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Cloud Migration with Google Cloud Storage and AWS (S3 Service)

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***Abstract:** In this paper we are going to see clouds migrate using Python and PHP. We use Cloud storage of google cloud to migrate its storage to Amazon Web Services using its S3 service. Along with its S3 service we need Lambda and SQS services provided by Amazon. Using an API created using PHP, we migrate files into Cloud Storage.*
***Keywords:** PHP, Amazon, Lambda, SQS*

I. INTRODUCTION

Cloud Storage allows world-wide storage and retrieval of any amount of knowledge at any time. Cloud storage is used for many purposes such as archival and disaster recovery, serving web content and distribution of large data to users by direct download. Amazon Web Services(AWS) may be a cloud service from Amazon, which provides services within the sort of building blocks, these building blocks are often wanted to create and deploy any type of application in the cloud. These services or building blocks are designed to figure with one another, and end in applications which are sophisticated and highly scalable.

Storage Transfer Service transfers data from a web data source to a knowledge sink. Your data sources are often an Amazon Simple Storage Service (Amazon S3) bucket, an HTTP/HTTPS location, or a Cloud Storage bucket. Your data sink (the destination) is usually a Cloud Storage bucket.

You can use Storage Transfer Service to:

Move or back up data to a Cloud Storage bucket from other storage providers.

Move data from one Cloud Storage bucket to another, so that it is made available to different groups of users or applications.

Periodically move data as a part of a knowledge processing pipeline or analytical workflow.

Storage Transfer Service performs a data transfer with a transfer operation. Transfer operations are scheduled and configured through a transfer job. Storage Transfer Service has options that make data transfers and synchronization between data sources and data sinks easier. For example, you can:

Schedule one-time transfer operations or recurring transfer operations.

Delete existing objects within the destination bucket if they do not have a corresponding object within the source.

Delete source objects after transferring them.

Schedule periodic synchronization from data source to data sink with advanced filters supported file creation dates, file-name filters, and therefore the times of day you favor to import data.

By default, Storage Transfer Service copies a file from the info source if the file doesn't exist within the data sink or if it differs between the version within the source and the sink. The default is also to retain files in the source after the transfer operation.

To use Storage Transfer Service, you must have one of the following roles, depending on the duties you are performing:

For full access — storagetransfer.admin

To submit transfers — storagetransfer.user

To view transfer jobs and operations — storagetransfer.viewer

For more information about roles and permissions, see access control.The project that creates the transfer job does not have to be associated with the buckets that act as the source or sink, but additional permissions are required to set up and use sources and sinks. See Configuring Access to Data Sources and Sinks for information on how to do this.

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II. LITERATURE REVIEW

Khajeh-Hosseini, Ali, David Greenwood, and Ian Sommerville. "Cloud migration: A case study of migrating an enterprise IT system to iaas." [1]The findings of this case study show that cloud computing is often a significantly cheaper alternative to buying and maintaining system infrastructure in-house.

Ismail, Mukhtar, Islam, and Mouratidis [2] have given an approach that calls for some concepts like monitoring, goals, conditions and evidence that support security audit activities. They use a real time cloud migration use case to demonstrate the application of security audit approach.

Jackson, Keith R., et al. "Performance analysis of high performance computing applications on the amazon web services cloud." [3]They have quantitatively examined the performance of a set of benchmarks designed to depict a typical HPC workload run on Amazon EC2. They were also able to see that the communication pattern of the application can have a significant impact on performance.

III. WORKING

There are a number of ways you can work with Storage Transfer Service:

A. Use the Google Cloud Platform Console UI to create and manage transfer jobs. This is often the easiest and quickest way to get started with Storage Transfer Service. For more information, see Creating and Managing Transfers with the Console.
B. Use a Google API Client Library in a language of your choice. See Creating a Storage Transfer Service Client.
C. If you are comfortable with REST APIs, you can work directly with the Storage Transfer Service API. See Creating a Storage Transfer Service Client for information about enabling the API and getting authentication tokens to use in your requests.

S3 bucket on Amazon is a public cloud storage resource, an object storage offering. S3 buckets are similar to store objects, file folders, which consist of data and its descriptive metadata. S3 stands for Simple Storage Service is a storage web service provided by Amazon web service. S3 is replacement of storage boxes in traditional data centers. It's a highly scale-able, cheap, reliable alternative. In S3 data is stored in a bucket. Bucket is the root folder in S3. One can have multiple buckets in a single AWS account. Files which are stored in these buckets are called as objects.One can control access to data by defining permissions at bucket level and object level.

The Buckets resource manifests a bucket in Google Cloud Storage. A single global namespace is shared amongst all the buckets. Buckets containing objects can be accessible by their own methods. Alongwith, acl property, buckets contain bucketAccessControls, which are used in fine-grained manipulation of an already existing bucket's access controls. Always a bucket is owned by the project team owners group.

Available methods for Buckets resources are as follows:

1) Delete: It Deletes an empty bucket permanently.
2) Get: metadata is returned from the specified bucket.
3) *Get I am Policy:* IAM policy for the specified bucket is returned.
4) *Insert:* A new bucket it created .
5) *List:* a list of buckets is retrieved for the given project.
6) *Lock Retention Policy:* Used for setting the retention policy on a bucket.
7) *Patch:* Changes are readable immediately after writing in the bucket, but not the configurations changes, Patch semantics is supported by this method.
8) *SetIam Policy:* IAM policy of the specified bucket is updated.
9) *Test I am Permissions:* set of permissions are tested on the given bucket to see which of them are held by the caller.
10) update: update: Update bucket. Changes to the bucket will be read immediately after typing, but configuration changes may take some time to spread.

This method sets the complete bucket metadata. If you want to change bucket metadata while leaving some parts untouched, use the PATCH method instead

Files you uploaded to Amazon S3 are stored in buckets. A bucket is a container of things. Your AWS user must have write permission to upload files in the S3 bucket. File / folder uploads may fail if your user does not have the required permission to upload files in the bucket.

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You can store unlimited amounts of data in the S3 bucket. There is no charge for using S3 storage. Pay for the amount of data you store in buckets (pay as you go). You can use the simple AWS monthly calculator to find the estimated monthly amount of data storage in S3.
Any file type (music, movie files, texts, photos, archive etc.) can be uploaded to the S3 bucket.
There is no file type limit set for the S3 bucket. Files and folders you upload to Amazon S3 are stored locally. To reduce delays, you should always select the closest region to upload files. Data can be uploaded to the S3 bucket using the drag and drop feature or manually select items to load. Drag and drop feature is only supported in Google Chrome web browsers and Mozilla Firefox.
Amazon Simple Queue Service (SQS) is a fully managed online service that allows you to segment and measure microservices, distributed systems, and applications without interruption.
AWS Lambda allows you to use the code without providing or managing servers. You only pay for the calculation time you use - no fee is charged if your code does not work.
With Lambda, you can run code with any type of app or back-up service - all with zero. Just upload your code and Lambda takes care of everything it needs to work and measures your code with high availability. You can set your code to start automatically from other AWS services or call it directly from any web or mobile application.
The publisher request creates and sends messages to the topic. Subscriber requests create a subscription to the topic to receive messages from it. Communication can be in three ways
i.e. one-to-many (fan-out), many-to-one (fan-in), and many-to-many. Here is a summary of the components in the Cloud Pub / Sub program and how the messages flow between them:

a) The publisher request creates a topic in the Cloud Pub / Sub service and sends messages to the topic. The message contains prepaid uploads and optional descriptions describing the downloaded content.
b) The service ensures that published messages are saved instead of subscriptions. A published message is kept to subscribe until it is received by any subscriber who receives messages from your subscription.
c) Cloud Pub / Sub transmits messages from the title to all of its subscriptions, individually. Each subscriber receives messages via Cloud Pub / Sub that pushes them to the subscriber's selected location, or by subscriber dragging them to the service.
d) Subscribers receive pending messages from their subscriptions and agree individually on the Cloud Pub / Sub service.
e) When a message is received by a subscriber, it is removed from the subscription message line.
f) Publishers can be any app that can make HTTPS applications on googleapis.com: the App Engine application, a web application hosted on Google Compute Engine or another third party network, a installed desktop or mobile device application, or a browser. Drag subscribers and can be any app that can make HTTPS applications on googleapis.com. Push subscribers must be the last point on the Webhook that can accept POST requests via HTTPS

The steps or processes followed by the business during cloud migration vary depending on factors such as the type of migration it wants to perform and the specific resources it wants to move. That is to say, the most common elements of a cloud migration plan include assessing operational and security requirements, selecting a cloud provider, calculating costs and making any necessary organizational changes.
Typical challenges we face during cloud migration include collaboration, data handling and usability, data integrity and security, and business continuity.
Without proper planning, migration can adversely affect workload performance and lead to higher IT costs - thus undermining some of the great benefits of cloud computing.
Depending on the details of the migration, we may choose to move the application to its new capture location without modification - a model sometimes called migration and migration promotion. In some cases, it may be more helpful to make changes to the application code or structure before making the migration. Depending on the transfer of data from its local data center to the public cloud, the business also has many options. This includes public Internet usage, private / dedicated network communication or offline transfers, where an organization uploads its local data to resources and sends the item to a public cloud provider, and then uploads that data to the cloud. The type of data migration the business chooses - online or offline - depends on the amount and type of data it wants to move, and how fast it takes to complete the migration.

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IV. ADVANTAGES

Cloud Migration can be very beneficial in many scenarios:

A. Scalability is one of the official marks of the cloud and a primary factor for its popularity.
B. Cloud services allow databases and documents to collaborate remotely and efficiently, reducing time and labour.
C. Cloud results in efficient and cost effective integration with other systems.
D. For smaller organizations, cloud based solutions are very ideal in terms of disaster recovery.
E. Cloud computing provides greater security, under conditions like data theft, hacking, and unauthorized intrusions.
F. All the cloud service providers promise 99% uptime and there is zero risk failure.
G. Cloud computing makes it easy to automatically update tasks and API.

V. RESULTS

This section presents the results of cloud migration with AWS and Google Cloud. This creates a menu driven application to choose between the services where the input is provided by the user and the user can upload the given file that is either on google cloud or on AWS. Not only upload but also create new files on the cloud and also delete unnecessary files.
It gives the user the flexibility to work on both the clouds simultaneously with the help of cloud migration.
The use of cloud migration can help one to set up a scalable cloud infrastructure for any application on AWS and Google Cloud with specific service implementations and controlled through configuration of the application. This would work as a library portable to Google Cloud as well as AWS.

VI. CONCLUSION AND FUTURE SCOPE

To create a menu driven application that would ask the user to choose between the services where the input would be provided by the user and that where they can upload the given file that is either on google cloud or on AWS.
One can store the data on the cloud by paying a minimal amount. For example , if the storage of photographs on our cell phones has exceeded the limit, we have to pay a certain amount so that we can store the data via cloud migration with AWS and Google cloud, without paying a huge amount one can flexibly store their data on both clouds, upload , store and even delete the unnecessary data.

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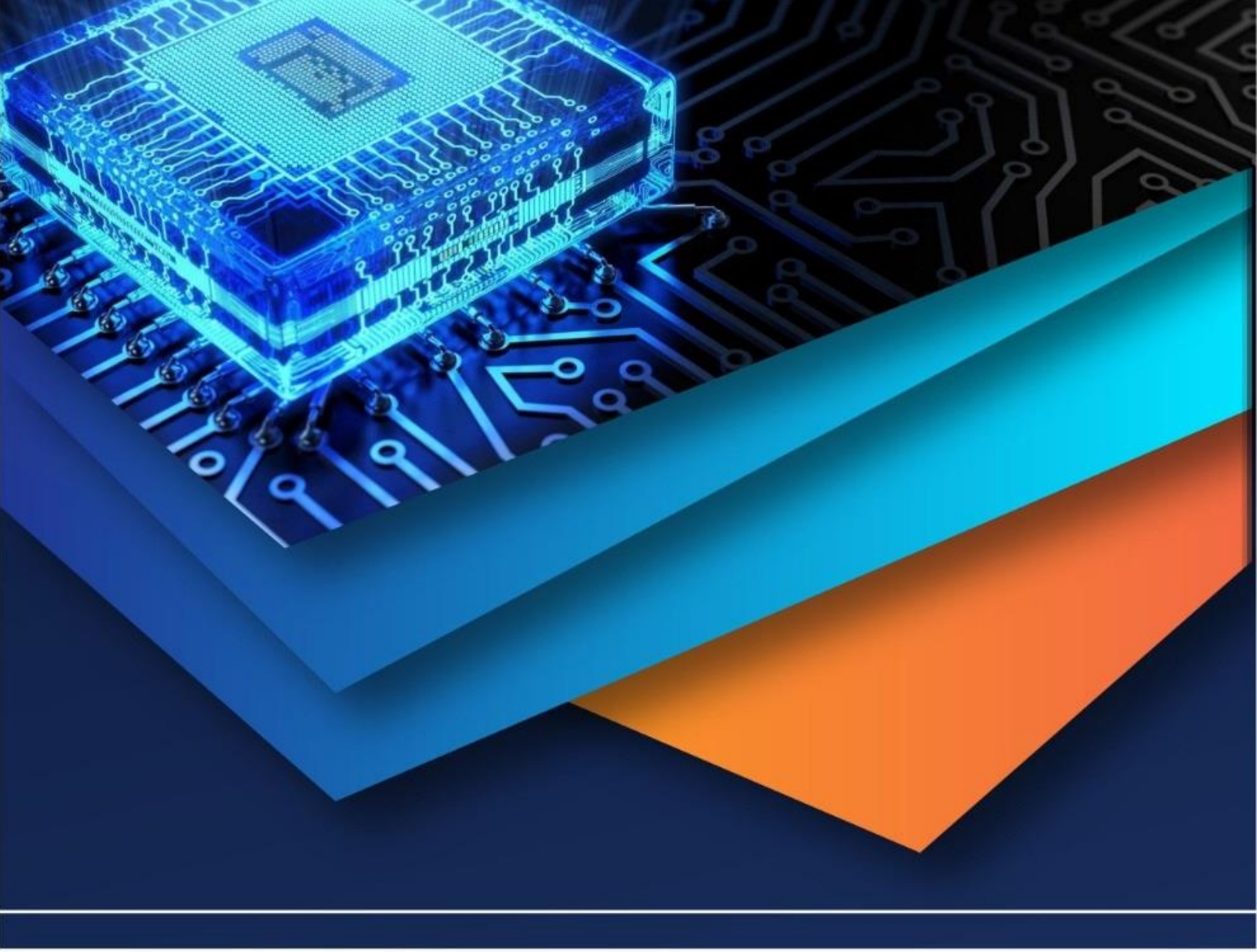

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