

## A Complete Introduction to Amazon S3

1 Comment



*Data availability, scalability, security, and performance enhancements are provided by Amazon Simple Storage Service (S3), an object-oriented storage service. Performance can also be enhanced with it. Individual objects in S3 are also limited to five terabytes. Business, organizational, and compliance needs can be met by utilizing cost-effective storage classes and easy-to-use management features. Amazon S3, sometimes called a bucket, is the subject of this article.*

### What Is Amazon S3?

Amazon Simple Storage Service (S3) is an object storage service by Amazon that provides industry-leading performance, data availability, security, and scalability. A variety of use cases can be supported by S3, including data lakes, websites, mobile applications, backups, archives, enterprise applications, IoT devices, and big data analytics, for customers of all sizes and industries. With S3, you can optimize, organize, and configure data access to meet the specific needs of your business, organization, and compliance requirements.

## How Amazon S3 Works

Data is stored in buckets as objects in the S3 service. An object consists of a file and its metadata. A bucket contains objects. The first step is to create an Amazon S3 bucket and specify a bucket name and AWS Region. Then, you upload your data into the bucket as objects in S3. Each object has a key (or key name), which identifies it within the bucket.

By S3, you can configure features to meet your specific needs. You can, for instance, use S3 Versioning to maintain multiple versions of an object in the same bucket, which facilitates restoring accidentally deleted objects. Objects stored in buckets are private and can only be accessed if you have explicitly granted access permissions. Policies, S3 Access Points, and AWS Identity & Access Management policies can be used to manage access.

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## Features of Amazon S3

### 1. Storage Classes

Various storage classes are available on S3 for different use cases. As an example, mission-critical production data can be stored in S3 Standard for frequent access, infrequently accessed data can be stored in S3 Standard-IA or S3 One Zone-IA, and archived data at the lowest cost by using S3 Glacier Instant Retrieval, S3 Glacier Flexible Retrieval, or S3 Glacier Deep Archive.

Using S3 Intelligent Tiering, you can store data that has changing or unknown access patterns, which optimizes storage costs by automatically moving your data between four access tiers as your access patterns change. There are four levels of access: two for low-latency access, designed for frequent and infrequent access, and two for opt-in archive access, designed for asynchronous access to rare data.

### 2. Storage Management

In addition to managing costs, meeting regulatory requirements, reducing latency, and storing multiple distinct copies of your data for compliance, S3 has storage management features.

#### S3 Lifecycle

Organize your objects using a lifecycle policy and store them cost-effectively throughout their lifecycle. You can transition objects to other S3 storage classes or expire them when they are no longer needed.

#### S3 Object Lock

For a fixed period of time or indefinitely, prevent Amazon S3 objects from being deleted or overwritten. Use Object Lock to comply with regulatory requirements for write-once-read-many (WORM) storage or simply add another layer of protection against object changes.

### **S3 Replication**

In order to reduce latency, compliance, security, and other issues, replicate objects and their metadata and tags to different buckets in the same or different AWS regions.

### **S3 Batch Operations**

A single S3 API request or a few clicks in Amazon S3 console can handle billions of objects. Batch Operations enable you to perform operations like Copy, Invoke the AWS Lambda function, and Restore.

## **3. Access Management**

It is possible to audit and manage access to your buckets and objects in S3. S3 buckets and objects are private by default. If you want to grant granular permissions for your S3 resources based on your specific use case or audit their permissions, you can use the following features.

### **S3 Block Public Access**

S3 buckets and objects can be blocked from public access. Block Public Access settings are enabled by default.

### **AWS Identity and Access Management (IAM)**

AWS IAM users allow you to manage access to S3 resources through your account. For example, you can control a user's access to an S3 bucket owned by your account using IAM.

### **Bucket policies**

Configure resource-based permissions for your S3 buckets and objects using IAM-based policy language.

### **Amazon S3 Access Points**

To manage data access at scale for shared datasets in Amazon S3, configure named network endpoints with dedicated access policies.

### **Access Control Lists (ACLs)**

Authorized users should have read and write permissions to buckets and objects. S3 resource-based policies (bucket policies and access point policies) or IAM policies are generally recommended for access control instead of ACLs. Access control mechanisms like ACLs predate resource-based policies and IAM.

### **S3 Object Ownership**

By disabling ACLs, you can easily manage access to the data you store in Amazon S3. You are the owner of the bucket, so you have full control over every object in your bucket, and you can set policies for access.

### **Access Analyzer for S3**

Maintain your S3 bucket access policies, ensuring that only the intended users have access.

## **4. Data Processing**

Use the following features to transform data and trigger workflows to automate a variety of other processing activities at scale.

### **S3 Object Lambda**

Customize and modify the data returned by S3's GET, HEAD, and LIST requests. Filter rows, dynamically resize images, and redact confidential data.

### **Event Notifications**

Using Amazon Simple Notification Service (Amazon SNS), Amazon Simple Queue Service (Amazon SQS), and AWS Lambda, trigger workflows when your S3 resources are changed.

## **5. Storage Logging and Monitoring**

You can monitor and control how your S3 resources are being used using Amazon S3's logging and monitoring tools.

### Automated Monitoring Tools

1. AWS CloudTrail: Tracks actions taken by AWS services, groups, and users in S3. CloudTrail logs offer detailed API tracking for all operations in S3 buckets and objects.
2. Amazon CloudWatch metrics for Amazon S3: Monitor the health of your S3 resources and receive alerts when estimated charges exceed a threshold.

### Manual Monitoring Tools

1. Server access logging: Detailed information on requests to buckets. Check server access logs for security and access audits, learn about your customers, and understand Amazon S3 billing.
2. AWS Trusted Advisor: Find ways to optimize your AWS infrastructure, improve security and performance, reduce costs, and monitor service quotas by using AWS best practices checks. You can then follow the recommendations to optimize your resources and services.

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## 6. Analytics and Insights

As a result of Amazon S3, you have access to features that enable you to gain visibility into your storage usage, enabling you to better understand, analyze, and optimize your storage at scale.

## Amazon S3 Storage Lens

With S3 Storage Lens, you can analyze and optimize your storage. You can aggregate data from 29+ usage and activity metrics for your entire organization, specific accounts, AWS Regions, buckets, or prefixes.

## Storage Class Analysis

Identify when data should be moved to more cost-effective storage by analyzing storage access patterns.

## S3 Inventory with Inventory Reports

Inventory reports can be used to audit and report on objects and metadata, and they can be configured to act on other S3 features. For example, you can report on replication and encryption status.

## 7. Strong Consistency

You can request PUTs and DELETES of objects in your Amazon S3 bucket across all AWS regions with strong read-after-write consistency. It is also applicable to PUTs that overwrite existing objects, as well as DELETE requests. Additionally, it is strongly consistent for read operations on Amazon S3 Select, S3 Access Control Lists (ACLs), and S3 Object Tags.

## Accessing Amazon S3

Using ACLs, you can grant read/write permissions to users for individual buckets and objects. Each bucket and object has an ACL associated with it as a subresource. ACLs are access control mechanisms that predate IAM. When another AWS account uploads an object to your S3 bucket, the account uploading the object (the object writer) owns it, has access to it, and can grant other users access through ACLs.

If you want to change this default behavior, you can use Object Ownership. This will disable ACLs and you, as the bucket owner, will own all objects in your bucket automatically. In this way, AWS Organizations' service control policies (SCPs) govern access to your data, including IAM policies, S3 bucket policies, virtual private cloud (VPC) endpoint policies, and virtual private cloud (VPC) endpoint policies).

The majority of modern Amazon S3 use cases do not require ACLs, so we recommend you disable them only in unusual circumstances when you need to control the access of each object separately. ACLs can be disabled and policies can be used to control access with Object Ownership. When ACLs are disabled, a bucket can be easily maintained with objects uploaded by different AWS accounts. The bucket owner owns all the objects in the bucket and can manage access to them through policies.

## Conclusion

In summary With Amazon S3 (Simple Storage Service), you can store and retrieve information or data from anywhere in the world in object storage. It provides this storage through a web services interface. In addition to providing 99.99999999 percent durability and 99.99 percent availability of objects, it is intended for developers for web-scale computing. Computer files of up to 5 terabytes can also be stored.

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