

Amazon

Exam Questions AWS-Certified-Data-Engineer-Associate

AWS Certified Data Engineer - Associate (DEA-C01)



NEW QUESTION 1

A company stores datasets in JSON format and .csv format in an Amazon S3 bucket. The company has Amazon RDS for Microsoft SQL Server databases, Amazon DynamoDB tables that are in provisioned capacity mode, and an Amazon Redshift cluster. A data engineering team must develop a solution that will give data scientists the ability to query all data sources by using syntax similar to SQL.

Which solution will meet these requirements with the LEAST operational overhead?

- A. Use AWS Glue to crawl the data source
- B. Store metadata in the AWS Glue Data Catalog
- C. Use Amazon Athena to query the data
- D. Use SQL for structured data source
- E. Use PartiQL for data that is stored in JSON format.
- F. Use AWS Glue to crawl the data source
- G. Store metadata in the AWS Glue Data Catalog
- H. Use Redshift Spectrum to query the data
- I. Use SQL for structured data source
- J. Use PartiQL for data that is stored in JSON format.
- K. Use AWS Glue to crawl the data source
- L. Store metadata in the AWS Glue Data Catalog
- M. Use AWS Glue jobs to transform data that is in JSON format to Apache Parquet or .csv format
- N. Store the transformed data in an S3 bucket
- O. Use Amazon Athena to query the original and transformed data from the S3 bucket.
- P. Use AWS Lake Formation to create a data lake
- Q. Use Lake Formation jobs to transform the data from all data sources to Apache Parquet format
- R. Store the transformed data in an S3 bucket
- S. Use Amazon Athena or Redshift Spectrum to query the data.

Answer: A

Explanation:

The best solution to meet the requirements of giving data scientists the ability to query all data sources by using syntax similar to SQL with the least operational overhead is to use AWS Glue to crawl the data sources, store metadata in the AWS Glue Data Catalog, use Amazon Athena to query the data, use SQL for structured data sources, and use PartiQL for data that is stored in JSON format.

AWS Glue is a serverless data integration service that makes it easy to prepare, clean, enrich, and move data between data stores¹. AWS Glue crawlers are processes that connect to a data store, progress through a prioritized list of classifiers to determine the schema for your data, and then create metadata tables in the Data Catalog². The Data Catalog is a persistent metadata store that contains table definitions, job definitions, and other control information to help you manage your AWS Glue components³. You can use AWS Glue to crawl the data sources, such as Amazon S3, Amazon RDS for Microsoft SQL Server, and Amazon DynamoDB, and store the metadata in the Data Catalog.

Amazon Athena is a serverless, interactive query service that makes it easy to analyze data directly in Amazon S3 using standard SQL or Python⁴. Amazon Athena also supports PartiQL, a SQL-compatible query language that lets you query, insert, update, and delete data from semi-structured and nested data, such as JSON. You can use Amazon Athena to query the data from the Data Catalog using SQL for structured data sources, such as .csv files and relational databases, and PartiQL for data that is stored in JSON format. You can also use Athena to query data from other data sources, such as Amazon Redshift, using federated queries.

Using AWS Glue and Amazon Athena to query all data sources by using syntax similar to SQL is the least operational overhead solution, as you do not need to provision, manage, or scale any infrastructure, and you pay only for the resources you use. AWS Glue charges you based on the compute time and the data processed by your crawlers and ETL jobs¹. Amazon Athena charges you based on the amount of data scanned by your queries. You can also reduce the cost and improve the performance of your queries by using compression, partitioning, and columnar formats for your data in Amazon S3.

Option B is not the best solution, as using AWS Glue to crawl the data sources, store metadata in the AWS Glue Data Catalog, and use Redshift Spectrum to query the data, would incur more costs and complexity than using Amazon Athena. Redshift Spectrum is a feature of Amazon Redshift, a fully managed data warehouse service, that allows you to query and join data across your data warehouse and your data lake using standard SQL. While Redshift Spectrum is powerful and useful for many data warehousing scenarios, it is not necessary or cost-effective for querying all data sources by using syntax similar to SQL. Redshift Spectrum charges you based on the amount of data scanned by your queries, which is similar to Amazon Athena, but it also requires you to have an Amazon Redshift cluster, which charges you based on the node type, the number of nodes, and the duration of the cluster⁵. These costs can add up quickly, especially if you have large volumes of data and complex queries. Moreover, using Redshift Spectrum would introduce additional latency and complexity, as you would have to provision and manage the cluster, and create an external schema and database for the data in the Data Catalog, instead of querying it directly from Amazon Athena.

Option C is not the best solution, as using AWS Glue to crawl the data sources, store metadata in the AWS Glue Data Catalog, use AWS Glue jobs to transform data that is in JSON format to Apache Parquet or .csv format, store the transformed data in an S3 bucket, and use Amazon Athena to query the original and transformed data from the S3 bucket, would incur more costs and complexity than using Amazon Athena with PartiQL. AWS Glue jobs are ETL scripts that you can write in Python or Scala to transform your data and load it to your target data store. Apache Parquet is a columnar storage format that can improve the performance of analytical queries by reducing the amount of data that needs to be scanned and providing efficient compression and encoding schemes⁶. While using AWS Glue jobs and Parquet can improve the performance and reduce the cost of your queries, they would also increase the complexity and the operational overhead of the data pipeline, as you would have to write, run, and monitor the ETL jobs, and store the transformed data in a separate location in Amazon S3. Moreover, using AWS Glue jobs and Parquet would introduce additional latency, as you would have to wait for the ETL jobs to finish before querying the transformed data.

Option D is not the best solution, as using AWS Lake Formation to create a data lake, use Lake Formation jobs to transform the data from all data sources to Apache Parquet format, store the transformed data in an S3 bucket, and use Amazon Athena or Redshift Spectrum to query the data, would incur more costs and complexity than using Amazon Athena with PartiQL. AWS Lake Formation is a service that helps you centrally govern, secure, and globally share data for analytics and machine learning⁷. Lake Formation jobs are ETL jobs that you can create and run using the Lake Formation console or API. While using Lake Formation and Parquet can improve the performance and reduce the cost of your queries, they would also increase the complexity and the operational overhead of the data pipeline, as you would have to create, run, and monitor the Lake Formation jobs, and store the transformed data in a separate location in Amazon S3. Moreover, using Lake Formation and Parquet would introduce additional latency, as you would have to wait for the Lake Formation jobs to finish before querying the transformed data. Furthermore, using Redshift Spectrum to query the data would also incur the same costs and complexity as mentioned in option B. References:

? What is Amazon Athena?

? Data Catalog and crawlers in AWS Glue

? AWS Glue Data Catalog

? Columnar Storage Formats

? AWS Certified Data Engineer - Associate DEA-C01 Complete Study Guide

? AWS Glue Schema Registry

? What is AWS Glue?

? Amazon Redshift Serverless

? Amazon Redshift provisioned clusters

? [Querying external data using Amazon Redshift Spectrum]
? [Using stored procedures in Amazon Redshift]
? [What is AWS Lambda?]
? [ParitQL for Amazon Athena]
? [Federated queries in Amazon Athena]
? [Amazon Athena pricing]
? [Top 10 performance tuning tips for Amazon Athena]
? [AWS Glue ETL jobs]
? [AWS Lake Formation jobs]

NEW QUESTION 2

A company maintains an Amazon Redshift provisioned cluster that the company uses for extract, transform, and load (ETL) operations to support critical analysis tasks. A sales team within the company maintains a Redshift cluster that the sales team uses for business intelligence (BI) tasks.

The sales team recently requested access to the data that is in the ETL Redshift cluster so the team can perform weekly summary analysis tasks. The sales team needs to join data from the ETL cluster with data that is in the sales team's BI cluster.

The company needs a solution that will share the ETL cluster data with the sales team without interrupting the critical analysis tasks. The solution must minimize usage of the computing resources of the ETL cluster.

Which solution will meet these requirements?

- A. Set up the sales team BI cluster as a consumer of the ETL cluster by using Redshift data sharing.
- B. Create materialized views based on the sales team's requirement
- C. Grant the sales team direct access to the ETL cluster.
- D. Create database views based on the sales team's requirement
- E. Grant the sales team direct access to the ETL cluster.
- F. Unload a copy of the data from the ETL cluster to an Amazon S3 bucket every week
- G. Create an Amazon Redshift Spectrum table based on the content of the ETL cluster.

Answer: A

Explanation:

Redshift data sharing is a feature that enables you to share live data across different Redshift clusters without the need to copy or move data. Data sharing provides secure and governed access to data, while preserving the performance and concurrency benefits of Redshift. By setting up the sales team BI cluster as a consumer of the ETL cluster, the company can share the ETL cluster data with the sales team without interrupting the critical analysis tasks. The solution also minimizes the usage of the computing resources of the ETL cluster, as the data sharing does not consume any storage space or compute resources from the producer cluster. The other options are either not feasible or not efficient. Creating materialized views or database views would require the sales team to have direct access to the ETL cluster, which could interfere with the critical analysis tasks. Unloading a copy of the data from the ETL cluster to an Amazon S3 bucket every week would introduce additional latency and cost, as well as create data inconsistency issues. References:

? Sharing data across Amazon Redshift clusters

? AWS Certified Data Engineer - Associate DEA-C01 Complete Study Guide, Chapter 2: Data Store Management, Section 2.2: Amazon Redshift

NEW QUESTION 3

A company's data engineer needs to optimize the performance of table SQL queries. The company stores data in an Amazon Redshift cluster. The data engineer cannot increase the size of the cluster because of budget constraints.

The company stores the data in multiple tables and loads the data by using the EVEN distribution style. Some tables are hundreds of gigabytes in size. Other tables are less than 10 MB in size.

Which solution will meet these requirements?

- A. Keep using the EVEN distribution style for all tables
- B. Specify primary and foreign keys for all tables.
- C. Use the ALL distribution style for large tables
- D. Specify primary and foreign keys for all tables.
- E. Use the ALL distribution style for rarely updated small tables
- F. Specify primary and foreign keys for all tables.
- G. Specify a combination of distribution, sort, and partition keys for all tables.

Answer: C

Explanation:

This solution meets the requirements of optimizing the performance of table SQL queries without increasing the size of the cluster. By using the ALL distribution style for rarely updated small tables, you can ensure that the entire table is copied to every node in the cluster, which eliminates the need for data redistribution during joins. This can improve query performance significantly, especially for frequently joined dimension tables. However, using the ALL distribution style also increases the storage space and the load time, so it is only suitable for small tables that are not updated frequently or extensively. By specifying primary and foreign keys for all tables, you can help the query optimizer to generate better query plans and avoid unnecessary scans or joins. You can also use the AUTO distribution style to let Amazon Redshift choose the optimal distribution style based on the table size and the query patterns. References:

? Choose the best distribution style

? Distribution styles

? Working with data distribution styles

NEW QUESTION 4

A company is planning to upgrade its Amazon Elastic Block Store (Amazon EBS) General Purpose SSD storage from gp2 to gp3. The company wants to prevent any interruptions in its Amazon EC2 instances that will cause data loss during the migration to the upgraded storage.

Which solution will meet these requirements with the LEAST operational overhead?

- A. Create snapshots of the gp2 volume
- B. Create new gp3 volumes from the snapshot
- C. Attach the new gp3 volumes to the EC2 instances.
- D. Create new gp3 volume
- E. Gradually transfer the data to the new gp3 volume
- F. When the transfer is complete, mount the new gp3 volumes to the EC2 instances to replace the gp2 volumes.
- G. Change the volume type of the existing gp2 volumes to gp3. Enter new values for volume size, IOPS, and throughput.

- H. Use AWS DataSync to create new gp3 volume
- I. Transfer the data from the original gp2 volumes to the new gp3 volumes.

Answer: C

Explanation:

Changing the volume type of the existing gp2 volumes to gp3 is the easiest and fastest way to migrate to the new storage type without any downtime or data loss. You can use the AWS Management Console, the AWS CLI, or the Amazon EC2 API to modify the volume type, size, IOPS, and throughput of your gp2 volumes. The modification takes effect immediately, and you can monitor the progress of the modification using CloudWatch. The other options are either more complex or require additional steps, such as creating snapshots, transferring data, or attaching new volumes, which can increase the operational overhead and the risk of errors. References:

? Migrating Amazon EBS volumes from gp2 to gp3 and save up to 20% on costs (Section: How to migrate from gp2 to gp3)

? Switching from gp2 Volumes to gp3 Volumes to Lower AWS EBS Costs (Section: How to Switch from GP2 Volumes to GP3 Volumes)

? Modifying the volume type, IOPS, or size of an EBS volume - Amazon Elastic Compute Cloud (Section: Modifying the volume type)

NEW QUESTION 5

A company uses Amazon RDS for MySQL as the database for a critical application. The database workload is mostly writes, with a small number of reads.

A data engineer notices that the CPU utilization of the DB instance is very high. The high CPU utilization is slowing down the application. The data engineer must reduce the CPU utilization of the DB Instance.

Which actions should the data engineer take to meet this requirement? (Choose two.)

- A. Use the Performance Insights feature of Amazon RDS to identify queries that have high CPU utilization
- B. Optimize the problematic queries.
- C. Modify the database schema to include additional tables and indexes.
- D. Reboot the RDS DB instance once each week.
- E. Upgrade to a larger instance size.
- F. Implement caching to reduce the database query load.

Answer: AE

Explanation:

Amazon RDS is a fully managed service that provides relational databases in the cloud. Amazon RDS for MySQL is one of the supported database engines that you can use to run your applications. Amazon RDS provides various features and tools to monitor and optimize the performance of your DB instances, such as Performance Insights, Enhanced Monitoring, CloudWatch metrics and alarms, etc.

Using the Performance Insights feature of Amazon RDS to identify queries that have high CPU utilization and optimizing the problematic queries will help reduce the CPU utilization of the DB instance. Performance Insights is a feature that allows you to analyze the load on your DB instance and determine what is causing performance issues. Performance Insights collects, analyzes, and displays database performance data using an interactive dashboard. You can use Performance Insights to identify the top SQL statements, hosts, users, or processes that are consuming the most CPU resources. You can also drill down into the details of each query and see the execution plan, wait events, locks, etc. By using Performance Insights, you can pinpoint the root cause of the high CPU utilization and optimize the queries accordingly. For example, you can rewrite the queries to make them more efficient, add or remove indexes, use prepared statements, etc. Implementing caching to reduce the database query load will also help reduce the CPU utilization of the DB instance. Caching is a technique that allows you to store frequently accessed data in a fast and scalable storage layer, such as Amazon ElastiCache. By using caching, you can reduce the number of requests that hit your database, which in turn reduces the CPU load on your DB instance. Caching also improves the performance and availability of your application, as it reduces the latency and increases the throughput of your data access. You can use caching for various scenarios, such as storing session data, user preferences, application configuration, etc. You can also use caching for read-heavy workloads, such as displaying product details, recommendations, reviews, etc.

The other options are not as effective as using Performance Insights and caching. Modifying the database schema to include additional tables and indexes may or may not improve the CPU utilization, depending on the nature of the workload and the queries. Adding more tables and indexes may increase the complexity and overhead of the database, which may negatively affect the performance. Rebooting the RDS DB instance once each week will not reduce the CPU utilization, as it will not address the underlying cause of the high CPU load. Rebooting may also cause downtime and disruption to your application. Upgrading to a larger instance size may reduce the CPU utilization, but it will also increase the cost and complexity of your solution. Upgrading may also not be necessary if you can optimize the queries and reduce the database load by using caching. References:

? Amazon RDS

? Performance Insights

? Amazon ElastiCache

? [AWS Certified Data Engineer - Associate DEA-C01 Complete Study Guide], Chapter 3: Data Storage and Management, Section 3.1: Amazon RDS

NEW QUESTION 6

A data engineer must orchestrate a series of Amazon Athena queries that will run every day. Each query can run for more than 15 minutes.

Which combination of steps will meet these requirements MOST cost-effectively? (Choose two.)

- A. Use an AWS Lambda function and the Athena Boto3 client start_query_execution API call to invoke the Athena queries programmatically.
- B. Create an AWS Step Functions workflow and add two state
- C. Add the first state before the Lambda function
- D. Configure the second state as a Wait state to periodically check whether the Athena query has finished using the Athena Boto3 get_query_execution API call
- E. Configure the workflow to invoke the next query when the current query has finished running.
- F. Use an AWS Glue Python shell job and the Athena Boto3 client start_query_execution API call to invoke the Athena queries programmatically.
- G. Use an AWS Glue Python shell script to run a sleep timer that checks every 5 minutes to determine whether the current Athena query has finished running successfully
- H. Configure the Python shell script to invoke the next query when the current query has finished running.
- I. Use Amazon Managed Workflows for Apache Airflow (Amazon MWAA) to orchestrate the Athena queries in AWS Batch.

Answer: AB

Explanation:

Option A and B are the correct answers because they meet the requirements most cost-effectively. Using an AWS Lambda function and the Athena Boto3 client start_query_execution API call to invoke the Athena queries programmatically is a simple and scalable way to orchestrate the queries. Creating an AWS Step Functions workflow and adding two states to check the query status and invoke the next query is a reliable and efficient way to handle the long-running queries. Option C is incorrect because using an AWS Glue Python shell job to invoke the Athena queries programmatically is more expensive than using a Lambda function, as it requires provisioning and running a Glue job for each query.

Option D is incorrect because using an AWS Glue Python shell script to run a sleep timer that checks every 5 minutes to determine whether the current Athena

query has finished running successfully is not a cost-effective or reliable way to orchestrate the queries, as it wastes resources and time.

Option E is incorrect because using Amazon Managed Workflows for Apache Airflow (Amazon MWAA) to orchestrate the Athena queries in AWS Batch is an overkill solution that introduces unnecessary complexity and cost, as it requires setting up and managing an Airflow environment and an AWS Batch compute environment.

References:

- ? AWS Certified Data Engineer - Associate DEA-C01 Complete Study Guide, Chapter 5: Data Orchestration, Section 5.2: AWS Lambda, Section 5.3: AWS Step Functions, Pages 125-135
- ? Building Batch Data Analytics Solutions on AWS, Module 5: Data Orchestration, Lesson 5.1: AWS Lambda, Lesson 5.2: AWS Step Functions, Pages 1-15
- ? AWS Documentation Overview, AWS Lambda Developer Guide, Working with AWS Lambda Functions, Configuring Function Triggers, Using AWS Lambda with Amazon Athena, Pages 1-4
- ? AWS Documentation Overview, AWS Step Functions Developer Guide, Getting Started, Tutorial: Create a Hello World Workflow, Pages 1-8

NEW QUESTION 7

A financial company wants to implement a data mesh. The data mesh must support centralized data governance, data analysis, and data access control. The company has decided to use AWS Glue for data catalogs and extract, transform, and load (ETL) operations. Which combination of AWS services will implement a data mesh? (Choose two.)

- A. Use Amazon Aurora for data storag
- B. Use an Amazon Redshift provisioned cluster for data analysis.
- C. Use Amazon S3 for data storag
- D. Use Amazon Athena for data analysis.
- E. Use AWS Glue DataBrewfor centralized data governance and access control.
- F. Use Amazon RDS for data storag
- G. Use Amazon EMR for data analysis.
- H. Use AWS Lake Formation for centralized data governance and access control.

Answer: BE

Explanation:

A data mesh is an architectural framework that organizes data into domains and treats data as products that are owned and offered for consumption by different teams¹. A data mesh requires a centralized layer for data governance and access control, as well as a distributed layer for data storage and analysis. AWS Glue can provide data catalogs and ETL operations for the data mesh, but it cannot provide data governance and access control by itself². Therefore, the company needs to use another AWS service for this purpose. AWS Lake Formation is a service that allows you to create, secure, and manage data lakes on AWS³. It integrates with AWS Glue and other AWS services to provide centralized data governance and access control for the data mesh. Therefore, option E is correct. For data storage and analysis, the company can choose from different AWS services depending on their needs and preferences. However, one of the benefits of a data mesh is that it enables data to be stored and processed in a decoupled and scalable way¹. Therefore, using serverless or managed services that can handle large volumes and varieties of data is preferable. Amazon S3 is a highly scalable, durable, and secure object storage service that can store any type of data. Amazon Athena is a serverless interactive query service that can analyze data in Amazon S3 using standard SQL. Therefore, option B is a good choice for data storage and analysis in a data mesh. Option A, C, and D are not optimal because they either use relational databases that are not suitable for storing diverse and unstructured data, or they require more management and provisioning than serverless services. References:

- ? 1: What is a Data Mesh? - Data Mesh Architecture Explained - AWS
- ? 2: AWS Glue - Developer Guide
- ? 3: AWS Lake Formation - Features
- ? [4]: Design a data mesh architecture using AWS Lake Formation and AWS Glue
- ? [5]: Amazon S3 - Features
- ? [6]: Amazon Athena - Features

NEW QUESTION 8

A data engineer needs to build an extract, transform, and load (ETL) job. The ETL job will process daily incoming .csv files that users upload to an Amazon S3 bucket. The size of each S3 object is less than 100 MB. Which solution will meet these requirements MOST cost-effectively?

- A. Write a custom Python applicatio
- B. Host the application on an Amazon Elastic Kubernetes Service (Amazon EKS) cluster.
- C. Write a PySpark ETL scrip
- D. Host the script on an Amazon EMR cluster.
- E. Write an AWS Glue PySpark jo
- F. Use Apache Spark to transform the data.
- G. Write an AWS Glue Python shell jo
- H. Use pandas to transform the data.

Answer: D

Explanation:

AWS Glue is a fully managed serverless ETL service that can handle various data sources and formats, including .csv files in Amazon S3. AWS Glue provides two types of jobs: PySpark and Python shell. PySpark jobs use Apache Spark to process large-scale data in parallel, while Python shell jobs use Python scripts to process small-scale data in a single execution environment. For this requirement, a Python shell job is more suitable and cost-effective, as the size of each S3 object is less than 100 MB, which does not require distributed processing. A Python shell job can use pandas, a popular Python library for data analysis, to transform the .csv data as needed. The other solutions are not optimal or relevant for this requirement. Writing a custom Python application and hosting it on an Amazon EKS cluster would require more effort and resources to set up and manage the Kubernetes environment, as well as to handle the data ingestion and transformation logic. Writing a PySpark ETL script and hosting it on an Amazon EMR cluster would also incur more costs and complexity to provision and configure the EMR cluster, as well as to use Apache Spark for processing small data files. Writing an AWS Glue PySpark job would also be less efficient and economical than a Python shell job, as it would involve unnecessary overhead and charges for using Apache Spark for small data files. References:

- ? AWS Glue
- ? Working with Python Shell Jobs
- ? pandas
- ? [AWS Certified Data Engineer - Associate DEA-C01 Complete Study Guide]

NEW QUESTION 9

A company is planning to migrate on-premises Apache Hadoop clusters to Amazon EMR. The company also needs to migrate a data catalog into a persistent

storage solution.

The company currently stores the data catalog in an on-premises Apache Hive metastore on the Hadoop clusters. The company requires a serverless solution to migrate the data catalog.

Which solution will meet these requirements MOST cost-effectively?

- A. Use AWS Database Migration Service (AWS DMS) to migrate the Hive metastore into Amazon S3. Configure AWS Glue Data Catalog to scan Amazon S3 to produce the data catalog.
- B. Configure a Hive metastore in Amazon EM
- C. Migrate the existing on-premises Hive metastore into Amazon EM
- D. Use AWS Glue Data Catalog to store the company's data catalog as an external data catalog.
- E. Configure an external Hive metastore in Amazon EM
- F. Migrate the existing on-premises Hive metastore into Amazon EM
- G. Use Amazon Aurora MySQL to store the company's data catalog.
- H. Configure a new Hive metastore in Amazon EM
- I. Migrate the existing on-premises Hive metastore into Amazon EM
- J. Use the new metastore as the company's data catalog.

Answer: A

Explanation:

AWS Database Migration Service (AWS DMS) is a service that helps you migrate databases to AWS quickly and securely. You can use AWS DMS to migrate the Hive metastore from the on-premises Hadoop clusters into Amazon S3, which is a highlyscalable, durable, and cost-effective object storage service. AWS Glue Data Catalog is a serverless, managed service that acts as a central metadata repository for your data assets. You can use AWS Glue Data Catalog to scan the Amazon S3 bucket that contains the migrated Hive metastore and create a data catalog that is compatible with Apache Hive and other AWS services. This solution meets the requirements of migrating the data catalog into a persistent storage solution and using a serverless solution. This solution is also the most cost-effective, as it does not incur any additional charges for running Amazon EMR or Amazon Aurora MySQL clusters. The other options are either not feasible or not optimal. Configuring a Hive metastore in Amazon EMR (option B) or an external Hive metastore in Amazon EMR (option C) would require running and maintaining Amazon EMR clusters, which would incur additional costs and complexity. Using Amazon Aurora MySQL to store the company's data catalog (option C) would also incur additional costs and complexity, as well as introduce compatibility issues with Apache Hive. Configuring a new Hive metastore in Amazon EMR (option D) would not migrate the existing data catalog, but create a new one, which would result in data loss and inconsistency. References:

? Using AWS Database Migration Service

? Populating the AWS Glue Data Catalog

? AWS Certified Data Engineer - Associate DEA-C01 Complete Study Guide, Chapter 4: Data Analysis and Visualization, Section 4.2: AWS Glue Data Catalog

NEW QUESTION 10

A company stores data from an application in an Amazon DynamoDB table that operates in provisioned capacity mode. The workloads of the application have predictable throughput load on a regular schedule. Every Monday, there is an immediate increase in activity early in the morning. The application has very low usage during weekends.

The company must ensure that the application performs consistently during peak usage times

Which solution will meet these requirements in the MOST cost-effective way?

- A. Increase the provisioned capacity to the maximum capacity that is currently present during peak load times.
- B. Divide the table into two table
- C. Provision each table with half of the provisioned capacity of the original tabl
- D. Spread queries evenly across both tables.
- E. Use AWS Application Auto Scaling to schedule higher provisioned capacity for peak usage time
- F. Schedule lower capacity during off-peak times.
- G. Change the capacity mode from provisioned to on-deman
- H. Configure the table to scale up and scale down based on the load on the table.

Answer: C

Explanation:

Amazon DynamoDB is a fully managed NoSQL database service that provides fast and predictable performance with seamless scalability. DynamoDB offers two capacity modes for throughput capacity: provisioned and on-demand. In provisioned capacity mode, you specify the number of read and write capacity units per second that you expect your application to require. DynamoDB reserves the resources to meet your throughput needs with consistent performance. In on-demand capacity mode, you pay per request and DynamoDB scales the resources up and down automatically based on the actual workload. On-demand capacity mode is suitable for unpredictable workloads that can vary significantly over time¹.

The solution that meets the requirements in the most cost-effective way is to use AWS Application Auto Scaling to schedule higher provisioned capacity for peak usage times and lower capacity during off-peak times. This solution has the following advantages:

? It allows you to optimize the cost and performance of your DynamoDB table by adjusting the provisioned capacity according to your predictable workload patterns. You can use scheduled scaling to specify the date and time for the scaling actions, and the new minimum and maximum capacity limits. For example, you can schedule higher capacity for every Monday morning and lower capacity for weekends².

? It enables you to take advantage of the lower cost per unit of provisioned capacity mode compared to on-demand capacity mode. Provisioned capacity mode charges a flat hourly rate for the capacity you reserve, regardless of how much you use. On-demand capacity mode charges for each read and write request you consume, with nomimum capacity required. For predictable workloads, provisioned capacity mode can be more cost-effective than on-demand capacity mode¹.

? It ensures that your application performs consistently during peak usage times by having enough capacity to handle the increased load. You can also use auto scaling to automatically adjust the provisioned capacity based on the actual utilization of your table, and set a target utilization percentage for your table or global secondary index. This way, you can avoid under-provisioning or over- provisioning your table².

Option A is incorrect because it suggests increasing the provisioned capacity to the maximum capacity that is currently present during peak load times. This solution has the following disadvantages:

? It wastes money by paying for unused capacity during off-peak times. If you provision the same high capacity for all times, regardless of the actual workload, you are over-provisioning your table and paying for resources that you don't need¹.

? It does not account for possible changes in the workload patterns over time. If your peak load times increase or decrease in the future, you may need to manually adjust the provisioned capacity to match the new demand. This adds operational overhead and complexity to your application².

Option B is incorrect because it suggests dividing the table into two tables and provisioning each table with half of the provisioned capacity of the original table. This solution has the following disadvantages:

? It complicates the data model and the application logic by splitting the data into two separate tables. You need to ensure that the queries are evenly distributed across both tables, and that the data is consistent and synchronized between them. This adds extra development and maintenance effort to your application³.

? It does not solve the problem of adjusting the provisioned capacity according to the workload patterns. You still need to manually or automatically scale the capacity of each table based on the actual utilization and demand. This may result in under- provisioning or over-provisioning your tables².

Option D is incorrect because it suggests changing the capacity mode from provisioned to on-demand. This solution has the following disadvantages:

? It may incur higher costs than provisioned capacity mode for predictable workloads. On-demand capacity mode charges for each read and write request you consume, with no minimum capacity required. For predictable workloads, provisioned capacity mode can be more cost-effective than on-demand capacity mode, as you can reserve the capacity you need at a lower rate¹.

? It may not provide consistent performance during peak usage times, as on-demand capacity mode may take some time to scale up the resources to meet the sudden increase in demand. On-demand capacity mode uses adaptive capacity to handle bursts of traffic, but it may not be able to handle very large spikes or sustained high throughput. In such cases, you may experience throttling or increased latency.

References:

? 1: Choosing the right DynamoDB capacity mode - Amazon DynamoDB

? 2: Managing throughput capacity automatically with DynamoDB auto scaling - Amazon DynamoDB

? 3: Best practices for designing and using partition keys effectively - Amazon DynamoDB

? [4]: On-demand mode guidelines - Amazon DynamoDB

? [5]: How to optimize Amazon DynamoDB costs - AWS Database Blog

? [6]: DynamoDB adaptive capacity: How it works and how it helps - AWS Database Blog

? [7]: Amazon DynamoDB pricing - Amazon Web Services (AWS)

NEW QUESTION 10

A company extracts approximately 1 TB of data every day from data sources such as SAP HANA, Microsoft SQL Server, MongoDB, Apache Kafka, and Amazon DynamoDB. Some of the data sources have undefined data schemas or data schemas that change.

A data engineer must implement a solution that can detect the schema for these data sources. The solution must extract, transform, and load the data to an Amazon S3 bucket. The company has a service level agreement (SLA) to load the data into the S3 bucket within 15 minutes of data creation.

Which solution will meet these requirements with the LEAST operational overhead?

- A. Use Amazon EMR to detect the schema and to extract, transform, and load the data into the S3 bucket
- B. Create a pipeline in Apache Spark.
- C. Use AWS Glue to detect the schema and to extract, transform, and load the data into the S3 bucket
- D. Create a pipeline in Apache Spark.
- E. Create a PySpark program in AWS Lambda to extract, transform, and load the data into the S3 bucket.
- F. Create a stored procedure in Amazon Redshift to detect the schema and to extract, transform, and load the data into a Redshift Spectrum table
- G. Access the table from Amazon S3.

Answer: B

Explanation:

AWS Glue is a fully managed service that provides a serverless data integration platform. It can automatically discover and categorize data from various sources, including SAP HANA, Microsoft SQL Server, MongoDB, Apache Kafka, and Amazon DynamoDB. It can also infer the schema of the data and store it in the AWS Glue Data Catalog, which is a central metadata repository. AWS Glue can then use the schema information to generate and run Apache Spark code to extract, transform, and load the data into an Amazon S3 bucket. AWS Glue can also monitor and optimize the performance and cost of the data pipeline, and handle any schema changes that may occur in the source data. AWS Glue can meet the SLA of loading the data into the S3 bucket within 15 minutes of data creation, as it can trigger the data pipeline based on events, schedules, or on-demand. AWS Glue has the least operational overhead among the options, as it does not require provisioning, configuring, or managing any servers or clusters. It also handles scaling, patching, and security automatically. References:

? AWS Glue

? [AWS Glue Data Catalog]

? [AWS Glue Developer Guide]

? AWS Certified Data Engineer - Associate DEA-C01 Complete Study Guide

NEW QUESTION 15

A company uses an on-premises Microsoft SQL Server database to store financial transaction data. The company migrates the transaction data from the on-premises database to AWS at the end of each month. The company has noticed that the cost to migrate data from the on-premises database to an Amazon RDS for SQL Server database has increased recently.

The company requires a cost-effective solution to migrate the data to AWS. The solution must cause minimal downtime for the applications that access the database.

Which AWS service should the company use to meet these requirements?

- A. AWS Lambda
- B. AWS Database Migration Service (AWS DMS)
- C. AWS Direct Connect
- D. AWS DataSync

Answer: B

Explanation:

AWS Database Migration Service (AWS DMS) is a cloud service that makes it possible to migrate relational databases, data warehouses, NoSQL databases, and other types of data stores to AWS quickly, securely, and with minimal downtime and zero data loss¹. AWS DMS supports migration between 20-plus database and analytics engines, such as Microsoft SQL Server to Amazon RDS for SQL Server². AWS DMS takes over many of the difficult or tedious tasks involved in a migration project, such as capacity analysis, hardware and software procurement, installation and administration, testing and debugging, and ongoing replication and monitoring¹. AWS DMS is a cost-effective solution, as you only pay for the compute resources and additional log storage used during the migration process². AWS DMS is the best solution for the company to migrate the financial transaction data from the on-premises Microsoft SQL Server database to AWS, as it meets the requirements of minimal downtime, zero data loss, and low cost.

Option A is not the best solution, as AWS Lambda is a serverless compute service that lets you run code without provisioning or managing servers, but it does not provide any built-in features for database migration. You would have to write your own code to extract, transform, and load the data from the source to the target, which would increase the operational overhead and complexity.

Option C is not the best solution, as AWS Direct Connect is a service that establishes a dedicated network connection from your premises to AWS, but it does not provide any built-in features for database migration. You would still need to use another service or tool to perform the actual data transfer, which would increase the cost and complexity.

Option D is not the best solution, as AWS DataSync is a service that makes it easy to transfer data between on-premises storage systems and AWS storage services, such as Amazon S3, Amazon EFS, and Amazon FSx for Windows File Server, but it does not support Amazon RDS for SQL Server as a target. You would have to use another service or tool to migrate the data from Amazon S3 to Amazon RDS for SQL Server, which would increase the latency and complexity.

References:

? Database Migration - AWS Database Migration Service - AWS

? What is AWS Database Migration Service?

? AWS Database Migration Service Documentation
? AWS Certified Data Engineer - Associate DEA-C01 Complete Study Guide

NEW QUESTION 16

A media company wants to improve a system that recommends media content to customer based on user behavior and preferences. To improve the recommendation system, the company needs to incorporate insights from third-party datasets into the company's existing analytics platform. The company wants to minimize the effort and time required to incorporate third-party datasets. Which solution will meet these requirements with the LEAST operational overhead?

- A. Use API calls to access and integrate third-party datasets from AWS Data Exchange.
- B. Use API calls to access and integrate third-party datasets from AWS
- C. Use Amazon Kinesis Data Streams to access and integrate third-party datasets from AWS CodeCommit repositories.
- D. Use Amazon Kinesis Data Streams to access and integrate third-party datasets from Amazon Elastic Container Registry (Amazon ECR).

Answer: A

Explanation:

AWS Data Exchange is a service that makes it easy to find, subscribe to, and use third-party data in the cloud. It provides a secure and reliable way to access and integrate data from various sources, such as data providers, public datasets, or AWS services. Using AWS Data Exchange, you can browse and subscribe to data products that suit your needs, and then use API calls or the AWS Management Console to export the data to Amazon S3, where you can use it with your existing analytics platform. This solution minimizes the effort and time required to incorporate third-party datasets, as you do not need to set up and manage data pipelines, storage, or access controls. You also benefit from the data quality and freshness provided by the data providers, who can update their data products as frequently as needed¹².

The other options are not optimal for the following reasons:

? B. Use API calls to access and integrate third-party datasets from AWS. This option is vague and does not specify which AWS service or feature is used to access and integrate third-party datasets. AWS offers a variety of services and features that can help with data ingestion, processing, and analysis, but not all of them are suitable for the given scenario. For example, AWS Glue is a serverless data integration service that can help you discover, prepare, and combine data from various sources, but it requires you to create and run data extraction, transformation, and loading (ETL) jobs, which can add operational overhead³.

? C. Use Amazon Kinesis Data Streams to access and integrate third-party datasets from AWS CodeCommit repositories. This option is not feasible, as AWS CodeCommit is a source control service that hosts secure Git-based repositories, not a data source that can be accessed by Amazon Kinesis Data Streams. Amazon Kinesis Data Streams is a service that enables you to capture, process, and analyze data streams in real time, such as clickstream data, application logs, or IoT telemetry. It does not support accessing and integrating data from AWS CodeCommit repositories, which are meant for storing and managing code, not data .

? D. Use Amazon Kinesis Data Streams to access and integrate third-party datasets from Amazon Elastic Container Registry (Amazon ECR). This option is also not feasible, as Amazon ECR is a fully managed container registry service that stores, manages, and deploys container images, not a data source that can be accessed by Amazon Kinesis Data Streams. Amazon Kinesis Data Streams does not support accessing and integrating data from Amazon ECR, which is meant for storing and managing container images, not data .

References:

- ? 1: AWS Data Exchange User Guide
- ? 2: AWS Data Exchange FAQs
- ? 3: AWS Glue Developer Guide
- ? : AWS CodeCommit User Guide
- ? : Amazon Kinesis Data Streams Developer Guide
- ? : Amazon Elastic Container Registry User Guide
- ? : Build a Continuous Delivery Pipeline for Your Container Images with Amazon ECR as Source

NEW QUESTION 20

A company is migrating on-premises workloads to AWS. The company wants to reduce overall operational overhead. The company also wants to explore serverless options.

The company's current workloads use Apache Pig, Apache Oozie, Apache Spark, Apache Hbase, and Apache Flink. The on-premises workloads process petabytes of data in seconds. The company must maintain similar or better performance after the migration to AWS.

Which extract, transform, and load (ETL) service will meet these requirements?

- A. AWS Glue
- B. Amazon EMR
- C. AWS Lambda
- D. Amazon Redshift

Answer: A

Explanation:

AWS Glue is a fully managed serverless ETL service that can handle petabytes of data in seconds. AWS Glue can run Apache Spark and Apache Flink jobs without requiring any infrastructure provisioning or management. AWS Glue can also integrate with Apache Pig, Apache Oozie, and Apache Hbase using AWS Glue Data Catalog and AWS Glue workflows. AWS Glue can reduce the overall operational overhead by automating the data discovery, data preparation, and data loading processes. AWS Glue can also optimize the cost and performance of ETL jobs by using AWS Glue Job Bookmarking, AWS Glue Crawlers, and AWS Glue Schema Registry. References:

- ? AWS Glue
- ? AWS Glue Data Catalog
- ? AWS Glue Workflows
- ? [AWS Glue Job Bookmarking]
- ? [AWS Glue Crawlers]
- ? [AWS Glue Schema Registry]
- ? [AWS Certified Data Engineer - Associate DEA-C01 Complete Study Guide]

NEW QUESTION 21

A data engineer must build an extract, transform, and load (ETL) pipeline to process and load data from 10 source systems into 10 tables that are in an Amazon Redshift database. All the source systems generate .csv, JSON, or Apache Parquet files every 15 minutes. The source systems all deliver files into one Amazon S3 bucket. The file sizes range from 10 MB to 20 GB. The ETL pipeline must function correctly despite changes to the data schema.

Which data pipeline solutions will meet these requirements? (Choose two.)

- A. Use an Amazon EventBridge rule to run an AWS Glue job every 15 minute
- B. Configure the AWS Glue job to process and load the data into the Amazon Redshift tables.
- C. Use an Amazon EventBridge rule to invoke an AWS Glue workflow job every 15 minute
- D. Configure the AWS Glue workflow to have an on-demand trigger that runs an AWS Glue crawler and then runs an AWS Glue job when the crawler finishes running successful
- E. Configure the AWS Glue job to process and load the data into the Amazon Redshift tables.
- F. Configure an AWS Lambda function to invoke an AWS Glue crawler when a file is loaded into the S3 bucket
- G. Configure an AWS Glue job to process and load the data into the Amazon Redshift table
- H. Create a second Lambda function to run the AWS Glue job
- I. Create an Amazon EventBridge rule to invoke the second Lambda function when the AWS Glue crawler finishes running successfully.
- J. Configure an AWS Lambda function to invoke an AWS Glue workflow when a file is loaded into the S3 bucket
- K. Configure the AWS Glue workflow to have an on-demand trigger that runs an AWS Glue crawler and then runs an AWS Glue job when the crawler finishes running successful
- L. Configure the AWS Glue job to process and load the data into the Amazon Redshift tables.
- M. Configure an AWS Lambda function to invoke an AWS Glue job when a file is loaded into the S3 bucket
- N. Configure the AWS Glue job to read the files from the S3 bucket into an Apache Spark DataFrame
- O. Configure the AWS Glue job to also put smaller partitions of the DataFrame into an Amazon Kinesis Data Firehose delivery stream
- P. Configure the delivery stream to load data into the Amazon Redshift tables.

Answer: AB

Explanation:

Using an Amazon EventBridge rule to run an AWS Glue job or invoke an AWS Glue workflow job every 15 minutes are two possible solutions that will meet the requirements. AWS Glue is a serverless ETL service that can process and load data from various sources to various targets, including Amazon Redshift. AWS Glue can handle different data formats, such as CSV, JSON, and Parquet, and also support schema evolution, meaning it can adapt to changes in the data schema over time. AWS Glue can also leverage Apache Spark to perform distributed processing and transformation of large datasets. AWS Glue integrates with Amazon EventBridge, which is a serverless event bus service that can trigger actions based on rules and schedules. By using an Amazon EventBridge rule, you can invoke an AWS Glue job or workflow every 15 minutes, and configure the job or workflow to run an AWS Glue crawler and then load the data into the Amazon Redshift tables. This way, you can build a cost-effective and scalable ETL pipeline that can handle data from 10 source systems and function correctly despite changes to the data schema.

The other options are not solutions that will meet the requirements. Option C, configuring an AWS Lambda function to invoke an AWS Glue crawler when a file is loaded into the S3 bucket, and creating a second Lambda function to run the AWS Glue job, is not a feasible solution, as it would require a lot of Lambda invocations and coordination. AWS Lambda has some limits on the execution time, memory, and concurrency, which can affect the performance and reliability of the ETL pipeline. Option D, configuring an AWS Lambda function to invoke an AWS Glue workflow when a file is loaded into the S3 bucket, is not a necessary solution, as you can use an Amazon EventBridge rule to invoke the AWS Glue workflow directly, without the need for a Lambda function. Option E, configuring an AWS Lambda function to invoke an AWS Glue job when a file is loaded into the S3 bucket, and configuring the AWS Glue job to put smaller partitions of the DataFrame into an Amazon Kinesis Data Firehose delivery stream, is not a cost-effective solution, as it would incur additional costs for Lambda invocations and data delivery. Moreover, using Amazon Kinesis Data Firehose to load data into Amazon Redshift is not suitable for frequent and small batches of data, as it can cause performance issues and data fragmentation. References:

- ? AWS Glue
- ? Amazon EventBridge
- ? Using AWS Glue to run ETL jobs against non-native JDBC data sources
- ? [AWS Lambda quotas]
- ? [Amazon Kinesis Data Firehose quotas]

NEW QUESTION 25

An airline company is collecting metrics about flight activities for analytics. The company is conducting a proof of concept (POC) test to show how analytics can provide insights that the company can use to increase on-time departures.

The POC test uses objects in Amazon S3 that contain the metrics in .csv format. The POC test uses Amazon Athena to query the data. The data is partitioned in the S3 bucket by date.

As the amount of data increases, the company wants to optimize the storage solution to improve query performance.

Which combination of solutions will meet these requirements? (Choose two.)

- A. Add a randomized string to the beginning of the keys in Amazon S3 to get more throughput across partitions.
- B. Use an S3 bucket that is in the same account that uses Athena to query the data.
- C. Use an S3 bucket that is in the same AWS Region where the company runs Athena queries.
- D. Preprocess the .csv data to JSON format by fetching only the document keys that the query requires.
- E. Preprocess the .csv data to Apache Parquet format by fetching only the data blocks that are needed for predicates.

Answer: CE

Explanation:

Using an S3 bucket that is in the same AWS Region where the company runs Athena queries can improve query performance by reducing data transfer latency and costs. Preprocessing the .csv data to Apache Parquet format can also improve query performance by enabling columnar storage, compression, and partitioning, which can reduce the amount of data scanned and fetched by the query. These solutions can optimize the storage solution for the POC test without requiring much effort or changes to the existing data pipeline. The other solutions are not optimal or relevant for this requirement. Adding a randomized string to the beginning of the keys in Amazon S3 can improve the throughput across partitions, but it can also make the data harder to query and manage. Using an S3 bucket that is in the same account that uses Athena to query the data does not have any significant impact on query performance, as long as the proper permissions are granted. Preprocessing the .csv data to JSON format does not offer any benefits over the .csv format, as both are row-based and verbose formats that require more data scanning and fetching than columnar formats like Parquet. References:

- ? Best Practices When Using Athena with AWS Glue
- ? Optimizing Amazon S3 Performance
- ? AWS Certified Data Engineer - Associate DEA-C01 Complete Study Guide

NEW QUESTION 28

A company uses an Amazon Redshift cluster that runs on RA3 nodes. The company wants to scale read and write capacity to meet demand. A data engineer needs to identify a solution that will turn on concurrency scaling.

Which solution will meet this requirement?

- A. Turn on concurrency scaling in workload management (WLM) for Redshift Serverless workgroups.
- B. Turn on concurrency scaling at the workload management (WLM) queue level in the Redshift cluster.

- C. Turn on concurrency scaling in the settings during the creation of a new Redshift cluster.
- D. Turn on concurrency scaling for the daily usage quota for the Redshift cluster.

Answer: B

Explanation:

Concurrency scaling is a feature that allows you to support thousands of concurrent users and queries, with consistently fast query performance. When you turn on concurrency scaling, Amazon Redshift automatically adds query processing power in seconds to process queries without any delays. You can manage which queries are sent to the concurrency-scaling cluster by configuring WLM queues. To turn on concurrency scaling for a queue, set the Concurrency Scaling mode value to auto. The other options are either incorrect or irrelevant, as they do not enable concurrency scaling for the existing Redshift cluster on RA3 nodes.

References:

- ? Working with concurrency scaling - Amazon Redshift
- ? Amazon Redshift Concurrency Scaling - Amazon Web Services
- ? Configuring concurrency scaling queues - Amazon Redshift
- ? AWS Certified Data Engineer - Associate DEA-C01 Complete Study Guide (Chapter 6, page 163)

NEW QUESTION 30

A financial company wants to use Amazon Athena to run on-demand SQL queries on a petabyte-scale dataset to support a business intelligence (BI) application. An AWS Glue job that runs during non-business hours updates the dataset once every day. The BI application has a standard data refresh frequency of 1 hour to comply with company policies.

A data engineer wants to cost optimize the company's use of Amazon Athena without adding any additional infrastructure costs.

Which solution will meet these requirements with the LEAST operational overhead?

- A. Configure an Amazon S3 Lifecycle policy to move data to the S3 Glacier Deep Archive storage class after 1 day
- B. Use the query result reuse feature of Amazon Athena for the SQL queries.
- C. Add an Amazon ElastiCache cluster between the BI application and Athena.
- D. Change the format of the files that are in the dataset to Apache Parquet.

Answer: B

Explanation:

The best solution to cost optimize the company's use of Amazon Athena without adding any additional infrastructure costs is to use the query result reuse feature of Amazon Athena for the SQL queries. This feature allows you to run the same query multiple times without incurring additional charges, as long as the underlying data has not changed and the query results are still in the query result location in Amazon S3¹. This feature is useful for scenarios where you have a petabyte-scale dataset that is updated infrequently, such as once a day, and you have a BI application that runs the same queries repeatedly, such as every hour. By using the query result reuse feature, you can reduce the amount of data scanned by your queries and save on the cost of running Athena. You can enable or disable this feature at the workgroup level or at the individual query level¹.

Option A is not the best solution, as configuring an Amazon S3 Lifecycle policy to move data to the S3 Glacier Deep Archive storage class after 1 day would not cost optimize the company's use of Amazon Athena, but rather increase the cost and complexity. Amazon S3 Lifecycle policies are rules that you can define to automatically transition objects between different storage classes based on specified criteria, such as the age of the object². S3 Glacier Deep Archive is the lowest-cost storage class in Amazon S3, designed

for long-term data archiving that is accessed once or twice in a year³. While moving data to S3 Glacier Deep Archive can reduce the storage cost, it would also increase the retrieval cost and latency, as it takes up to 12 hours to restore the data from S3 Glacier Deep Archive³. Moreover, Athena does not support querying data that is in S3 Glacier or S3 Glacier Deep Archive storage classes⁴. Therefore, using this option would not meet the requirements of running on-demand SQL queries on the dataset.

Option C is not the best solution, as adding an Amazon ElastiCache cluster between the BI application and Athena would not cost optimize the company's use of Amazon Athena, but rather increase the cost and complexity. Amazon ElastiCache is a service that offers fully managed in-memory data stores, such as Redis and Memcached, that can improve the performance and scalability of web applications by caching frequently accessed data. While using ElastiCache can reduce the latency and load on the BI application, it would not reduce the amount of data scanned by Athena, which is the main factor that determines the cost of running Athena. Moreover, using ElastiCache would introduce additional infrastructure costs and operational overhead, as you would have to provision, manage, and scale the ElastiCache cluster, and integrate it with the BI application and Athena. Option D is not the best solution, as changing the format of the files that are in the dataset to Apache Parquet would not cost optimize the company's use of Amazon Athena without adding any additional infrastructure costs, but rather increase the complexity. Apache Parquet is a columnar storage format that can improve the performance of analytical queries by reducing the amount of data that needs to be scanned and providing efficient compression and encoding schemes. However, changing the format of the files that are in the dataset to Apache Parquet would require additional processing and transformation steps, such as using AWS Glue or Amazon EMR to convert the files from their original format to Parquet, and storing the converted files in a separate location in Amazon S3. This would increase the complexity and the operational overhead of the data pipeline, and also incur additional costs for using AWS Glue or Amazon EMR. References:

- ? Query result reuse
- ? Amazon S3 Lifecycle
- ? S3 Glacier Deep Archive
- ? Storage classes supported by Athena
- ? [What is Amazon ElastiCache?]
- ? [Amazon Athena pricing]
- ? [Columnar Storage Formats]
- ? AWS Certified Data Engineer - Associate DEA-C01 Complete Study Guide

NEW QUESTION 34

A company has five offices in different AWS Regions. Each office has its own human resources (HR) department that uses a unique IAM role. The company stores employee records in a data lake that is based on Amazon S3 storage.

A data engineering team needs to limit access to the records. Each HR department should be able to access records for only employees who are within the HR department's Region.

Which combination of steps should the data engineering team take to meet this requirement with the LEAST operational overhead? (Choose two.)

- A. Use data filters for each Region to register the S3 paths as data locations.
- B. Register the S3 path as an AWS Lake Formation location.
- C. Modify the IAM roles of the HR departments to add a data filter for each department's Region.
- D. Enable fine-grained access control in AWS Lake Formation.
- E. Add a data filter for each Region.
- F. Create a separate S3 bucket for each Region.
- G. Configure an IAM policy to allow S3 access.
- H. Restrict access based on Region.

Answer: BD

Explanation:

AWS Lake Formation is a service that helps you build, secure, and manage data lakes on Amazon S3. You can use AWS Lake Formation to register the S3 path as a data lake location, and enable fine-grained access control to limit access to the records based on the HR department's Region. You can use data filters to specify which S3 prefixes or partitions each HR department can access, and grant permissions to the IAM roles of the HR departments accordingly. This solution will meet the requirement with the least operational overhead, as it simplifies the data lake management and security, and leverages the existing IAM roles of the HR departments¹².

The other options are not optimal for the following reasons:

? A. Use data filters for each Region to register the S3 paths as data locations. This option is not possible, as data filters are not used to register S3 paths as data locations, but to grant permissions to access specific S3 prefixes or partitions within a data location. Moreover, this option does not specify how to limit access to the records based on the HR department's Region.

? C. Modify the IAM roles of the HR departments to add a data filter for each department's Region. This option is not possible, as data filters are not added to IAM roles, but to permissions granted by AWS Lake Formation. Moreover, this option does not specify how to register the S3 path as a data lake location, or how to enable fine-grained access control in AWS Lake Formation.

? E. Create a separate S3 bucket for each Region. Configure an IAM policy to allow S3 access. Restrict access based on Region. This option is not recommended, as it would require more operational overhead to create and manage multiple S3 buckets, and to configure and maintain IAM policies for each HR department. Moreover, this option does not leverage the benefits of AWS Lake Formation, such as data cataloging, data transformation, and data governance.

References:

? 1: AWS Lake Formation

? 2: AWS Lake Formation Permissions

? : AWS Identity and Access Management

? : Amazon S3

NEW QUESTION 35

A company uses Amazon RDS to store transactional data. The company runs an RDS DB instance in a private subnet. A developer wrote an AWS Lambda function with default settings to insert, update, or delete data in the DB instance.

The developer needs to give the Lambda function the ability to connect to the DB instance privately without using the public internet.

Which combination of steps will meet this requirement with the LEAST operational overhead? (Choose two.)

- A. Turn on the public access setting for the DB instance.
- B. Update the security group of the DB instance to allow only Lambda function invocations on the database port.
- C. Configure the Lambda function to run in the same subnet that the DB instance uses.
- D. Attach the same security group to the Lambda function and the DB instance.
- E. Include a self-referencing rule that allows access through the database port.
- F. Update the network ACL of the private subnet to include a self-referencing rule that allows access through the database port.

Answer: CD

Explanation:

To enable the Lambda function to connect to the RDS DB instance privately without using the public internet, the best combination of steps is to configure the Lambda function to run in the same subnet that the DB instance uses, and attach the same security group to the Lambda function and the DB instance. This way, the Lambda function and the DB instance can communicate within the same private network, and the security group can allow traffic between them on the database port. This solution has the least operational overhead, as it does not require any changes to the public access setting, the network ACL, or the security group of the DB instance.

The other options are not optimal for the following reasons:

? A. Turn on the public access setting for the DB instance. This option is not recommended, as it would expose the DB instance to the public internet, which can compromise the security and privacy of the data. Moreover, this option would not enable the Lambda function to connect to the DB instance privately, as it would still require the Lambda function to use the public internet to access the DB instance.

? B. Update the security group of the DB instance to allow only Lambda function invocations on the database port. This option is not sufficient, as it would only modify the inbound rules of the security group of the DB instance, but not the outbound rules of the security group of the Lambda function. Moreover, this option would not enable the Lambda function to connect to the DB instance privately, as it would still require the Lambda function to use the public internet to access the DB instance.

? E. Update the network ACL of the private subnet to include a self-referencing rule that allows access through the database port. This option is not necessary, as the network ACL of the private subnet already allows all traffic within the subnet by default. Moreover, this option would not enable the Lambda function to connect to the DB instance privately, as it would still require the Lambda function to use the public internet to access the DB instance.

References:

? 1: Connecting to an Amazon RDS DB instance

? 2: Configuring a Lambda function to access resources in a VPC

? 3: Working with security groups

? : Network ACLs

NEW QUESTION 36

A company currently stores all of its data in Amazon S3 by using the S3 Standard storage class.

A data engineer examined data access patterns to identify trends. During the first 6 months, most data files are accessed several times each day. Between 6 months and 2 years, most data files are accessed once or twice each month. After 2 years, data files are accessed only once or twice each year.

The data engineer needs to use an S3 Lifecycle policy to develop new data storage rules. The new storage solution must continue to provide high availability.

Which solution will meet these requirements in the MOST cost-effective way?

- A. Transition objects to S3 One Zone-Infrequent Access (S3 One Zone-IA) after 6 month
- B. Transfer objects to S3 Glacier Flexible Retrieval after 2 years.
- C. Transition objects to S3 Standard-Infrequent Access (S3 Standard-IA) after 6 month
- D. Transfer objects to S3 Glacier Flexible Retrieval after 2 years.
- E. Transition objects to S3 Standard-Infrequent Access (S3 Standard-IA) after 6 month
- F. Transfer objects to S3 Glacier Deep Archive after 2 years.
- G. Transition objects to S3 One Zone-Infrequent Access (S3 One Zone-IA) after 6 month
- H. Transfer objects to S3 Glacier Deep Archive after 2 years.

Answer: C

Explanation:

To achieve the most cost-effective storage solution, the data engineer needs to use an S3 Lifecycle policy that transitions objects to lower-cost storage classes based on their access patterns, and deletes them when they are no longer needed. The storage classes should also provide high availability, which means they should be resilient to the loss of data in a single Availability Zone¹. Therefore, the solution must include the following steps:

? Transition objects to S3 Standard-Infrequent Access (S3 Standard-IA) after 6 months. S3 Standard-IA is designed for data that is accessed less frequently, but requires rapid access when needed. It offers the same high durability, throughput, and low latency as S3 Standard, but with a lower storage cost and a retrieval fee².

Therefore, it is suitable for data files that are accessed once or twice each month. S3 Standard-IA also provides high availability, as it stores data redundantly across multiple Availability Zones¹.

? Transfer objects to S3 Glacier Deep Archive after 2 years. S3 Glacier Deep Archive is the lowest-cost storage class that offers secure and durable storage for data that is rarely accessed and can tolerate a 12-hour retrieval time. It is ideal for long-term archiving and digital preservation³. Therefore, it is suitable for data files that are accessed only once or twice each year. S3 Glacier Deep Archive also provides high availability, as it stores data across at least three geographically dispersed Availability Zones¹.

? Delete objects when they are no longer needed. The data engineer can specify an expiration action in the S3 Lifecycle policy to delete objects after a certain period of time. This will reduce the storage cost and comply with any data retention policies.

Option C is the only solution that includes all these steps. Therefore, option C is the correct answer.

Option A is incorrect because it transitions objects to S3 One Zone-Infrequent Access (S3 One Zone-IA) after 6 months. S3 One Zone-IA is similar to S3 Standard-IA, but it stores data in a single Availability Zone. This means it has a lower availability and durability than S3 Standard-IA, and it is not resilient to the loss of data in a single Availability Zone¹. Therefore, it does not provide high availability as required.

Option B is incorrect because it transfers objects to S3 Glacier Flexible Retrieval after 2 years. S3 Glacier Flexible Retrieval is a storage class that offers secure and durable storage for data that is accessed infrequently and can tolerate a retrieval time of minutes to hours. It is more expensive than S3 Glacier Deep Archive, and it is not suitable for data that is accessed only once or twice each year³. Therefore, it is not the most cost-effective option.

Option D is incorrect because it combines the errors of option A and B. It transitions objects to S3 One Zone-IA after 6 months, which does not provide high availability, and it transfers objects to S3 Glacier Flexible Retrieval after 2 years, which is not the most cost-effective option.

References:

? 1: Amazon S3 storage classes - Amazon Simple Storage Service

? 2: Amazon S3 Standard-Infrequent Access (S3 Standard-IA) - Amazon Simple Storage Service

? 3: Amazon S3 Glacier and S3 Glacier Deep Archive - Amazon Simple Storage Service

? [4]: Expiring objects - Amazon Simple Storage Service

? [5]: Managing your storage lifecycle - Amazon Simple Storage Service

? [6]: Examples of S3 Lifecycle configuration - Amazon Simple Storage Service

? [7]: Amazon S3 Lifecycle further optimizes storage cost savings with new features

- What's New with AWS

NEW QUESTION 37

A company has multiple applications that use datasets that are stored in an Amazon S3 bucket. The company has an ecommerce application that generates a dataset that contains personally identifiable information (PII). The company has an internal analytics application that does not require access to the PII.

To comply with regulations, the company must not share PII unnecessarily. A data engineer needs to implement a solution that with redact PII dynamically, based on the needs of each application that accesses the dataset.

Which solution will meet the requirements with the LEAST operational overhead?

- A. Create an S3 bucket policy to limit the access each application has
- B. Create multiple copies of the dataset
- C. Give each dataset copy the appropriate level of redaction for the needs of the application that accesses the copy.
- D. Create an S3 Object Lambda endpoint
- E. Use the S3 Object Lambda endpoint to read data from the S3 bucket
- F. Implement redaction logic within an S3 Object Lambda function to dynamically redact PII based on the needs of each application that accesses the data.
- G. Use AWS Glue to transform the data for each application
- H. Create multiple copies of the dataset
- I. Give each dataset copy the appropriate level of redaction for the needs of the application that accesses the copy.
- J. Create an API Gateway endpoint that has custom authorizer
- K. Use the API Gateway endpoint to read data from the S3 bucket
- L. Initiate a REST API call to dynamically redact PII based on the needs of each application that accesses the data.

Answer: B

Explanation:

Option B is the best solution to meet the requirements with the least operational overhead because S3 Object Lambda is a feature that allows you to add your own code to process data retrieved from S3 before returning it to an application. S3 Object Lambda works with S3 GET requests and can modify both the object metadata and the object data. By using S3 Object Lambda, you can implement redaction logic within an S3 Object Lambda function to dynamically redact PII based on the needs of each application that accesses the data. This way, you can avoid creating and maintaining multiple copies of the dataset with different levels of redaction.

Option A is not a good solution because it involves creating and managing multiple copies of the dataset with different levels of redaction for each application. This option adds complexity and storage cost to the data protection process and requires additional resources and configuration. Moreover, S3 bucket policies cannot enforce fine-grained data access control at the row and column level, so they are not sufficient to redact PII.

Option C is not a good solution because it involves using AWS Glue to transform the data for each application. AWS Glue is a fully managed service that can extract, transform, and load (ETL) data from various sources to various destinations, including S3. AWS Glue can also convert data to different formats, such as Parquet, which is a columnar storage format that is optimized for analytics. However, in this scenario, using AWS Glue to redact PII is not the best option because it requires creating and maintaining multiple copies of the dataset with different levels of redaction for each application. This option also adds extra time and cost to the data protection process and requires additional resources and configuration.

Option D is not a good solution because it involves creating and configuring an API Gateway endpoint that has custom authorizers. API Gateway is a service that allows you to create, publish, maintain, monitor, and secure APIs at any scale. API Gateway can also integrate with other AWS services, such as Lambda, to provide custom logic for processing requests. However, in this scenario, using API Gateway to redact PII is not the best option because it requires writing and maintaining custom code and configuration for the API endpoint, the custom authorizers, and the REST API call. This option also adds complexity and latency to the data protection process and requires additional resources and configuration.

References:

? AWS Certified Data Engineer - Associate DEA-C01 Complete Study Guide

? Introducing Amazon S3 Object Lambda – Use Your Code to Process Data as It Is Being Retrieved from S3

? Using Bucket Policies and User Policies - Amazon Simple Storage Service

? AWS Glue Documentation

? What is Amazon API Gateway? - Amazon API Gateway

NEW QUESTION 39

A company stores details about transactions in an Amazon S3 bucket. The company wants to log all writes to the S3 bucket into another S3 bucket that is in the same AWS Region.

Which solution will meet this requirement with the LEAST operational effort?

- A. Configure an S3 Event Notifications rule for all activities on the transactions S3 bucket to invoke an AWS Lambda function
- B. Program the Lambda function to write the event to Amazon Kinesis Data Firehose
- C. Configure Kinesis Data Firehose to write the event to the logs S3 bucket.
- D. Create a trail of management events in AWS CloudTrail
- E. Configure the trail to receive data from the transactions S3 bucket
- F. Specify an empty prefix and write-only event
- G. Specify the logs S3 bucket as the destination bucket.
- H. Configure an S3 Event Notifications rule for all activities on the transactions S3 bucket to invoke an AWS Lambda function
- I. Program the Lambda function to write the events to the logs S3 bucket.
- J. Create a trail of data events in AWS CloudTrail
- K. Configure the trail to receive data from the transactions S3 bucket
- L. Specify an empty prefix and write-only event
- M. Specify the logs S3 bucket as the destination bucket.

Answer: D

Explanation:

This solution meets the requirement of logging all writes to the S3 bucket into another S3 bucket with the least operational effort. AWS CloudTrail is a service that records the API calls made to AWS services, including Amazon S3. By creating a trail of data events, you can capture the details of the requests that are made to the transactions S3 bucket, such as the requester, the time, the IP address, and the response elements. By specifying an empty prefix and write-only events, you can filter the data events to only include the ones that write to the bucket. By specifying the logs S3 bucket as the destination bucket, you can store the CloudTrail logs in another S3 bucket that is in the same AWS Region. This solution does not require any additional coding or configuration, and it is more scalable and reliable than using S3 Event Notifications and Lambda functions. References:

? Logging Amazon S3 API calls using AWS CloudTrail

? Creating a trail for data events

? Enabling Amazon S3 server access logging

NEW QUESTION 40

A company wants to implement real-time analytics capabilities. The company wants to use Amazon Kinesis Data Streams and Amazon Redshift to ingest and process streaming data at the rate of several gigabytes per second. The company wants to derive near real-time insights by using existing business intelligence (BI) and analytics tools.

Which solution will meet these requirements with the LEAST operational overhead?

- A. Use Kinesis Data Streams to stage data in Amazon S3. Use the COPY command to load data from Amazon S3 directly into Amazon Redshift to make the data immediately available for real-time analysis.
- B. Access the data from Kinesis Data Streams by using SQL queries
- C. Create materialized views directly on top of the stream
- D. Refresh the materialized views regularly to query the most recent stream data.
- E. Create an external schema in Amazon Redshift to map the data from Kinesis Data Streams to an Amazon Redshift object
- F. Create a materialized view to read data from the stream
- G. Set the materialized view to auto refresh.
- H. Connect Kinesis Data Streams to Amazon Kinesis Data Firehose
- I. Use Kinesis Data Firehose to stage the data in Amazon S3. Use the COPY command to load the data from Amazon S3 to a table in Amazon Redshift.

Answer: C

Explanation:

This solution meets the requirements of implementing real-time analytics capabilities with the least operational overhead. By creating an external schema in Amazon Redshift, you can access the data from Kinesis Data Streams using SQL queries without having to load the data into the cluster. By creating a materialized view on top of the stream, you can store the results of the query in the cluster and make them available for analysis. By setting the materialized view to auto refresh, you can ensure that the view is updated with the latest data from the stream at regular intervals. This way, you can derive near real-time insights by using existing BI and analytics tools. References:

? Amazon Redshift streaming ingestion

? Creating an external schema for Amazon Kinesis Data Streams

? Creating a materialized view for Amazon Kinesis Data Streams

NEW QUESTION 41

A data engineer needs to securely transfer 5 TB of data from an on-premises data center to an Amazon S3 bucket. Approximately 5% of the data changes every day. Updates to the data need to be regularly proliferated to the S3 bucket. The data includes files that are in multiple formats. The data engineer needs to automate the transfer process and must schedule the process to run periodically.

Which AWS service should the data engineer use to transfer the data in the MOST operationally efficient way?

- A. AWS DataSync
- B. AWS Glue
- C. AWS Direct Connect
- D. Amazon S3 Transfer Acceleration

Answer: A

Explanation:

AWS DataSync is an online data movement and discovery service that simplifies and accelerates data migrations to AWS as well as moving data to and from on-premises storage, edge locations, other cloud providers, and AWS Storage services¹. AWS DataSync can copy data to and from various sources and targets, including Amazon S3, and handle files in multiple formats. AWS DataSync also supports incremental transfers, meaning it can detect and copy only the changes to the data, reducing the amount of data transferred and improving the performance. AWS DataSync can automate and schedule the transfer process using triggers, and monitor the progress and status of the transfers using CloudWatch metrics and events¹.

AWS DataSync is the most operationally efficient way to transfer the data in this scenario, as it meets all the requirements and offers a serverless and scalable

solution. AWS Glue, AWS Direct Connect, and Amazon S3 Transfer Acceleration are not the best options for this scenario, as they have some limitations or drawbacks compared to AWS DataSync. AWS Glue is a serverless ETL service that can extract, transform, and load data from various sources to various targets, including Amazon S3. However, AWS Glue is not designed for large-scale data transfers, as it has some quotas and limits on the number and size of files it can process. AWS Glue also does not support incremental transfers, meaning it would have to copy the entire data set every time, which would be inefficient and costly.

AWS Direct Connect is a service that establishes a dedicated network connection between your on-premises data center and AWS, bypassing the public internet and improving the bandwidth and performance of the data transfer. However, AWS Direct Connect is not a data transfer service by itself, as it requires additional services or tools to copy the data, such as AWS DataSync, AWS Storage Gateway, or AWS CLI. AWS Direct Connect also has some hardware and location requirements, and charges you for the port hours and data transfer out of AWS.

Amazon S3 Transfer Acceleration is a feature that enables faster data transfers to Amazon S3 over long distances, using the AWS edge locations and optimized network paths. However, Amazon S3 Transfer Acceleration is not a data transfer service by itself, as it requires additional services or tools to copy the data, such as AWS CLI, AWS SDK, or third-party software. Amazon S3 Transfer Acceleration also charges you for the data transferred over the accelerated endpoints, and does not guarantee a performance improvement for every transfer, as it depends on various factors such as the network conditions, the distance, and the object size. References:

? AWS DataSync

? AWS Glue

? AWS Glue quotas and limits

? [AWS Direct Connect]

? [Data transfer options for AWS Direct Connect]

? [Amazon S3 Transfer Acceleration]

? [Using Amazon S3 Transfer Acceleration]

NEW QUESTION 42

A company receives call logs as Amazon S3 objects that contain sensitive customer information. The company must protect the S3 objects by using encryption. The company must also use encryption keys that only specific employees can access.

Which solution will meet these requirements with the LEAST effort?

- A. Use an AWS CloudHSM cluster to store the encryption key
- B. Configure the process that writes to Amazon S3 to make calls to CloudHSM to encrypt and decrypt the object
- C. Deploy an IAM policy that restricts access to the CloudHSM cluster.
- D. Use server-side encryption with customer-provided keys (SSE-C) to encrypt the objects that contain customer information
- E. Restrict access to the keys that encrypt the objects.
- F. Use server-side encryption with AWS KMS keys (SSE-KMS) to encrypt the objects that contain customer information
- G. Configure an IAM policy that restricts access to the KMS keys that encrypt the objects.
- H. Use server-side encryption with Amazon S3 managed keys (SSE-S3) to encrypt the objects that contain customer information
- I. Configure an IAM policy that restricts access to the Amazon S3 managed keys that encrypt the objects.

Answer: C

Explanation:

Option C is the best solution to meet the requirements with the least effort because server-side encryption with AWS KMS keys (SSE-KMS) is a feature that allows you to encrypt data at rest in Amazon S3 using keys managed by AWS Key Management Service (AWS KMS). AWS KMS is a fully managed service that enables you to create and manage encryption keys for your AWS services and applications. AWS KMS also allows you to define granular access policies for your keys, such as who can use them to encrypt and decrypt data, and under what conditions. By using SSE-KMS, you can protect your S3 objects by using encryption keys that only specific employees can access, without having to manage the encryption and decryption process yourself.

Option A is not a good solution because it involves using AWS CloudHSM, which is a service that provides hardware security modules (HSMs) in the AWS Cloud. AWS CloudHSM allows you to generate and use your own encryption keys on dedicated hardware that is compliant with various standards and regulations.

However, AWS CloudHSM is not a fully managed service and requires more effort to set up and maintain than AWS KMS. Moreover, AWS CloudHSM does not integrate with Amazon S3, so you have to configure the process that writes to S3 to make calls to CloudHSM to encrypt and decrypt the objects, which adds complexity and latency to the data protection process. Option B is not a good solution because it involves using server-side encryption with customer-provided keys (SSE-C), which is a feature that allows you to encrypt data at rest in Amazon S3 using keys that you provide and manage yourself. SSE-C requires you to send your encryption key along with each request to upload or retrieve an object. However, SSE-C does not provide any mechanism to restrict access to the keys that encrypt the objects, so you have to implement your own key management and access control system, which adds more effort and risk to the data protection process.

Option D is not a good solution because it involves using server-side encryption with Amazon S3 managed keys (SSE-S3), which is a feature that allows you to encrypt data at rest in Amazon S3 using keys that are managed by Amazon S3. SSE-S3 automatically encrypts and decrypts your objects as they are uploaded and downloaded from S3. However, SSE-S3 does not allow you to control who can access the encryption keys or under what conditions. SSE-S3 uses a single encryption key for each S3 bucket, which is shared by all users who have access to the bucket. This means that you cannot restrict access to the keys that encrypt the objects by specific employees, which does not meet the requirements.

References:

? AWS Certified Data Engineer - Associate DEA-C01 Complete Study Guide

? Protecting Data Using Server-Side Encryption with AWS KMS–Managed Encryption Keys (SSE-KMS) - Amazon Simple Storage Service

? What is AWS Key Management Service? - AWS Key Management Service

? What is AWS CloudHSM? - AWS CloudHSM

? Protecting Data Using Server-Side Encryption with Customer-Provided Encryption Keys (SSE-C) - Amazon Simple Storage Service

? Protecting Data Using Server-Side Encryption with Amazon S3-Managed Encryption Keys (SSE-S3) - Amazon Simple Storage Service

NEW QUESTION 45

A data engineer needs Amazon Athena queries to finish faster. The data engineer notices that all the files the Athena queries use are currently stored in uncompressed .csv format. The data engineer also notices that users perform most queries by selecting a specific column.

Which solution will MOST speed up the Athena query performance?

- A. Change the data format from .csv to JSON format
- B. Apply Snappy compression.
- C. Compress the .csv files by using Snappy compression.
- D. Change the data format from .csv to Apache Parquet
- E. Apply Snappy compression.
- F. Compress the .csv files by using gzip compression.

Answer: C

Explanation:

Amazon Athena is a serverless interactive query service that allows you to analyze data in Amazon S3 using standard SQL. Athena supports various data formats, such as CSV, JSON, ORC, Avro, and Parquet. However, not all data formats are equally efficient for querying. Some data formats, such as CSV and JSON, are row-oriented, meaning that they store data as a sequence of records, each with the same fields. Row-oriented formats are suitable for loading and exporting data, but they are not optimal for analytical queries that often access only a subset of columns. Row-oriented formats also do not support compression or encoding techniques that can reduce the data size and improve the query performance.

On the other hand, some data formats, such as ORC and Parquet, are column-oriented, meaning that they store data as a collection of columns, each with a specific data type. Column-oriented formats are ideal for analytical queries that often filter, aggregate, or join data by columns. Column-oriented formats also support compression and encoding techniques that can reduce the data size and improve the query performance. For example, Parquet supports dictionary encoding, which replaces repeated values with numeric codes, and run-length encoding, which replaces consecutive identical values with a single value and a count. Parquet also supports various compression algorithms, such as Snappy, GZIP, and ZSTD, that can further reduce the data size and improve the query performance.

Therefore, changing the data format from CSV to Parquet and applying Snappy compression will most speed up the Athena query performance. Parquet is a column-oriented format that allows Athena to scan only the relevant columns and skip the rest, reducing the amount of data read from S3. Snappy is a compression algorithm that reduces the data size without compromising the query speed, as it is splittable and does not require decompression before reading. This solution will also reduce the cost of Athena queries, as Athena charges based on the amount of data scanned from S3.

The other options are not as effective as changing the data format to Parquet and applying Snappy compression. Changing the data format from CSV to JSON and applying Snappy compression will not improve the query performance significantly, as JSON is also a row-oriented format that does not support columnar access or encoding techniques. Compressing the CSV files by using Snappy compression will reduce the data size, but it will not improve the query performance significantly, as CSV is still a row-oriented format that does not support columnar access or encoding techniques. Compressing the CSV files by using gzip compression will reduce the data size, but it will degrade the query performance, as gzip is not a splittable compression algorithm and requires decompression before reading. References:

? Amazon Athena

? Choosing the Right Data Format

? AWS Certified Data Engineer - Associate DEA-C01 Complete Study Guide, Chapter 5: Data Analysis and Visualization, Section 5.1: Amazon Athena

NEW QUESTION 50

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