 is Region specific, not Availability Zone specific.
- Each object within a bucket is stored as a key-value pair.
  - key + key is the object's name
  - value + value is the content of object (file and data itself).

## Size of Storing data

- Maximum size for a single object in Amazon S3 is 5TB.
- Multipart upload is recommended for objects larger than 5GB (split the file into smaller parts and upload them separately).

## # S3 Static Website Hosting

Amazon S3 allows you to host static websites using only frontend code (HTML, CSS, JS). No backend (like PHP, node.js) is supported.

### Steps :-

1. Requirement :-  
Upload your index.html, style.css, and other static files to an S3 bucket.

### 2. Enable static website hosting

- Go to bucket > properties > static websites hosting.
- Choose "Enable"
- Set → index document = index.html  
→ Error document = error.html (optional).

3. Make files publicly accessible!. Add a customize bucket policy that allow all for website.

## To access your site

Once hosted, your static site is available at:  
S3 bucket → properties → At last.

## Important Points

- ≡ No HTTPS directly (you need CloudFront for HTTPS).
- ≡ for production: prefer using S3 + CloudFront + custom domain.
- ≡ ideal for frontend portfolios, landing pages, or React / static build.

## S3 Bucket Policies

A Bucket Policy is a JSON-based access control policy that applies to an entire S3 bucket & all its objects.

It's used to control +

- ≡ who can access the bucket.
- ≡ what action they can perform (S3: GetObject, S3: putObject) etc.
- ≡ from where (e.g. specific IPs or VPC).

→ Write or Paste your JSON policy in the bucket policy editor.

→ You can use AWS's Policy Generator to create a custom policy, or you can manually write the policy in json format.

≡ Get Object : Used to retrieve or download files from an S3 bucket.

≡ Put Object : Used to upload or add files into an S3 bucket.

## Structure of a Bucket policy (JSON)

```
{ "Version": "2012-10-17",
```

```
  "Statement": [
```

```
    {
```

```
      "Sid": "PublicReadAccess",
```

```
      "Effect": "Allow",
```

```
      "Principal": "*",
```

```
      "Action": "S3:GetObject",
```

```
      "Resource": "arn:aws:s3:::your-bucket-name/*"
```

```
    }
```

```
  ]
```

```
}
```

S3 Versioning : It allows you to keep multiple versions of an object in the same bucket, providing protection against accidental deletion or overwrites.

When versioning is enabled, S3 stores every versions of an object, allowing you to recover older versions if needed, making it ideal for data safety and backup.

### Steps:

1. Go to S3 console.
2. Click your bucket name.
3. Go to the properties tab.
4. Scroll to bucket versioning.
5. Click Edit → Enable → Save.

Once enable, you cannot disable it — only suspend it.

### S3 Replication

It allows you to automatically copy objects from one S3 buckets.

→ within the same region (Same-region Replication - SRR) or  
→ in different regions (Cross-region Replication - CRR).

It commonly used for compliance, redundancy, and to improve data access performance by maintaining copies closer to your users.

## Steps for Enable Replications

1. Go to S3 console.
2. Open your source bucket.
3. Go to Management > Replication rules.
4. Click "Create Replication rule"
5. Set:
  - Rule name
  - Source prefix/folder (or apply to all).
  - Destination bucket (same or cross region).
6. Set.  
Enable versioning if not already.
7. Create a new IAM role (or use an existing one).
8. Save.

Note: Replication doesn't replicate existing files; only new uploads.

- Bucket can be in same or different AWS accounts.
- You must have IAM role or bucket owner permissions.

## # S3 Storage Classes

Storage classes: S3 offers multiple storage classes to optimize cost, availability, and data access patterns. Each class is designed for specific use case.

1. S3 Standard : Default, high availability for frequent accessed data.

2. S3 Intelligent-Tiering : Automatically move data b/w tier based on access.

3. S3 Standard-IA + for frequent accessed data (retention cost applies)

4. S3 One Zone IA : same as IA but stored in single AZ (cheaper, less durable).

5. S3 Glacier : Archival storage, retrieval in minutes to hours.

6. S3 Glacier Deep Archive : Lowest cost storage for rarely accessed data (retention in hours).

S3 express One Zone: Ultra - fast - low - latency access in a single AZ (for performance critical - apps.).

## S3 Bucket life Cycle

In S3 lifecycle policy allows you to automatically manage object storage cost over time by transitioning objects to cheaper storage classes or expiring (deleting) them after a defined period.

### # Why use Lifecycle Rules

- ⇒ Reduce storage Cost
- ⇒ Automatically archive or delete old / unused data.
- ⇒ Apply data retention policies.

### Steps :-

1. Go to S3.
2. Open a bucket
3. Navigate to management → lifecycle rules → Create rule.
4. Set prefix / tags and action like transaction / expiration from same.

## S3 Snow family

The S3 Snow family is a group of physical devices offered by AWS to help move large amounts of data to the cloud when using the internet isn't practical.

These devices are used when there's too much data to upload over a regular connection or when dealing with remote areas without good internet.

### The Snow family includes

- AWS Snowcone : A small, portable device for a few terabyte of data.
- AWS Snowball : A larger device for moving petabytes of data and can also be used for edge computing.
- AWS Snowmobile : A massive truck sized container used for exabyte-scale data transfer, typically used by big companies moving entire data centers.

These device helps you transfer data quickly, securely, and cost-effectively to AWS, especially when internet speed or reliability is an issue.

## Amazon S3 Storage Gateway

It is a hybrid cloud storage service that connects on-premises environments to cloud storage in Amazon S3.

It helps extend your local storage to the cloud by acting as a bridge.

### Types of storage gateway

Gateway type	Protocol	Backed by	Used for
File Gateway	NFS/SMB	Amazon S3	file backups, achieves, big data apps.
Volume Gateway	iSCSI	EBS Snapshots /S3	Block storage, disaster recovery
Tape Gateway	iSCSI (VTL)	S3 /Glacier	Replace physical tape backup.