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Introduction to Amazon S3

Amazon S3

- Amazon Simple Storage Service (Amazon S3), provides secure, durable, highly-scalable object storage.
- Amazon S3 stores data as objects within resources called "buckets." You can store as many objects as you want within a bucket, and write, read, and delete objects in your bucket. Objects can be up to **5 terabytes in size**.
- Amazon S3 is easy to use, with a **simple web service interface** to store and retrieve any amount of data from anywhere on the web.

S3 Benefits

Durable

- Amazon S3 provides durable infrastructure to store important data and is designed for durability of 99.999999999% of objects.

Low Cost

- Amazon S3 allows you to store large amounts of data at a very low cost.

Available

- Amazon S3 Standard is designed for up to 99.99% availability of objects over a given year and is backed by the Amazon S3 Service Level Agreement, ensuring that you can rely on it when needed.

Secure

- Amazon S3 supports data transfer over SSL and automatic encryption of your data once it is uploaded. You can also configure bucket policies to manage object permissions and control access to your data using AWS Identity and Access Management (IAM).

Scalable

- With Amazon S3, you can store as much data as you want and access it when needed. You can stop guessing your future storage needs and scale up and down as required, dramatically increasing business agility.

Send Event Notifications

- Amazon S3 can send event notifications when objects are uploaded to Amazon S3. Amazon S3 event notifications can be delivered using Amazon SQS or Amazon SNS enabling you to trigger workflows, alerts, or other processing.
- **For example**, you could use Amazon S3 event notifications to trigger media files when they are uploaded, processing of data files when they become available, or synchronization of Amazon S3 objects with other data stores

S3 integrations include Amazon CloudFront, Amazon CloudWatch, Amazon Kinesis, Amazon RDS, Amazon Glacier, Amazon EBS, Amazon DynamoDB, Amazon Redshift, Amazon Route 53, Amazon EMR, Amazon VPC, Amazon KMS, and AWS Lambda

High Performance

Easy to use

- Amazon S3 is easy to use with a web-based management console and mobile app and full REST APIs and SDKs for easy integration with third party technologies.

Use cases

Backup and Archiving

- Amazon S3 offers a highly durable, scalable, and secure solution for backing up and archiving your critical data.

Big Data Analytics

- **Whether ou're stori g phar a euti al or fi a ial data, or ulti edia files su h as photos** and videos, Amazon S3 can be used as your big data object store. Amazon Web Services offers reducing costs, scaling to meet demand, and increasing the speed of innovation.

Static Website Hosting

- You can host your entire **static website** on Amazon S3 for a low-cost, highly available hosting solution that can scale automatically to meet traffic demands.

Disaster Recovery

- We can have failover and failback scenario

Key Features

Storage and Security

- Amazon S3 stores data as objects within resources called "buckets." You can store as many objects as you want within a bucket, and write, read, and delete objects in your bucket. Objects can be up to **5 terabytes in size**.

- You can control access to the bucket (who can create, delete, and retrieve objects in the bucket for example), view access logs for the bucket and its objects, and choose the AWS region where a bucket is stored to optimize for latency, minimize costs, or address regulatory requirements

Cross-Region Replication

- **Cross-region replication (CRR)** provides automated, fast, reliable data replication across AWS regions. Every object uploaded to an S3 bucket is automatically replicated to a destination bucket in a different AWS region that you choose

Event Notifications

- Amazon S3 event notifications can be sent when objects are uploaded to or deleted from Amazon S3

Versioning

- Amazon S3 allows you to enable versioning so you can preserve, retrieve, and restore every version of every object stored in an Amazon S3 bucket.

Lifecycle Management

- Amazon S3 provides a number of capabilities to manage the lifecycle of your data, including automated migration of older data from S3 Standard to S3 Standard - Infrequent Access and Amazon Glacier

Encryption

- Amazon S3 encrypts data in transit via SSL-encrypted endpoints and can also encrypt data at rest with three options for managing encryption keys: directly by S3, through AWS Key Management Service (AWS KMS), or you can provide your own keys

Security and Access Management

- Amazon S3 provides several mechanisms to control and monitor who can access your data as well as how, when, and where they can access it. VPC endpoints allow you to create a secure connection without a gateway or NAT instances

Cost Monitoring and Controls

- Amazon S3 has several features for managing and controlling your costs, including bucket tagging to manage cost allocation and integration with Amazon CloudWatch to receive billing alerts

Flexible Storage Options

- Amazon S3 is designed for **99.999999999%** durability and up to **99.99%** availability of objects over a given year.

- In addition to S3 Standard, there is a lower-cost Standard - Infrequent Access option for infrequently accessed data, and Amazon Glacier for archiving cold data at the lowest possible cost

Time-limited Access to Objects

- Amazon S3 supports query string authentication by devs, which allows you to provide a URL that is valid only for a length of time that you define. This **time limited URL** can be useful for scenarios such as software downloads or other applications where you want to restrict the length of time users have access to an object

Data Lifecycle Management

- Lifecycle management of data refers to how your data is managed and stored from creation and initial
  storage to he it's o lo ger eeded a d deleted

Transferring Large Amounts of Data

- **AWS Import/Export** accelerates moving large amounts of data into and out of AWS. AWS transfers your
  data directly onto and off of storage devices using **A azo 's high-speed internal network** and bypassing the Internet.

- You can use AWS Import/Export for migrating data into the cloud, distributing content to your customers, sending backups to AWS, and disaster recovery.

You can also use **AWS Direct Connect** to transfer large amounts of data to Amazon S3.

Storage classes

Amazon S3 Storage Classes

Amazon S3 offers a range of storage classes designed for different use cases.

These include

- **Amazon S3 Standard for general-purpose storage** of frequently accessed data,
- **Amazon S3 Standard - Infrequent Access for long-lived**, but less frequently accessed data, and
- **Amazon Glacier** for long-term archive.
- Amazon S3 also offers configurable lifecycle policies for managing your data throughout its lifecycle. Once a policy is set, your data will automatically migrate to the most **appropriate storage class without any changes to your application**

General Purpose

Amazon S3 Standard

- Amazon S3 Standard offers high durability, availability, and performance object storage for frequently accessed data.

- Lifecycle management offers **configurable policies** to automatically **migrate** objects to the most appropriate storage class.

- **Key Features:**
- Low latency and high throughput performance
- Designed for durability of 99.999999999% of objects
- Designed for 99.99% availability over a given year
- Backed with the Amazon S3 Service Level Agreement for availability (almost 10,000 years).
- Supports SSL encryption of data in transit and at rest
- Lifecycle management for automatic migration of objects

Infrequent Access

- **Amazon S3 Standard - Infrequent Access**
- Amazon S3 Standard - Infrequent Access (Standard - IA) is an Amazon S3 storage class for data that is accessed less **frequently**, but requires rapid access when needed.
- Standard - IA ideal **for long-term storage, backups, and as a data store for disaster recovery**.
- Key Features:
- Same low latency and high throughput performance of Standard
- Designed for durability of **99.9999%** of objects
- Designed for 99.9% availability over a given year
- Backed with the Amazon S3 Service Level Agreement for availability
- Supports SSL encryption of data in transit and at rest
- Lifecycle management for automatic migration of objects

Archive

- **Amazon Glacier**
- Amazon Glacier is a secure, durable, and extremely low-cost storage service for data archiving.
- Amazon Glacier is optimized for data that is rarely accessed and a **retrieval time of several hours**.
- **Key Features:**
- Designed for durability of 99.999999999% of objects
- Supports SSL encryption of data in transit and at rest
- Vault Lock feature enforces compliance via a lockable policy

- Extremely low cost design is ideal for long-term archive
- Lifecycle management for automatic migration of objects

Announcing Amazon S3 Reduced Redundancy Storage

- **Reduced Redundancy Storage (RRS)** is a new storage option within Amazon S3 that enables customers to reduce their costs by storing non-critical, reproducible data at lower levels of redundancy than Amazon **"3's sta dard storage.**
- It provides a cost-effective, highly available solution for distributing or sharing content that is durably stored elsewhere, or for storing **thumbnails, transcoded media**, or other **processed data** that can be easily reproduced.
- Both the standard and RRS storage options are designed to be highly available, and both are backed by **A azo S3's Service Level Agree e t**

Pricing

- **Amazon S3 Pricing**
- Pay only for what you use. There is no minimum fee. Estimate your monthly bill using the AWS Simple Monthly Calculator. Prices are based on the location of your Amazon S3 bucket
- **AWS Free Usage Tier**
- As part of the AWS Free Usage Tier, you can get started with Amazon S3 for free. Upon sign-up.
- New AWS customers receive 5 GB of Amazon S3 standard storage, 20,000 Get Requests, 2,000 Put Requests, and 15GB of data transfer out each month for one year
- **Data Transfer Pricing**
- The pricing below is based on data transferred "in" to and "out" of Amazon S3

Data size

How much data can I store?

- The total volume of data and number of objects you can store are **unlimited**. Individual Amazon S3 objects can range in size from **1 byte** to **5 terabytes**. The largest object that can be uploaded in a single PUT is 5 gigabytes.
- For objects larger than 100 megabytes, customers should consider using the **Multipart Upload capability**

How can I configure my objects to be deleted after a specific time period?

- You can use the **Object Expiration** feature to remove objects from your buckets after a specified number of days. You can define the expiration rules for a set of objects in your bucket through the Lifecycle Configuration policy that you apply to the bucket

How can I Increase the number of Amazon S3 buckets that I can provision?

- By default, customers can provision up to **100 buckets** per AWS account. However, you can increase your Amazon S3 bucket limit by visiting AWS Service Limits

Pricing

Pricing Example:

- With Amazon S3, you pay only for the storage you actually use. There is no minimum fee and **no setup cost**
- Storage Example:

  Assume you store 100GB (107,374,182,400 bytes) of standard Amazon S3 storage data in your bucket for 15 days in March, and 100TB (109,951,162,777,600 bytes) of standard Amazon S3 storage data for the final 16 days in March.

- At the end of March, you would have the following usage in Byte-Hours: Total Byte-Hour usage

  = [107,374,182,400 bytes x 15 days x (24 hours / day)] + [109,951,162,777,600 bytes x 16 days x (24 hours / day)] = 42,259,901,212,262,400 Byte-Hours.

- **Let's o ert this to GB**-Months:

  42,259,901,212,262,400 Byte-Hours x (1 GB / 1,073,741,824 bytes) x (1 month / 744 hours) = 52,900 GB-Months

- This usage volume crosses three different volume tiers. The monthly storage price is calculated below assuming the data is stored in the US Standard Region:

  1 TB Tier: 1024 GB x $0.0300 = $30.72

  1 TB to 50 TB Tier: 50,176 GB (49×1024) x $0.0295 = $1,480.19
  50 TB to 450 TB Tier: 1,700 GB (remainder) x $0.0290 = $49.30

  Total Storage Fee = $30.72 + $1,480.19 + $49.30 = $1,560.21

Website on S3

- We can host your entire static website on Amazon S3 for an inexpensive, highly available hosting solution that scales automatically to meet traffic demands.
- Amazon S3 is ideal for hosting websites that contain only static content, including html files, images, videos, and **client-side scripts such as JavaScript**.
- We can easily and durably store your content in an Amazon S3 bucket and map your domain name (e.g. **e a ple. o to this u ket. Visitors to our e site a the a ess this o te t t pi g i our e site's URL e.g., http://e a ple. o i their ro ser**
- There is no additional charge for hosting static websites on Amazon S3.
- The same pricing dimensions of storage, requests, and data transfer apply to your website objects