Question 46: **Skipped**

Scenario: Dr. Karl Malus works for the Power Broker Corporation (PBC) founded by Curtiss Jackson, using technology to service various countries and their military efforts. You have been contracted by the company to assist Dr. Malus with their Microsoft Azure Databricks projects.

The team plans to create an Azure Databricks workspace that has a tiered structure. The workspace will contain the following three workloads:

- A workload for data engineers who will use Python and SQL.
- A workload for jobs that will run notebooks that use Python, Scala, and SOL.
- A workload that data scientists will use to perform ad hoc analysis in Scala and R.

The enterprise architecture team at PBC identifies the following standards for Databricks environments:

- The data engineers must share a cluster.
- The job cluster will be managed by using a request process whereby data scientists and data engineers provide packaged notebooks for deployment to the cluster.
- All the data scientists must be assigned their own cluster that terminates automatically after 120 minutes of inactivity. Currently, there are three data scientists.

Required: The team needs to create the Databricks clusters for the workloads.

Solution: The team creates a Standard cluster for each data scientist, a High Concurrency cluster for the data engineers, and a High Concurrency cluster for the jobs.

Does this meet the requirement?

- ○ No
  (Correct)
- ○ Yes

Explanation

The solution does not meet the requirement because: "High Concurrency clusters work only for SQL, Python, and R. The performance and security of High Concurrency clusters is provided by running user code in separate processes, which is not possible in Scala."

Standard clusters

Standard clusters are recommended for a single user. Standard clusters can run workloads developed in any language: Python, R, Scala, and SQL.

High Concurrency clusters

A High Concurrency cluster is a managed cloud resource. The key benefits of High Concurrency clusters are that they provide Apache Spark-native fine-grained sharing for maximum resource utilization and minimum query latencies.

High Concurrency clusters work only for SQL, Python, and R. The performance and security of High Concurrency clusters is provided by running user code in separate processes, which is not possible in Scala.

In addition, only High Concurrency clusters support table access control.

https://docs.microsoft.com/en-us/azure/databricks/clusters/configure

Question 47: Skipped

Azure Storage provides a REST API to work with the containers and data stored in each account.

See the below command:

```
HTTP
GET https://[url-for-service-account]/?comp=list&include=metadata
```

What would this command return?

- ○
  All the listed options.
- ○
  A list all the blobs in a container
  (Correct)
- ○
  A list all the tables in a container
- ○
  A list all the files in a container
- ○
  A list all the queues in a container
- ○
  None of the listed options.

Explanation

Azure Storage provides a REST API to work with the containers and data stored in each account. There are independent APIs available to work with each type of data you can store. We have four specific data types:

• **Blobs** for unstructured data such as binary and text files.

• **Queues** for persistent messaging.

• **Tables** for structured storage of key/values.

• **Files** for traditional SMB file shares.

Use the REST API

The Storage REST APIs are accessible from anywhere on the Internet, by any app that can send an HTTP/HTTPS request and receive an HTTP/HTTPS response.

If you wanted to list all the blobs in a container, you would send something like:

```
HTTP

GET https://[url-for-service-account]/?comp=list&include=metadata
```

This would return an XML block with data specific to the account:

```
XML

<?xml version="1.0" encoding="utf-8"?>

<EnumerationResults AccountName="https://[url-for-service-account]/">

<Containers>

<Container>

<Name>container1</Name>

<Url>https://[url-for-service-account]/container1</Url>

<Properties>

<Last-Modified>Sun, 24 Sep 2018 18:09:03 GMT</Last-Modified>

<Etag>0x8CAE7D0C4AF4487</Etag>

</Properties>

<Metadata>

<Color>orange</Color>

<ContainerNumber>01</ContainerNumber>

<SomeMetadataName>SomeMetadataValue</SomeMetadataName>

</Metadata>

</Container>

<Container>

<Name>container2</Name>

<Url>https://[url-for-service-account]/container2</Url>

<Properties>

<Last-Modified>Sun, 24 Sep 2018 17:26:40 GMT</Last-Modified>

<Etag>0x8CAE7CAD8C24928</Etag>

</Properties>

<Metadata>

<Color>pink</Color>

<ContainerNumber>02</ContainerNumber>

<SomeMetadataName>SomeMetadataValue</SomeMetadataName>

</Metadata>
```

```
</Container>
<Container>
<Name>container3</Name>
<Url>https://[url-for-service-account]/container3</Url>
<Properties>
<Last-Modified>Sun, 24 Sep 2018 17:26:40 GMT</Last-Modified>
<Etag>0x8CAE7CAD8EAC0BB</Etag>
</Properties>
<Metadata>
<Color>brown</Color>
<ContainerNumber>03</ContainerNumber>
<SomeMetadataName>SomeMetadataValue</SomeMetadataName>
</Metadata>
</Container>
</Containers>
<NextMarker>container4</NextMarker>
</EnumerationResults>
```

This approach requires a lot of manual parsing and the creation of HTTP packets to work with each API. For this reason, Azure provides pre-built *client libraries* that make working with the service easier for common languages and frameworks.

https://docs.microsoft.com/en-us/rest/api/storageservices/blob-service-rest-api

Question 48: Skipped

True or False: Azure Synapse functionality requires integration with Azure Data Factory, Azure Databricks and Power BI.

- ○ True
- ○ False (Correct)

Explanation
When thinking about usage patterns that customers are using today to maximize the value of their data, a modern data warehouse lets you bring together all your data at scale easily, so you get to the insights through analytics dashboards, operational reporting, or advanced analytics for your users.

The process of building a modern data warehouse typically consists of:

• Data Ingestion and Preparation.

• Making the data ready for consumption by analytical tools.

• Providing access to the data, in a shaped format so that it can easily be consumed by data visualization tools.

Prior to the release of Azure Synapse Analytics, this would be achieved in the following way.

Data ingestion and preparation

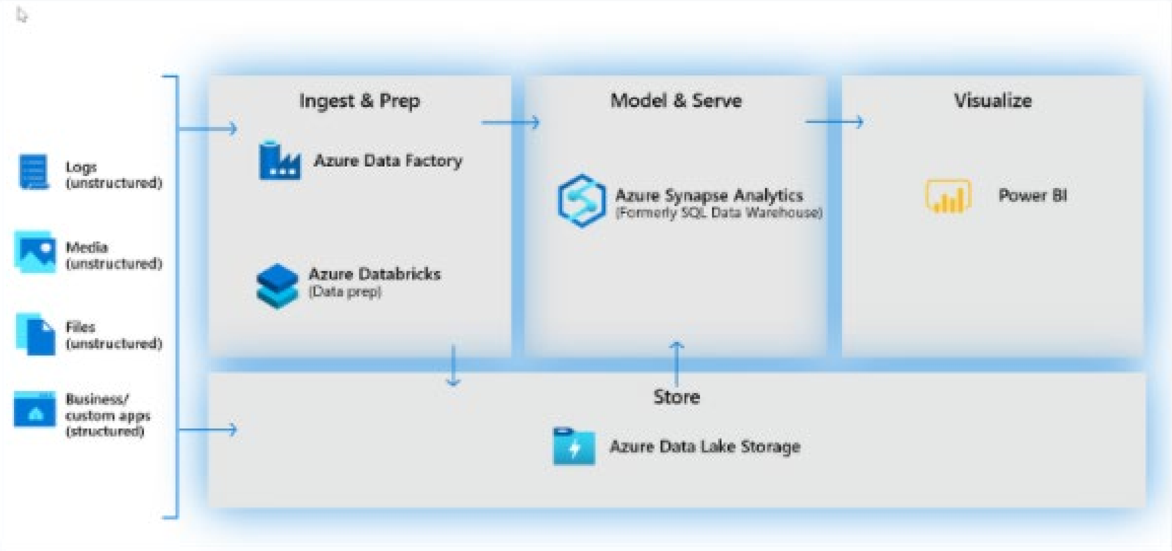
At the foundation, customers build a data lake to store all their data and different data types with Azure Data Lake Store Gen2.

To ingest data, customers can do so code-free with over 100 data integration connectors with Azure Data Factory. Data Factory empowers customers to do code-free ETL/ELT, including preparation and transformation.

And while a lot of our customers are currently heavily invested in the SQL Server Integration Services packages (SSIS), they created, they can leverage these without having to rewrite those packages in Azure Data Factory.

Whether the data is an on-premises data sources, other Azure services, or other cloud services, customers can seamlessly author, monitor, and manage their big data pipelines with a visual environment that is easy to use.

Another option for data preparation is Azure Databricks - to shape the data formats and prep it using a Notebook—making internal collaboration on data more streamlined and efficient.



Making the data ready for consumption by analytical tools

At the heart of a modern data warehouse, and cloud scale analytical solution was Azure Synapse Analytics (Formerly SQL Data Warehouse). This implemented a Massively Parallel Processing that brings together enterprise data warehousing and Big Data analytics.

Providing access to the data, that it can easily be consumed by data visualization tools

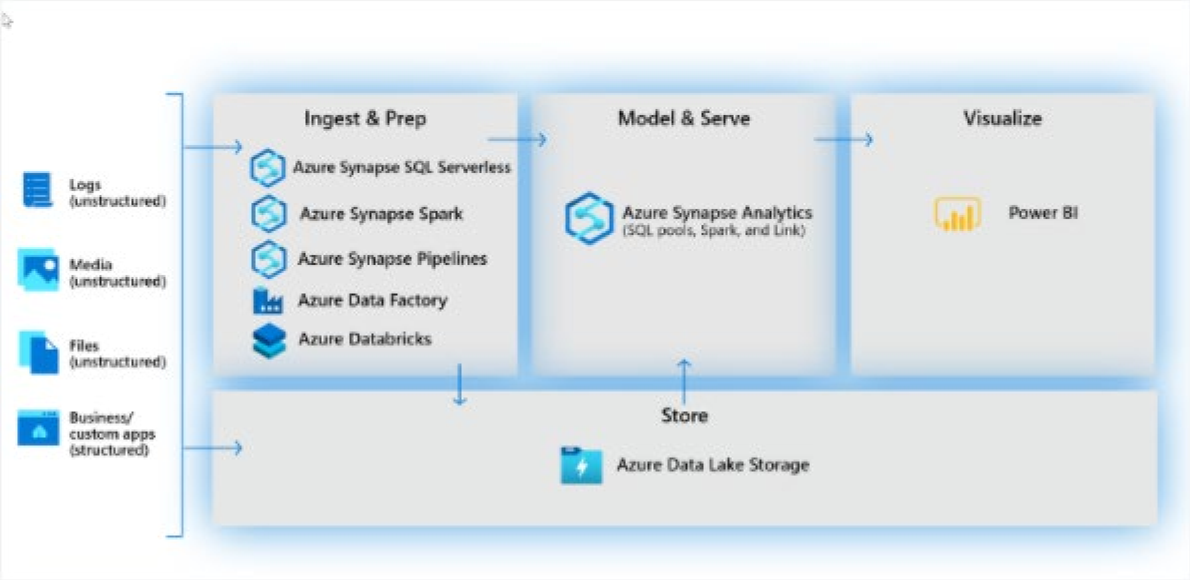
Power BI enables customers to build visualizations on massive amounts of data and ensure that data insights are available to everyone across their organization.

Power BI supports an enormous set of data sources, which can be queried live, or be used to model and ingest, for detailed analysis and visualization.

Brought together with AI capabilities, it’s a powerful tool to build and deploy dashboards in the enterprise, through rich visualizations, and features like natural language querying.

With the release of Azure Synapse Analytics, you have a choice. You can either use Azure Synapse exclusively, which works very well for green field projects, but for organizations with existing investments in Azure with Azure Data Factory, Azure

Databricks and Power BI, you can take a hybrid approach and combine them with Azure Synapse Analytics.



https://docs.microsoft.com/en-us/azure/synapse-analytics/overview-what-is

Question 49: Skipped

When creating a new cluster in the Azure Databricks workspace, what happens behind the scenes?

- ○ Azure Databricks creates a cluster of driver and worker nodes, based on your VM type and size selections.
  (Correct)
- ○ Azure Databricks provisions a dedicated VM that processes all jobs, based on your VM type and size selection.
- ○ When an Azure Databricks workspace is deployed, you are allocated a pool of VMs. Creating a cluster draws from this pool.
- ○ None of the listed options.

Explanation

At the time of cluster creation, you specify the types and sizes of the virtual machines (VMs) to use for both the Driver and Worker nodes, but Azure Databricks manages all other aspects of the cluster.

https://docs.microsoft.com/en-us/windows-server/remote/remote-desktop-services/virtual-machine-recs

Question 50: Skipped

Identify the missing word(s) in the following sentence within the context of Microsoft Azure.

[?] is a Hadoop-compatible data repository that can store any size or type of data. The following are key features of [?]:

• Unlimited scalability

• Hadoop compatibility

• Security support for both access control lists (ACLs)

• POSIX compliance

• Zone-redundant storage

- ○ Azure Data Lake Storage
  (Correct)
- ○ Azure HDInsight
- ○ Azure Cosmos DB
- ○ Azure Data Studio
- ○ Azure Bulk File Storage
- ○ Azure Lab Services

Explanation

Azure Data Lake Storage is a Hadoop-compatible data repository that can store any size or type of data. This storage service is available as Generation 1 (Gen1) or Generation 2 (Gen2). Data Lake Storage Gen1 users don't have to upgrade to Gen2, but they forgo some benefits.

Data Lake Storage Gen2 users take advantage of Azure Blob storage, a hierarchical file system, and performance tuning that helps them process big-data analytics solutions. In Gen2, developers can access data through either the Blob API or the Data Lake file API. Gen2 can also act as a storage layer for a wide range of compute platforms, including Azure Databricks, Hadoop, and Azure HDInsight, but data doesn't need to be loaded into the platforms.

Here are the key features of Data Lake Storage:

- Unlimited scalability
- Hadoop compatibility
- Security support for both access control lists (ACLs)
- POSIX compliance
- An optimized Azure Blob File System (ABFS) driver that's designed for big-data analytics
- Zone-redundant storage
- Geo-redundant storage

https://docs.microsoft.com/en-us/azure/storage/blobs/data-lake-storage-introduction

Question 51: Skipped

Scenario: O'Shaughnessy's is a fast food restaurant. The chain has stores nationwide and is rivalled by Big Belly Burgers. You have been hired by the company to advise on the implementation of Azure migrating from an on-prem datacentre.

The IT team has an Azure subscription which contains an Azure Storage account and they plan to create an Azure container instance named OShaughnessy001 that will use a Docker image named Source001. Source001 contains a Microsoft SQL Server instance that requires persistent storage. Right now the team is configuring a storage service for OShaughnessy001 and there is debate around which of the following should be used.

As the expert consultant, the team looks to you for direction.

Which should you advise them to use?

- ○ Azure Blob storage
- ○ Azure Files (Correct)
- ○ Azure Table storage
- ○ Azure Queue storage

Explanation
Persistent Docker volumes with Azure File Storage

Azure Files offers fully managed file shares in the cloud that are accessible via the industry standard Server Message Block (SMB) protocol or Network File System (NFS) protocol. Azure file shares can be mounted concurrently by cloud or on-premises deployments. Azure Files SMB file shares are accessible from Windows, Linux, and macOS clients. Azure Files NFS file shares are accessible from Linux or macOS clients. Additionally, Azure Files SMB file shares can be cached on Windows Servers with Azure File Sync for fast access near where the data is being used.

Azure file shares can be used to:

Replace or supplement on-premises file servers: Azure Files can be used to completely replace or supplement traditional on-premises file servers or NAS devices. Popular operating systems such as Windows, macOS, and Linux can directly mount Azure file shares wherever they are in the world. Azure File SMB file shares can also be replicated with Azure File Sync to Windows Servers, either on-premises or in the cloud, for performance and distributed caching of the data where it's being used. With the recent release of Azure Files AD Authentication, Azure File SMB file shares can continue to work with AD hosted on-premises for access control.

"Lift and shift" applications:
Azure Files makes it easy to "lift and shift" applications to the cloud that expect a file share to store file application or user data. Azure Files enables both the "classic" lift and shift scenario, where both the application and its data are moved to Azure, and the "hybrid" lift and shift scenario, where the application data is moved to Azure Files, and the application continues to run on-premises.

Simplify cloud development:
Azure Files can also be used in numerous ways to simplify new cloud development projects. For example:

Shared application settings:
A common pattern for distributed applications is to have configuration files in a centralized location where they can be accessed from many application instances. Application instances can load their configuration through the File REST API, and humans can access them as needed by mounting the SMB share locally.

Diagnostic share:
An Azure file share is a convenient place for cloud applications to write their logs, metrics, and crash dumps. Logs can be written by the application instances via the File REST API, and developers can access them by mounting the file share on their local machine. This enables great flexibility, as developers can embrace cloud development without having to abandon any existing tooling they know and love.

Dev/Test/Debug:
When developers or administrators are working on VMs in the cloud, they often need a set of tools or utilities. Copying such utilities and tools to each VM can be a time consuming exercise. By mounting an Azure file share locally on the VMs, a developer and administrator can quickly access their tools and utilities, no copying required.

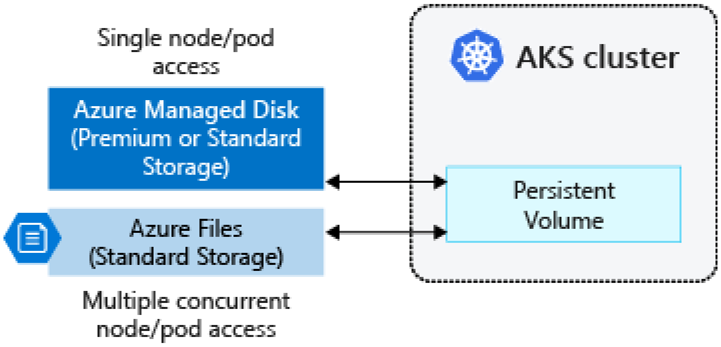
Containerization:
Azure file shares can be used as persistent volumes for stateful containers. Containers deliver "build once, run anywhere" capabilities that enable developers to accelerate innovation. For the containers that access raw data at every start, a shared file system is required to allow these containers to access the file system no matter which instance they run on.

https://docs.microsoft.com/en-us/azure/storage/files/storage-files-introduction

Persistent volumes

Volumes defined and created as part of the pod lifecycle only exist until you delete the pod. Pods often expect their storage to remain if a pod is rescheduled on a different host during a maintenance event, especially in StatefulSets. A *persistent volume* (PV) is a storage resource created and managed by the Kubernetes API that can exist beyond the lifetime of an individual pod.

You can use Azure Disks or Files to provide the PersistentVolume. As noted in the Volumes section, the choice of Disks or Files is often determined by the need for concurrent access to the data or the performance tier.

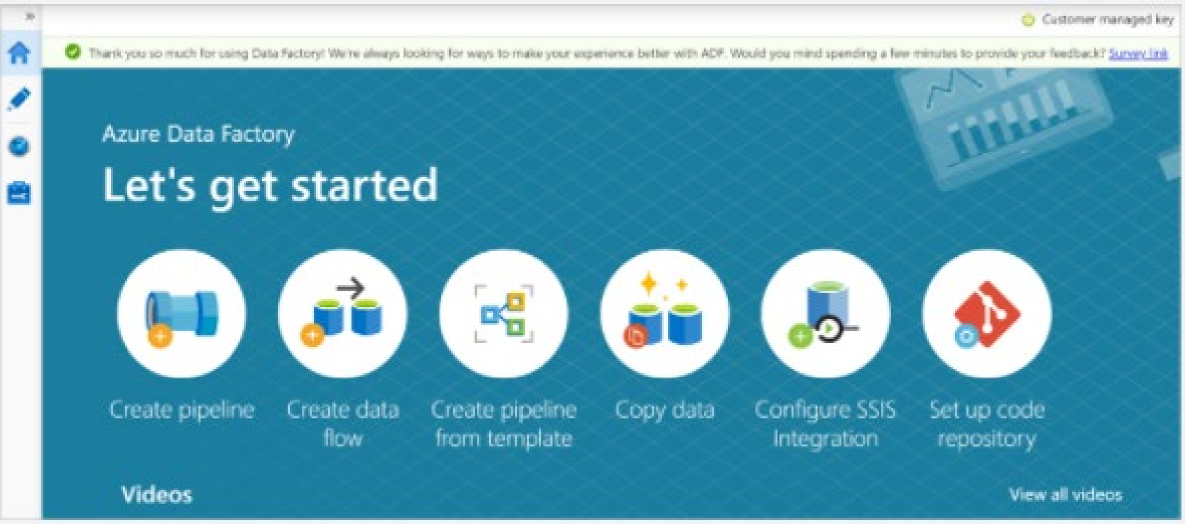

Single node/pod access
Azure Managed Disk (Premium or Standard Storage)
Azure Files (Standard Storage)
Multiple concurrent node/pod access
AKS cluster
Persistent Volume

A PersistentVolume can be *statically* created by a cluster administrator, or *dynamically* created by the Kubernetes API server. If a pod is scheduled and requests currently unavailable storage, Kubernetes can create the underlying Azure Disk or Files storage and attach it to the pod. Dynamic provisioning uses a *StorageClass* to identify what type of Azure storage needs to be created.

https://docs.microsoft.com/en-us/azure/aks/concepts-storage#volumes

Question 52: Skipped

Scenario: You team is working on a project using the Azure Data Factory authoring tool.



Customer managed key

Thank you so much for using Data Factory! We're always looking for ways to make your experience better with ADF. Would you mind spending a few minutes to provide your feedback? Survey link

Azure Data Factory

Let's get started

A junior team member comes to you and asks *“Where can I find the Copy Data activity ?”*

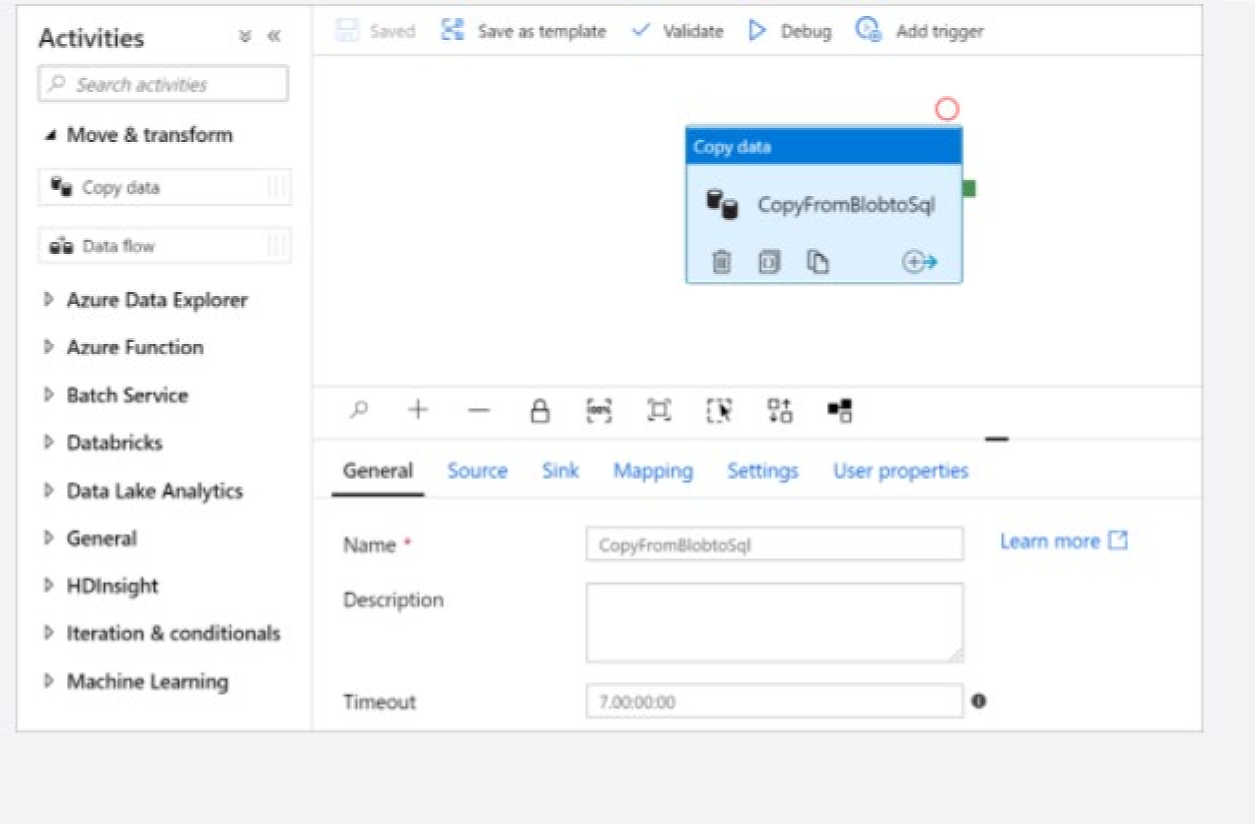
Which of the below is the correct location?

- ○ Data Explorer
- ○ Azure Function
- ○ Batch Service
- ○ Batch Service
- ○ Move & Transform (Correct)
- ○ Databricks

Explanation

The Move & Transform section contains activities that are specific to Azure Data Factory copying data and defining data flows.

Activities tool box → **Move and Transform** category → **Copy Data** activity



Name * CopyFromBlobtoSql

Description

Timeout 7.00:00:00

https://docs.microsoft.com/en-us/azure/data-factory/author-visually

Question 53: Skipped

Scenario: You are working as a consultant at Avengers Security (AS). At the moment, you are consulting with Tony, the lead of the IT team and the topic of discussion is about creating an SQL pool in Azure Synapse that will use data from the data lake.

AS has an enterprise-wide Azure Data Lake Storage Gen2 account where the data lake is accessible only through an Azure virtual network named VNET1. The AS sales team members are in an Azure Active Directory group named Sales. POSIX controls are used to assign the Sales group access to the files in the data lake. The plan is to load data to the SQL pool every hour and the team needs to ensure that the SQL pool can load the sales data from the data lake.

Since Azure is new to Avengers Security, the team has created the list shown below of things the team members think are needed, but they are not certain about which actions are necessary, and which are not.

Tony and the team look to you for guidance; which of the following should you advise them to perform? (Select three)

- □ Add the managed identity to the Sales group.
  (Correct)
- □ Add your Azure Active Directory (Azure AD) account to the Sales group.
- □ Create a managed identity.
  (Correct)
- □ Use the snared access signature (SAS) as the credentials for the data load process.
- □ Create a shared access signature (SAS).
- □ Use the managed identity as the credentials for the data load process.
  (Correct)

Explanation

You advise them to perform the following:

• *Create a managed identity.*

• *Add the managed identity to the Sales group.*

• Use the managed identity as the credentials for the data load process.

Azure Data Lake Storage Gen2 implements an access control model that supports both Azure role-based access control (Azure RBAC) and POSIX-like access control lists (ACLs). This article describes access control lists in Data Lake Storage Gen2. To learn about how to incorporate Azure RBAC together with ACLs, and how system evaluates them to make authorization decisions, see Access control model in Azure Data Lake Storage Gen2.

About ACLs

You can associate a security principal with an access level for files and directories. These associations are captured in an *access control list (ACL)*. Each file and directory in your storage account has an access control list. When a security principal attempts an operation on a file or directory, An ACL check determines whether that security principal (user, group, service principal, or managed identity) has the correct permission level to perform the operation

https://docs.microsoft.com/en-us/azure/storage/blobs/data-lake-storage-access-control

You can use Storage Explorer to view, and then update the ACLs of directories and files. ACL inheritance is already available for new child items that are created under a parent directory. But you can also apply ACL settings recursively on the existing child items of a parent directory without having to make these changes individually for each child item.

Storage Explorer makes use of both the Blob (blob) & Data Lake Storage Gen2 (dfs) endpoints when working with Azure Data Lake Storage Gen2. If access to Azure Data Lake Storage Gen2 is configured using private endpoints, ensure that two private endpoints are created for the storage account: one with the target sub-resource `blob` and the other with the target sub-resource `dfs`.

https://docs.microsoft.com/en-us/azure/storage/blobs/data-lake-storage-explorer-acl

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Question 54: Skipped

Knowing now the different concepts of spark it is imperative to understand how it fits in with the different Data services on Azure.

Which of the following is best described by:

“Organizations that don’t have existing spark implementations yet, get the functionality to spin up a spark cluster to meet data engineering needs without the overhead of the other Spark Platforms. Data Engineers, Data scientist, Data Platform Experts, and Data Analyst can come together within Synapse Analytics where the Spark cluster is spun up quickly to meet the needs. It provides scale in an efficient way for Spark Clusters and integrates with the one stop shop Data warehousing platform of Synapse.”

- ○ Apache Spark
- ○ HDI
- ○ Azure Databricks
- ○ Spark Pools in Azure Synapse Analytics **(Correct)**

Explanation

There are two concepts within Apache Spark Pools in Azure Synapse Analytics, namely Spark pools and Spark Instances. In short, they do the following:

Spark Pools:

- Exists as Metadata

- Creates a Spark Instance

- No costs associated with creating Pool

- Permissions can be applied

- Best practices

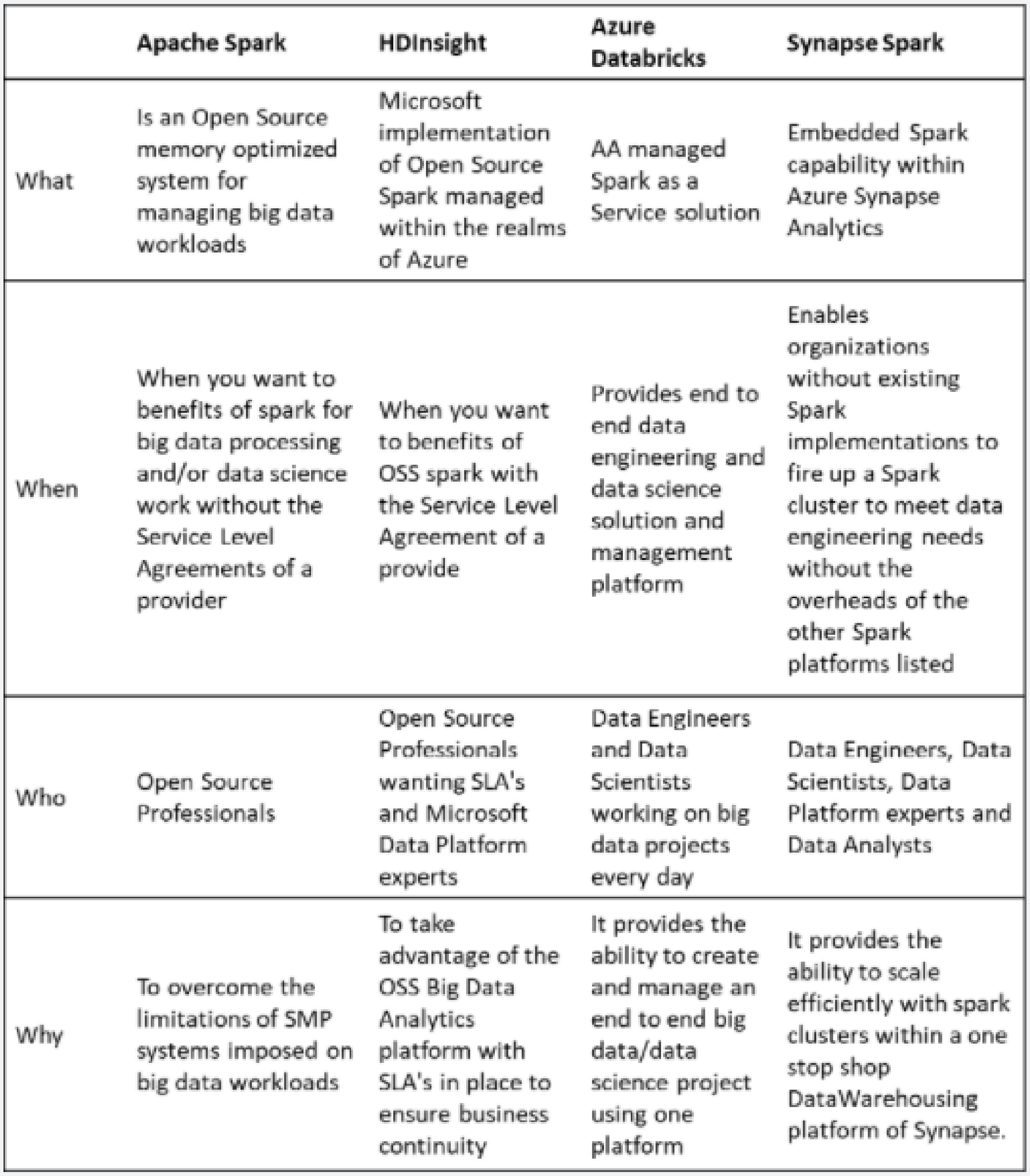
Spark Instances:

- Created when connected to Spark Pool, Session, or Job

- Multiple users can have access

• Reusable

Knowing now the different concepts of spark it is imperative to understand how it fits in with the different Data services on Azure. Below is a table where "the when to use what" is outlined:



	Apache Spark	HDInsight	Azure Databricks	Synapse Spark
What	Is an Open Source memory optimized system for managing big data workloads	Microsoft implementation of Open Source Spark managed within the realms of Azure	AA managed Spark as a Service solution	Embedded Spark capability within Azure Synapse Analytics
When	When you want to benefits of spark for big data processing and/or data science work without the Service Level Agreements of a provider	When you want to benefits of OSS spark with the Service Level Agreement of a provide	Provides end to end data engineering and data science solution and management platform	Enables organizations without existing Spark implementations to fire up a Spark cluster to meet data engineering needs without the overheads of the other Spark platforms listed
Who	Open Source Professionals	Open Source Professionals wanting SLA's and Microsoft Data Platform experts	Data Engineers and Data Scientists working on big data projects every day	Data Engineers, Data Scientists, Data Platform experts and Data Analysts
Why	To overcome the limitations of SMP systems imposed on big data workloads	To take advantage of the OSS Big Data Analytics platform with SLA's in place to ensure business continuity	It provides the ability to create and manage an end to end big data/data science project using one platform	It provides the ability to scale efficiently with spark clusters within a one stop shop DataWarehousing platform of Synapse.

Spark Pools in Azure Synapse Analytics**:** Spark in Azure Synapse Analytics is a capability of Spark embedded in Azure Synapse Analytics in which organizations that don't have existing spark implementations yet, get the functionality to spin up a spark cluster to meet data engineering needs without the overhead of the other Spark Platforms listed. Data Engineers, Data scientist, Data Platform Experts, and Data Analyst can come together within Synapse Analytics where the Spark cluster is spun up quickly to meet the needs. It provides scale in an efficient way for Spark Clusters and integrates with the one stop shop Data warehousing platform of Synapse.

Apache Spark**:** Apache Spark is an open-source memory optimized system for managing big data workloads, which is used when you want a spark engine for big data processing or data science where you don't mind that there is no SLA provided. Usually it is of interest of Open Source Professionals and the reason for Apache spark is to overcome the limitations of what was known as SMP systems for big data workloads.

HDI**:** HDI is an implementation by Microsoft of Open Source Spark, managed on the Azure Platform. You can use HDI for a spark environment when you are aware of the benefits of Apache Spark in its OSS form, but you want a SLA. Usually this of interest of Open Source Professionals needing an SLA as well as Data Platform experts experienced with Microsoft.

Azure Databricks**:** Azure Databricks is a managed Spark as a Service propriety Solution that provides an end to end data engineering/data science platform as a solution. Azure Databricks is of interest for Data Engineers and Data Scientists, working on big data projects daily because it provides the whole platform in which you have the ability to create and manage the big data/data science pipelines/projects all on one platform.

https://docs.microsoft.com/en-us/azure/synapse-analytics/spark/apache-spark-overview

Question 55: Skipped

The first step in deploying Azure Synapse Analytics is to deploy an Azure Synapse Analytics workspace. A shared Hive-compatible metadata system allows tables defined on files in the data lake to be seamlessly consumed by either Spark or Hive.

SQL and Spark can directly explore and analyze which types of files stored in the data lake? (Select all that apply)

- □
  CSV
  (Correct)
- □
  Parquet
  (Correct)
- □
  XLSX
- □
  TXT
- □
  JSON
  (Correct)
- □
  XLS
- □
  TSV
  (Correct)
- □
  PDF

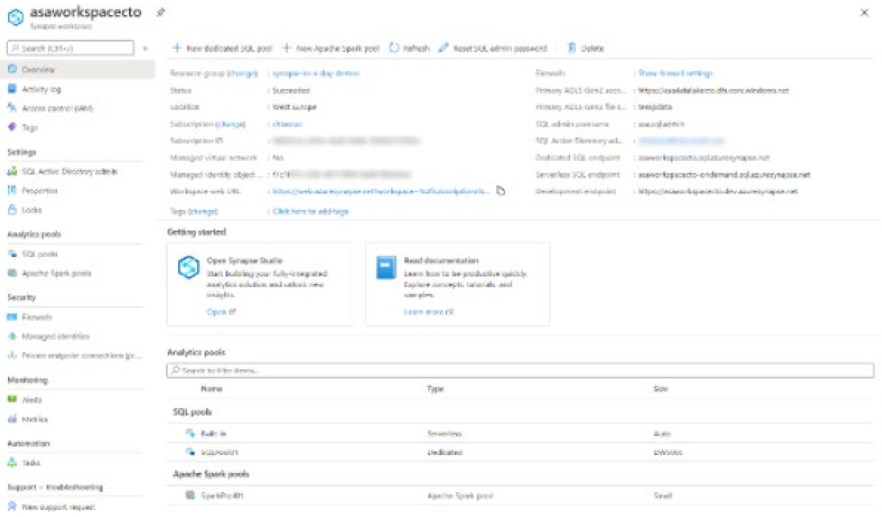
Explanation

The first step in deploying Azure Synapse Analytics is to deploy an Azure Synapse Analytics workspace. This deployment creates several resources which include an Azure Data Lake Storage Gen2 account that acts as the primary storage and the container to store workspace data. The workspace stores data in Apache Spark tables. It also stores Spark application logs under a folder called `/synapse/workspacename`. There are endpoints created that can be used to connect to the SQL on-demand service, and the Azure Synapse Analytics Workspace itself.

Azure Synapse Analytics enables you to create pools, either SQL pools, or Spark pools within the workspace that can be seamlessly mixed and matched based on your requirements. It is able to do this through Azure Synapse Analytics shared metadata, which enables the different engines to share databases and tables.

For example, **A shared Hive-compatible metadata system allows tables defined on files in the data lake to be seamlessly consumed by either Spark or Hive. SQL and Spark can directly explore and analyze Parquet, CSV, TSV, and JSON files stored in the data lake.** There is also a fast scalable load and unload for data going between SQL and Spark databases.

It is this capability that enables the Modern Data Warehousing workload pattern and gives the workspace SQL engines access to databases and tables created with Spark. It also allows the SQL engines to create their own objects that aren't being shared with the other engines. The Azure Synapse Analytics workspace is the central location where you can view information about these resources and connect to them from within the Azure portal. The initial setup looks as follows:



Resource group (change) : synapse-in-a-day-demos
Status : Succeeded
Location : West Europe
Subscription (change) : chiasso
Subscription ID : [redacted]
Managed virtual network : No
Managed identity object ... : f1c1[redacted]
Workspace web URL : https://web.azuresynapse.net?workspace=%2fsubscriptions%2f...
Tags (change) : Click here to add tags

Firewalls : Show firewall settings
Primary ADLS Gen2 acco... : https://asadatalakecto.dfs.core.windows.net
Primary ADLS Gen2 file s... : tempdata
SQL admin username : asa.sql.admin
SQL Active Directory ad... : [redacted]
Dedicated SQL endpoint : asaworkspacecto.sql.azuresynapse.net
Serverless SQL endpoint : asaworkspacecto-ondemand.sql.azuresynapse.net
Development endpoint : https://asaworkspacecto.dev.azuresynapse.net

Name	Type	Size
SQL pools		
Built-in	Serverless	Auto
SQLPool01	Dedicated	DW500c
Apache Spark pools		
SparkPool01	Apache Spark pool	Small

With a SQL on-demand endpoint available, and an Azure Data Lake Storage Gen2 (ADLS Gen2) account, you can immediately realize value from the product by uploading files to the data lake, and using the SQL on-demand service to prepare and explore the files

Furthermore, while you are able to manage some aspects of the service in the Azure portal, the best practices is to connect to the Azure Synapse Studio to perform your activities from with there.

https://docs.microsoft.com/en-us/azure/synapse-analytics/quickstart-create-workspace

Question 56: Skipped

Which Index Type offers the highest compression in Synapse Analytics?

- ○ Replicated
- ○ Columnstore **(Correct)**
- ○ Heap
- ○ Round-Robin
- ○ Rowstore

Explanation

Columnstore is the default index type created for a table. It works on segments of rows that get compressed and optimized by column.

Dedicated SQL Pools have the following indexing options available:

Clustered columnstore index

Dedicated SQL Pools create a clustered columnstore index when no index options are specified on a table. Clustered columnstore indexes offer both the highest level of data compression as well as the best overall query performance. Clustered columnstore indexes will generally outperform clustered rowstore indexes or heap tables and are usually the best choice for large tables.

Additional compression on the data can be gained also with the index option `COLUMNSTORE_ARCHIVE`. These reduced sizes allow less memory to be used when accessing and using the data as well as reducing the IOPs required to retrieve data from storage.

Columnstore works on segments of 1,024,000 rows that get compressed and optimized by column. This segmentation further helps to filter out and reduce the data accessed through leveraging metadata stored which summarizes the range and values within each segment during query optimization.

https://docs.microsoft.com/en-us/azure/synapse-analytics/sql-data-warehouse/sql-data-warehouse-tables-index

Clustered index

Clustered Rowstore Indexes define how the table itself is stored, ordered by the columns used for the Index. There can be only one clustered index on a table.

Clustered indexes are best for queries and joins that require ranges of data to be scanned, preferably in the same order that the index is defined.

Non-clustered index

A non-clustered index can be defined on a table or view with a clustered index or on a heap. Each index row in the non-clustered index contains the non-clustered key value and a row locator. This is a data structure separate/additional to the table or heap. You can create multiple non-clustered indexes on a table.

Non clustered indexes are best used when used for the columns in a join, group by statement or where clauses that return an exact match or few rows.

https://docs.microsoft.com/en-us/sql/t-sql/statements/create-table-azure-sql-data-warehouse?view=aps-pdw-2016-au7

Question 57: Skipped

Identify the missing word(s) in the following sentence within the context of Microsoft Azure.

Azure Synapse Analytics is an integrated analytics platform, which combines data warehousing, big data analytics, data integration, and visualization into a single environment. Azure Synapse Analytics empowers users of all abilities to gain access and quick insights across all of their data, enabling a whole new level of performance and scale.

Diagnostic analytics deals with answering the question [?].

- ○ *"Why is it happening?"*
  (Correct)
- ○ *"What is likely to happen in the future based on previous trends and patterns?”*
- ○ *"When will the modification made meet my goals?"*
- ○ *"What is happening in my business?"*

Explanation

Azure Synapse Analytics is an integrated analytics platform, which combines data warehousing, big data analytics, data integration, and visualization into a single environment. Azure Synapse Analytics empowers users of all abilities to gain access and quick insights across all of their data, enabling a whole new level of performance and scale.

Gartner defines a range of analytical types that Azure Synapse Analytics can support including:

Descriptive analytics

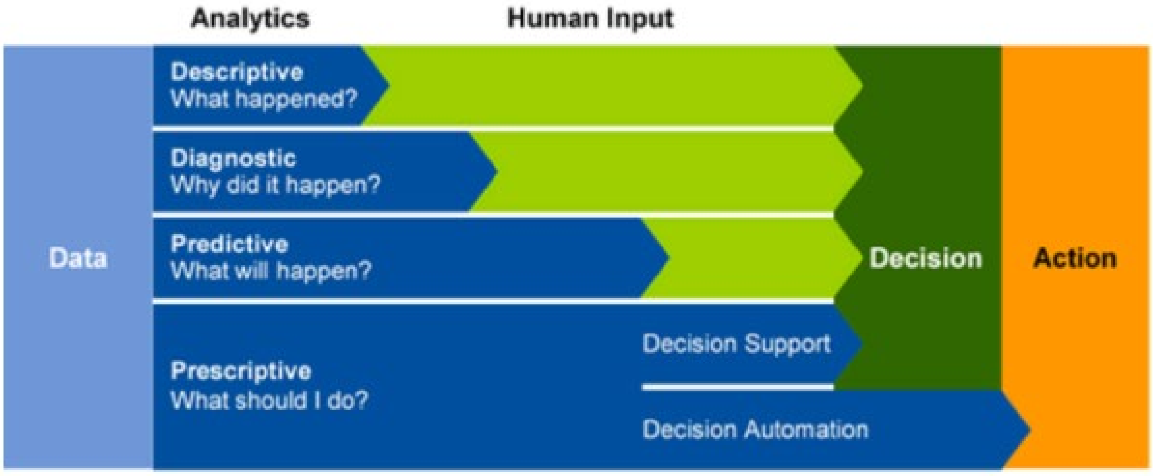
Descriptive analytics answers the question “What is happening in my business?” The data to answer this question is typically answered through the creation of a data warehouse. Azure Synapse Analytics leverages the dedicated SQL Pool capability that enables you to create a persisted data warehouse to perform this type of analysis. You can also make use of SQL Serverless to prepare data from files to create a data warehouse interactively to answer the question too.

Diagnostic analytics

Diagnostic analytics deals with answering the question **“Why is it happening?”** this may involve exploring information that already exists in a data warehouse, but typically involves a wider search of your data estate to find more data to support this type of analysis.

You can use the same SQL serverless capability within Azure Synapse Analytics that enables you to interactively explore data within a data lake. This can quickly enable a user to search for additional data that may help them to understand “Why is it happening?”

https://www.valamis.com/hub/descriptive-analytics



Predictive analytics

Azure Synapse Analytics also enables you to answer the question “What is likely to happen in the future based on previous trends and patterns?” by using its integrated Apache Spark engine. This can also be used in conjunction with other services such as Azure Machine Learning Services, or Azure Databricks.

https://www.ibm.com/analytics/predictive-analytics

Prescriptive analytics

This type of analytics looks at executing actions based on real-time or near real-time analysis of data, using predictive analytics. Azure Synapse Analytics provides this capability through both Apache Spark, Azure Synapse Link, and by integrating streaming technologies such as Azure Stream Analytics.

https://www.talend.com/resources/what-is-prescriptive-analytics/

Azure Synapse Analytics gives the users of the service the freedom to query data on their own terms, using either serverless or dedicated resources at scale. Azure Synapse Analytics brings these two worlds together with a unified data integration experience to ingest, prepare, manage, and serve data using Azure Synapse Pipelines. In addition, you can visualize the data in the form of dashboards and reports for immediate analysis using Power BI which is integrated into the service too.

https://docs.microsoft.com/en-us/azure/synapse-analytics/overview-what-is

Question 58: Skipped

Scenario: Your organization must respond to data events in real time in a continuous time-bound stream. The company must monitor IoT devices combined with remote patient monitoring to dispatch life-critical services.

Which would be the best Azure product to use?

- ○ Azure Table Storage
- ○ Azure Cosmos DB
- ○ Azure On-prem solution
- ○ Azure DataNow
- ○ Azure Synapse Analytics
- ○ Azure Stream Analytics **(Correct)**

Explanation

Applications, sensors, monitoring devices, and gateways broadcast continuous event data known as *data streams*. Streaming data is high volume and has a lighter payload than nonstreaming systems.

Data engineers use Azure Stream Analytics to process streaming data and respond to data anomalies in real time. You can use Stream Analytics for Internet of Things (IoT) monitoring, web logs, remote patient monitoring, and point of sale (POS) systems.

When to use Stream Analytics

If your organization must respond to data events in real time or analyze large batches of data in a continuous time-bound stream, Stream Analytics is a good solution. Your organization must decide whether to work with streaming data or batch data.

In real time, data is ingested from applications or IoT devices and gateways into an event hub or IoT hub. The event hub or IoT hub then streams the data into Stream Analytics for real-time analysis.

Batch systems process groups of data that are stored in an Azure Blob store. They do this in a single job that runs at a predefined interval. Don't use batch systems for business intelligence systems that can't tolerate the predefined interval. For example, an autonomous vehicle can't wait for a batch system to adjust its driving. Similarly, a fraud-detection system must decline a questionable financial transaction in real time.

Data ingestion

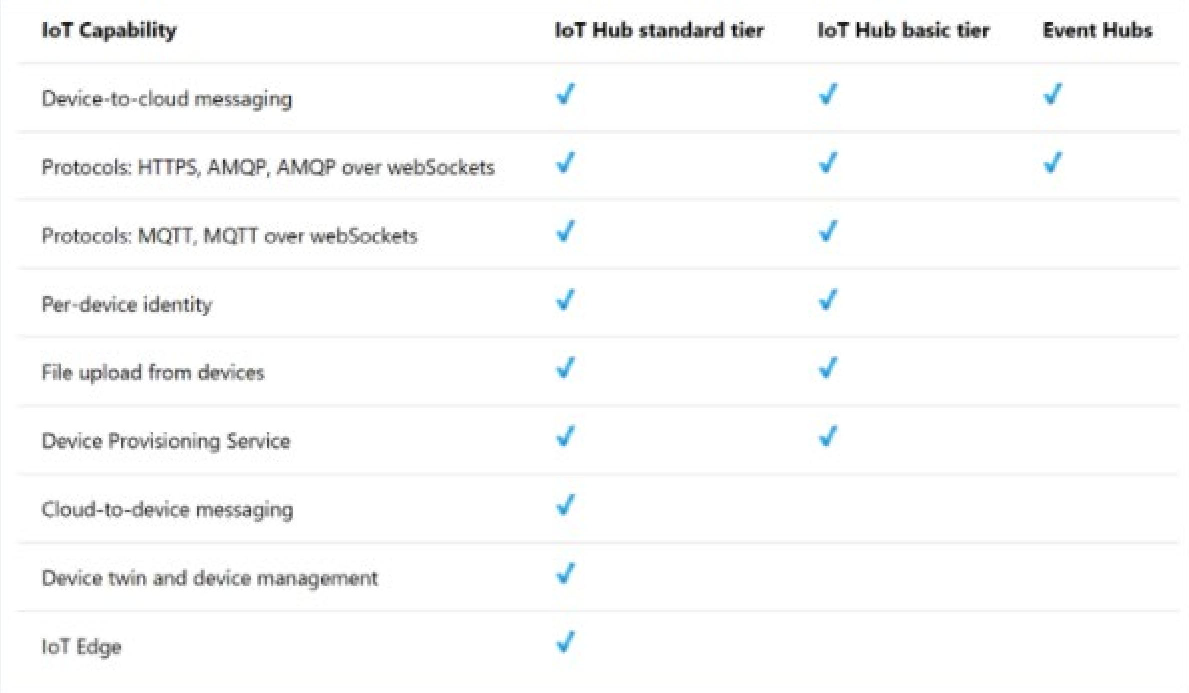
As a data engineer, set up data ingestion in Stream Analytics by configuring data inputs from first-class integration sources. These sources include Azure Event Hubs, Azure IoT Hub, and Azure Blob storage.

An IoT hub is the cloud gateway that connects IoT devices. IoT hubs gather data to drive business insights and automation.

Features in Azure IoT Hub enrich the relationship between your devices and your back-end systems. Bidirectional communication capabilities mean that while you receive data from devices, you can also send commands and policies back to devices. Take advantage of this ability, for example, to update properties or invoke device management actions. Azure IoT Hub can also authenticate access between the IoT device and the IoT hub.

Azure Event Hubs provides big-data streaming services. It's designed for high data throughput, allowing customers to send billions of requests per day. Event Hubs uses a partitioned consumer model to scale out your data stream. This service is integrated into the big-data and analytics services of Azure. These include Databricks, Stream Analytics, Azure Data Lake Storage, and HDInsight. Event Hubs provides authentication through a shared key.

You can use Azure Storage to store data before you process it in batches.



IoT Capability	IoT Hub standard tier	IoT Hub basic tier	Event Hubs
Device-to-cloud messaging	✓	✓	✓
Protocols: HTTPS, AMQP, AMQP over webSockets	✓	✓	✓
Protocols: MQTT, MQTT over webSockets	✓	✓	
Per-device identity	✓	✓	
File upload from devices	✓	✓	
Device Provisioning Service	✓	✓	
Cloud-to-device messaging	✓		
Device twin and device management	✓		
IoT Edge	✓		

https://docs.microsoft.com/en-us/azure/stream-analytics/stream-analytics-introduction

Question 59: Skipped

Scenario: Jungle.com uses Azure Cosmos DB to store sales orders and customer profile data from their eCommerce site. The NoSQL document store provided by the Azure Cosmos DB provides the familiarity of managing their data using SQL syntax, while being able to read and write the files at a massive, global scale.

While Jungle.com is happy with the capabilities and performance of Azure Cosmos DB, they are concerned about the cost of executing a large volume of complex analytical queries needed to fulfill their operational reporting requirements.

They want to efficiently access all their operational data stored in Cosmos DB without needing to increase the Azure Cosmos DB throughput and associate cost. They have looked at options for extracting data from their containers to the data lake as it changes, through the Azure Cosmos DB change feed mechanism.

The problem with this approach is the extra service and code dependencies and long-term maintenance of the solution. They could perform bulk exports from a Synapse Pipeline, but then they won't have the most up-to-date information at any given moment.

Which would be the best action to take?

- ○ Enable Azure VNet Peering for Cosmos DB and enable the analytical store on their Azure Cosmos DB containers.
- ○ Enable Azure Dedicated Connect for Cosmos DB and enable the analytical store on their Azure Cosmos DB containers.
- ○ Enable Azure Synapse Link for Cosmos DB and enable the analytical store on their Azure Cosmos DB containers.
  (Correct)
- ○ Enable Azure VPN Gateway for Cosmos DB and enable the analytical store on their Azure Cosmos DB containers.

Explanation

The best option is to enable Azure Synapse Link for Cosmos DB and enable the analytical store on their Azure Cosmos DB containers. With this configuration, all transactional data is automatically stored in a fully isolated column store. This store enables large-scale analytics against the operational data in Azure Cosmos DB, without impacting the transactional workloads or incurring additional costs. Azure Synapse Link for Cosmos DB creates a tight integration between Azure Cosmos DB and Azure Synapse Analytics, which enables Jungle.com to run near real-time analytics over their operational data with no-ETL and full performance isolation from their transactional workloads.

Hybrid Transactional/Analytics Processing (HTAP) enables businesses to perform analytics over database systems that provide high performance transactional capabilities without impacting the performance of these systems. This enables organizations to use a database to fulfill both transactional and analytical needs to support near real-time analysis of operational data to make timely decisions.

By combining the distributed scale of Cosmos DB's transactional processing and the built-in analytical store with the computing power of Azure Synapse Analytics, Azure Synapse Link enables a Hybrid Transactional/Analytical Processing (HTAP) architecture for optimizing Jungle.com business processes. This integration eliminates ETL processes, enabling business analysts, data engineers and data scientists to self-serve and run near real-time BI, analytics, and Machine Learning pipelines over operational data.

https://azure.microsoft.com/en-us/services/synapse-analytics/

Question 60: Skipped

True or False: The Apache Spark history server can be used to debug and diagnose completed only.

- ○
  True
- ○
  False
  (Correct)

Explanation

The Apache Spark history server can be used to debug and diagnose completed as well as running Spark applications.

You can use the Apache Spark history server web UI from the Azure Synapse Studio environment. Once you launch it, there are several tabs that you can use in order to monitor the Apache Spark application:

- Jobs

- Stages

- Storage

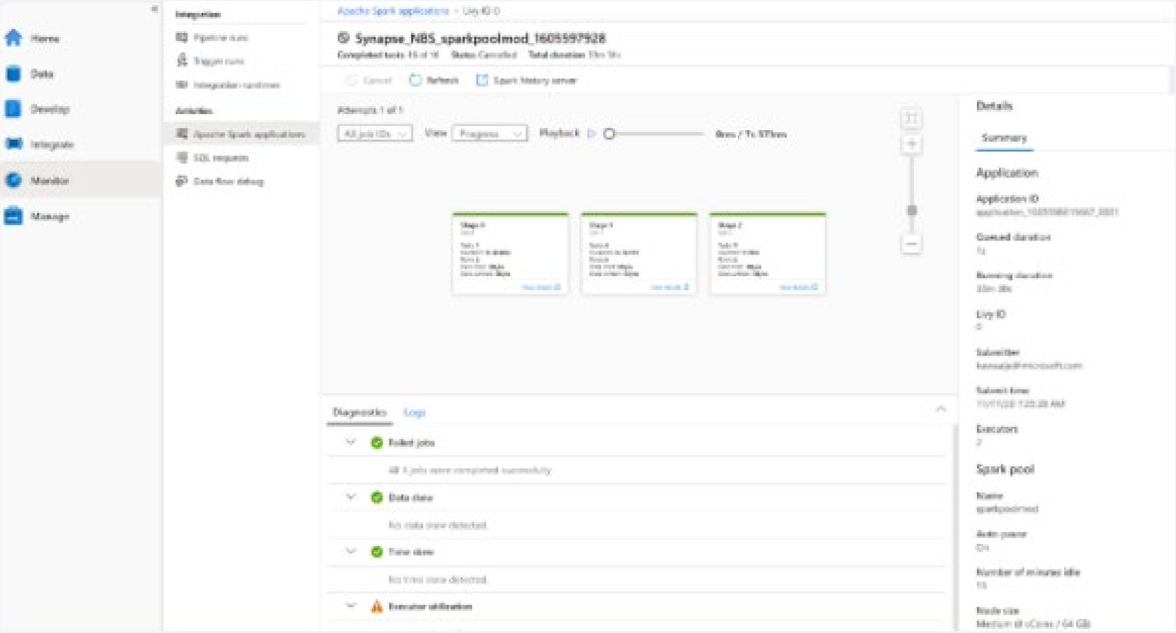
- Environment

- Executors

- SQL

The Apache Spark history server is the web user interface known as Spark UI for completed and running Spark applications. If you want to navigate to the Apache Spark History server, you can navigate to the Azure Synapse Analytics studio environment and go to the Monitor tab. In the Monitor tab, you can select 'Apache Spark Applications'.

To give you a visual interpretation of how that looks like, see below:



If you are familiar with Apache Spark, you can find the standard Apache Spark history server UI by selecting Open Spark UI.

The other possibility of opening the Apache Spark History server is by navigating to the Data tab, where if you create a notebook and read a dataframe you can go to the bottom of the page where you'll find the Spark History Server known as the Spark UI.

https://docs.microsoft.com/en-us/azure/synapse-analytics/spark/apache-spark-history-server

Question 61: Skipped

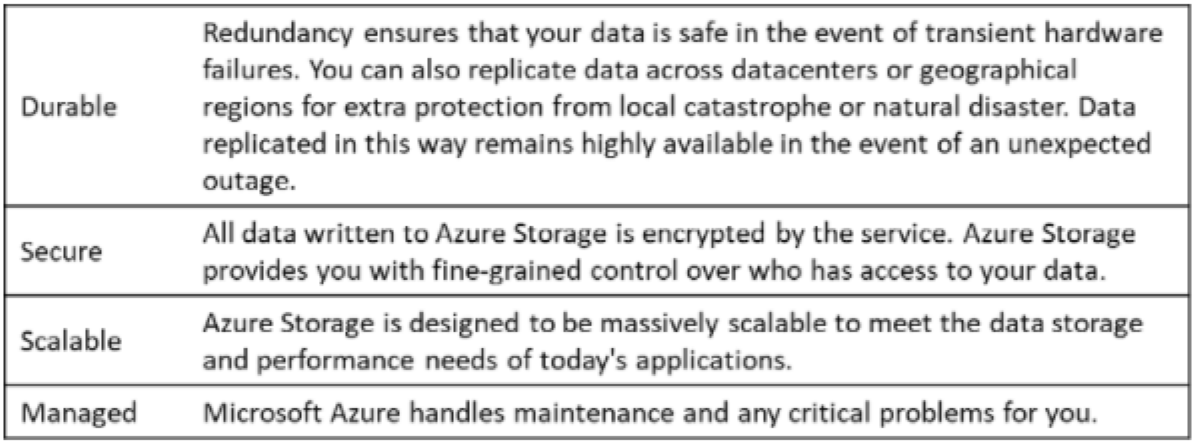
Identify the missing word(s) in the following sentence within the context of Microsoft Azure.

Microsoft Azure Storage is a managed service that provides durable, secure, and scalable storage in the cloud. Azure Files enables you to set up highly available network file shares that can be accessed using the standard Server Message Block (SMB) protocol. This means that multiple VMs can share the same files with both read and write access. You can read the files using the REST interface or the storage client libraries. You can also associate a unique URL to any file to allow fine-grained access to a private file for a set period of time.

Which are common scenarios where File shares can be used? (Select all that apply)

- □
  Storing shared configuration files for VMs, tools, or utilities so that everyone is using unique versions.
- □
  Shared data between on-premises applications and Azure VMs to allow migration of apps to the cloud over a period of time.
  (Correct)
- □
  Shared data between on-premises applications and Azure VMs to allow migration of apps to the cloud instantly.
- □
  Log files such as diagnostics, metrics, and crash dumps.
  (Correct)
- □
  Storing shared configuration files for VMs, tools, or utilities so that everyone is using the same version.
  (Correct)

Explanation
Microsoft Azure Storage is a managed service that provides durable, secure, and scalable storage in the cloud.



Durable	Redundancy ensures that your data is safe in the event of transient hardware failures. You can also replicate data across datacenters or geographical regions for extra protection from local catastrophe or natural disaster. Data replicated in this way remains highly available in the event of an unexpected outage.
Secure	All data written to Azure Storage is encrypted by the service. Azure Storage provides you with fine-grained control over who has access to your data.
Scalable	Azure Storage is designed to be massively scalable to meet the data storage and performance needs of today's applications.
Managed	Microsoft Azure handles maintenance and any critical problems for you.

A single Azure subscription can host up to 200 storage accounts, each of which can hold 500 TB of data.

Azure data services

Azure storage includes four types of data:

• Azure Blobs: A massively scalable object store for text and binary data. Can include support for Azure Data Lake Storage Gen2.

• **Files**: Managed file shares for cloud or on-premises deployments.

• Azure Queues: A messaging store for reliable messaging between application components.

• Azure Tables: A NoSQL store for schema-less storage of structured data. Table Storage is not covered in this module.

• Azure Disks: Block-level storage volumes for Azure VMs.

All of these data types in Azure Storage are accessible from anywhere in the world over HTTP or HTTPS. Microsoft provides SDKs for Azure Storage in various languages, and a REST API. You can also visually explore your data right in the Azure portal.

Files

Azure Files enables you to set up highly available network file shares that can be accessed using the standard Server Message Block (SMB) protocol. This means that multiple VMs can share the same files with both read and write access. You can also read the files using the REST interface or the storage client libraries. You can also associate a unique URL to any file to allow fine-grained access to a private file for a set period of time. File shares can be used for many common scenarios:

• Storing shared configuration files for VMs, tools, or utilities so that everyone is using the same version.

• Log files such as diagnostics, metrics, and crash dumps.

• Shared data between on-premises applications and Azure VMs to allow migration of apps to the cloud over a period of time.

https://docs.microsoft.com/en-us/azure/storage/common/storage-introduction

Question 62: Skipped

When talking about the Azure Databricks workspace, we refer to two different things.

• The first reference is the logical Azure Databricks environment in which clusters are created, data is stored (via DBFS), and in which the server resources are housed.

• The second reference is the more common one used within the context of Azure Databricks.

The first step to using Azure Databricks is to create and deploy a Databricks workspace, which is the logical environment. You can do this in the Azure portal.

There are a number of required values to create your Azure Databricks workspace.

Which are they? (Select five)

- □ Pricing Tier
  (Correct)
- □ Subscription
  (Correct)
- □ Autopilot Options
- □ Cluster Mode
- □ Resource Group
  (Correct)
- □ Workspace Name
  (Correct)
- □ Databricks RuntimeVersion
- □ Location
  (Correct)
- □ Node Type

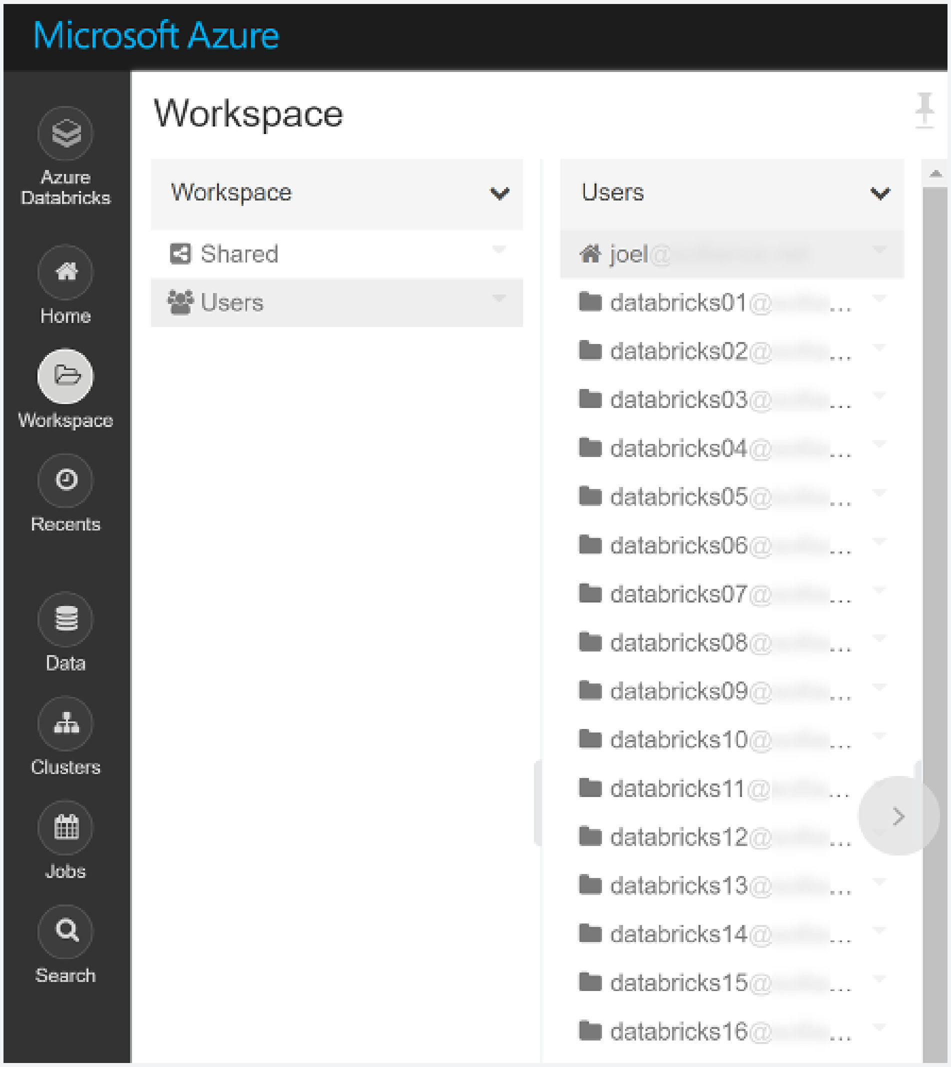
Explanation

When talking about the Azure Databricks workspace, we refer to two different things.

• The first reference is the logical Azure Databricks environment in which clusters are created, data is stored (via DBFS), and in which the server resources are housed.

• The second reference is the more common one used within the context of Azure Databricks.

That is the special root folder for all of your organization's Databricks assets, including notebooks, libraries, and dashboards, as shown below:



The first step to using Azure Databricks is to create and deploy a Databricks workspace, which is the logical environment. You can do this in the Azure portal.

Deploy an Azure Databricks workspace

1. Open the Azure portal.

2. Click **Create a Resource** in the top left

3. Search for "Databricks"

4. Select *Azure Databricks*

5. On the Azure Databricks page select *Create*

6. Provide the required values to create your Azure Databricks workspace:

- **Subscription**: Choose the Azure subscription in which to deploy the workspace.

- **Resource Group**: Use **Create new** and provide a name for the new resource group.

- **Location**: Select a location near you for deployment. For the list of regions that are supported by Azure Databricks, see Azure services available by region.

- **Workspace Name**: Provide a unique name for your workspace.

- **Pricing Tier**: **Trial (Premium - 14 days Free DBUs)**. You must select this option when creating your workspace or you will be charged. The workspace will suspend automatically after 14 days. When the trial is over you can convert the workspace to **Premium** but then you will be charged for your usage.

7.Select **Review + Create**.

8.Select **Create**.

The workspace creation takes a few minutes. During workspace creation, the **Submitting deployment for Azure Databricks** tile appears on the right side of the portal. You might need to scroll right on your dashboard to see the tile. There's also a progress bar displayed near the top of the screen. You can watch either area for progress.

What is a cluster?

The notebooks are backed by clusters, or networked computers, that work together to process your data. The first step is to create a cluster.

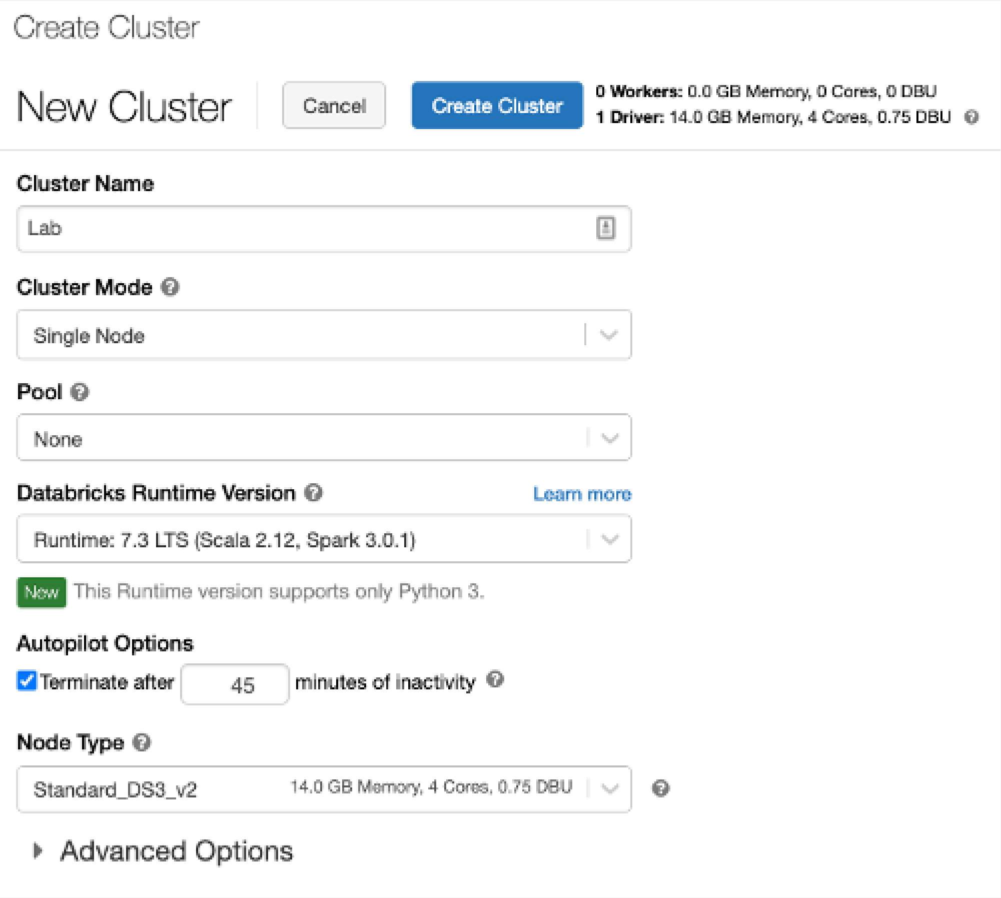
Create a cluster

1. When your Azure Databricks workspace creation is complete, select the link to go to the resource.

2. Select **Launch Workspace** to open your Databricks workspace in a new tab.

3. In the left-hand menu of your Databricks workspace, select **Clusters**.

4. Select **Create Cluster** to add a new cluster.



0 Workers: 0.0 GB Memory, 0 Cores, 0 DBU
1 Driver: 14.0 GB Memory, 4 Cores, 0.75 DBU

Cluster Name: Lab

Cluster Mode: Single Node

Pool: None

Databricks Runtime Version: Runtime: 7.3 LTS (Scala 2.12, Spark 3.0.1)

New This Runtime version supports only Python 3.

Autopilot Options

☑ Terminate after 45 minutes of inactivity

Node Type: Standard_DS3_v2 14.0 GB Memory, 4 Cores, 0.75 DBU

5. Enter a name for your cluster. Use your name or initials to easily differentiate your cluster from your coworkers.

6. Select the Cluster Mode: Single Node.

7. Select the Databricks RuntimeVersion: Runtime: 7.3 LTS (Scala 2.12, Spark 3.0.1).

8. Under Autopilot Options, leave the box checked and in the text box enter 45.

9. Select the Node Type: Standard_DS3_v2.

10. Select Create Cluster.

https://docs.microsoft.com/en-us/azure/databricks/clusters/create

---

Question 63: Skipped

You can use either the REST API or the Azure client library to programmatically access a storage account. What is the primary advantage of using the client library?

- ○ Cost
- ○ Availability
- ○ Convenience (Correct)
- ○ Localization

Explanation

Code that uses the client library is much shorter and simpler than code that uses the REST API. The client library handles assembling requests and parsing responses for you.

https://docs.microsoft.com/en-us/azure/storage/common/storage-account-overview

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Question 64: Skipped

Identify the missing word(s) in the following sentence within the context of Microsoft Azure.

A(n) [?] is an orchestration of pipeline activities that includes chaining activities in a sequence, branching, defining parameters at the pipeline level, and passing arguments while invoking the pipeline on demand or from a trigger.

- ○ Data Flow
- ○ Control Flow (Correct)
- ○ Procedure
- ○ Workflow
- ○ Test Lab
- ○ Activity

Explanation

A Control Flow is an orchestration of pipeline activities that includes chaining activities in a sequence, branching, defining parameters at the pipeline level, and passing arguments while invoking the pipeline on demand or from a trigger.

It also includes custom-state passing and looping containers, that are, For-each iterators. If a `ForEach` loop is used as a control flow activity, Azure Data Factory can start these multiple copy activities in parallel.

This allows you to build complex and iterative processing logic within the pipelines you create with Azure Data Factory. It supports diverse integration flows and patterns in the modern data warehouse, by enabling this flexible data pipeline model.

Chaining activities

Within Azure Data Factory you can chain activities in a sequence within a pipeline. It is possible to use the `dependsOn` property in an activity definition to chain it with an upstream activity.

Branching activities

Use Azure Data Factory for Branching activities within a pipeline. An example of a branching activity is *TheIf-condition* activity which is similar to an if-statement provided in programming languages. A branching activity evaluates a set of activities when the condition evaluates to true and another set of activities when the condition evaluates to false.

Parameters

You can define parameters at the pipeline level and pass arguments while you're invoking the pipeline on-demand or from a trigger. Activities can consume the arguments that are passed to the pipeline.

Custom state passing

Custom state passing is made possible with Azure Data Factory. Custom state passing is an activity that created output or the state of the activity that needs to be consumed by a subsequent activity in the pipeline. An example, is that in a JSON definition of an activity, you can access the output of the previous activity. Using custom state passing, enables you to build workflows where values are passing through activities.

Looping containers

The looping containers umbrella of control flow such as the `ForEach` activity defines repetition in a pipeline. It enables you to iterate over a collection and runs specified activities in the defined loop. It works similar as the 'for each looping structure' used in programming languages. Besides for each activity, there is also an Until activity. This functionality is similar to a do-until loop used in programming. What it does is running a set of activities (do) in a loop until the condition (until) is met.

Trigger based flows

Pipelines can be triggered by on-demand (event-based, i.e. blob post) or wall-clock time.

Invoke a pipeline from another pipeline

The Execute Pipeline activity with Azure Data Factory allows a Data Factory pipeline to invoke another pipeline.

Delta flows

Use-cases related to using delta flows, is delta loads. Delta loads in ETL patterns will only load data that has changed since a previous iteration of a pipeline. Capabilities such as lookup activity, and flexible scheduling helps handling delta load jobs. In case of using a Lookup activity, it will read or look up a record or table name value from any external source. This output can further be referenced by succeeding activities.

Other control flows

There are many more control flow activities. Below you find a couple of other useful activities.

- Web activity: The web activity in Azure Data Factory using control flows, can call a custom `RESTendpoint` from a Data Factory pipeline. Datasets and linked services can be passed in order to get consumed by the activity.

- Get metadata activity: The Get metadata activity retrieves the metadata of any data in Azure Data Factory.

https://docs.microsoft.com/en-us/azure/data-factory/introduction

Question 65: Skipped

Identify the missing word(s) in the following sentence within the context of Microsoft Azure.

[?] for Storage provides an extra layer of security intelligence that detects unusual and potentially harmful attempts to access or exploit storage accounts. This layer of protection allows you to address threats without being a security expert or managing security monitoring systems.

Security alerts are triggered when anomalies in activity occur. These security alerts are integrated with Azure Security Centre, and are also sent via email to subscription administrators, with details of suspicious activity and recommendations on how to investigate and remediate threats.

- ○ Azure Defender (Correct)
- ○ Azure RBAC
- ○ Azure Shield
- ○ Azure Armour
- ○ Azure Vault

Explanation

Azure Defender for Storage provides an extra layer of security intelligence that detects unusual and potentially harmful attempts to access or exploit storage accounts. This layer of protection allows you to address threats without being a security expert or managing security monitoring systems.

Security alerts are triggered when anomalies in activity occur. These security alerts are integrated with Azure Security Centre, and are also sent via email to subscription administrators, with details of suspicious activity and recommendations on how to investigate and remediate threats.

Azure Defender for Storage is currently available for Blob storage, Azure Files, and Azure Data Lake Storage Gen2. Account types that support Azure Defender include general-purpose v2, block blob, and Blob storage accounts. Azure Defender for Storage is available in all public clouds and US government clouds, but not in other sovereign or Azure Government cloud regions.

Accounts with hierarchical namespaces enabled for Data Lake Storage support transactions using both the Azure Blob storage APIs and the Data Lake Storage APIs. Azure file shares support transactions over SMB.

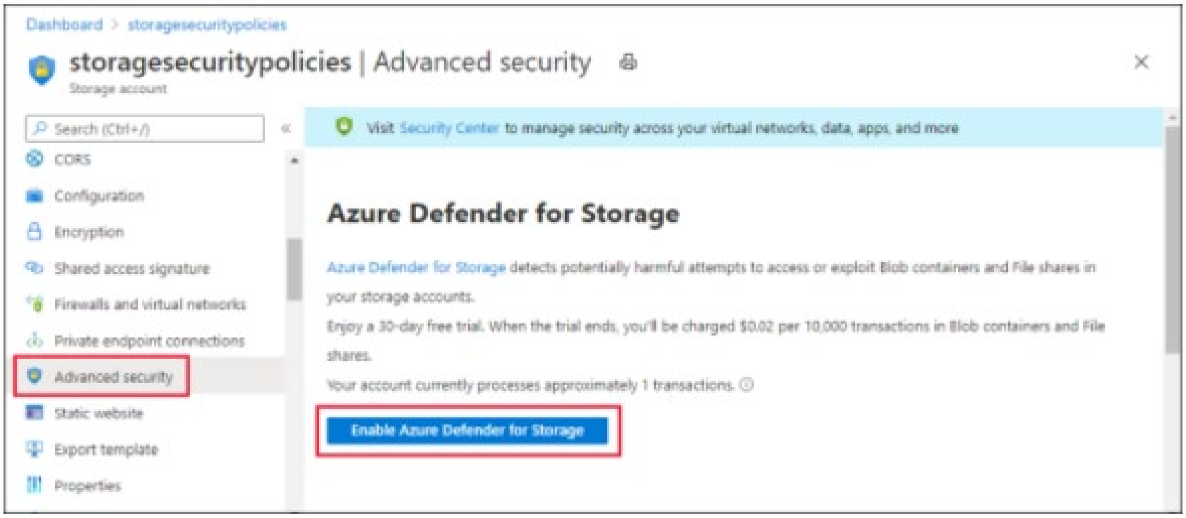
You can turn on Azure Defender for Storage in the Azure portal through the configuration page of the Azure Storage account, or in the advanced security section of the Azure portal.

Follow these steps.

1. Launch the Azure portal.

2. Navigate to your storage account. Under **Settings**, select **Advanced security**.

3. Select **Enable Azure Defender for Storage**.



Dashboard > storagesecuritypolicies

storagesecuritypolicies | Advanced security

Storage account

Visit Security Center to manage security across your virtual networks, data, apps, and more

Azure Defender for Storage

Azure Defender for Storage detects potentially harmful attempts to access or exploit Blob containers and File shares in your storage accounts.

Enjoy a 30-day free trial. When the trial ends, you'll be charged $0.02 per 10,000 transactions in Blob containers and File shares.

Your account currently processes approximately 1 transactions.

https://docs.microsoft.com/en-us/azure/security-center/defender-for-storage-introduction

Question 66: Skipped

Scenario: You are working as a consultant at **Advanced Idea Mechanics** (**A.I.M.**) who is a privately funded think tank organized of a group of brilliant scientists whose sole dedication is to acquire and develop power through technological means. Their goal is to use this power to overthrow the governments of the world. They supply arms and technology to radicals and subversive organizations in order to foster a violent technological revolution of society while making a profit.

The company has 10,000 employees. Most employees are located in Europe. The company supports teams worldwide.

AIM has two main locations: a main office in London, England, and a manufacturing plant in Berlin, Germany.

During events, 100 engineers set up a remote portable office by using a VPN to connect the datacentre in the London office. The portable office is set up and torn down in approximately 20 different countries each year.

AIM runs Microsoft SQL Server in an on-premises virtual machine (VM).

Required:

• Migration of the database to Azure SQL Database

• Synchronize users from Active Directory to Azure Active Directory (Azure AD)

• Configure Azure SQL Database to use an Azure AD user as administrator

Which of the following should be configured?

- ○ For each Azure SQL Database, set the Access Control to administrator.
- ○ For each Azure SQL Database server, set the Access Control to administrator.
- ○ For each Azure SQL Database, set the Active Directory administrator role. **(Correct)**
- ○ For each Azure SQL Database server, set the Active Directory to administrator.

Explanation

There are two administrative accounts (Server admin and Active Directory admin) that act as administrators.

One Azure Active Directory account, either an individual or security group account, can also be configured as an administrator. It is optional to configure an Azure

AD administrator, but an Azure AD administrator must be configured if you want to use Azure AD accounts to connect to SQL Database.

Authentication and authorization

Authentication is the process of proving the user is who they claim to be. A user connects to a database using a user account. When a user attempts to connect to a database, they provide a user account and authentication information. The user is authenticated using one of the following two authentication methods:

- SQL authentication.

With this authentication method, the user submits a user account name and associated password to establish a connection. This password is stored in the master database for user accounts linked to a login or stored in the database containing the user accounts *not* linked to a login.

- Azure Active Directory Authentication

With this authentication method, the user submits a user account name and requests that the service use the credential information stored in Azure Active Directory (Azure AD).

Logins and users: A user account in a database can be associated with a login that is stored in the master database or can be a user name that is stored in an individual database.

- A **login** is an individual account in the master database, to which a user account in one or more databases can be linked. With a login, the credential information for the user account is stored with the login.

- A **user account** is an individual account in any database that may be, but does not have to be, linked to a login. With a user account that is not linked to a login, the credential information is stored with the user account.

Authorization to access data and perform various actions are managed using database roles and explicit permissions. Authorization refers to the permissions assigned to a user, and determines what that user is allowed to do. Authorization is controlled by your user account's database role memberships and object-level permissions. As a best practice, you should grant users the least privileges necessary.

Existing logins and user accounts after creating a new database

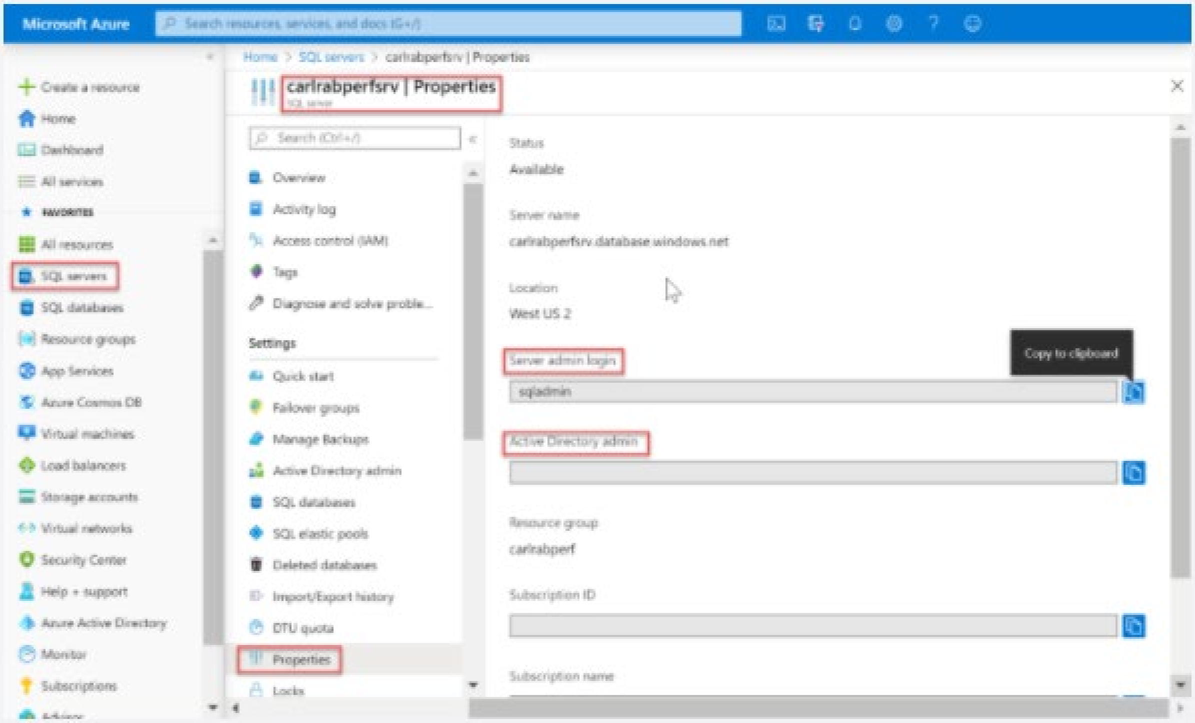
When you first deploy Azure SQL, you specify an admin login and an associated password for that login. This administrative account is called **Server admin**. The following configuration of logins and users in the master and user databases occurs during deployment:

• A SQL login with administrative privileges is created using the login name you specified. A login is an individual user account for logging in to SQL Database, SQL Managed Instance, and Azure Synapse.

• This login is granted full administrative permissions on all databases as a server-level principal. The login has all available permissions and can't be limited. In a SQL Managed Instance, this login is added to the sysadmin fixed server role (this role does not exist in Azure SQL Database).

• A user account called `dbo` is created for this login in each user database. The dbo user has all database permissions in the database and is mapped to the `db_owner` fixed database role. Additional fixed database roles are discussed later in this article.

To identify the administrator accounts for a database, open the Azure portal, and navigate to the **Properties** tab of your server or managed instance.



Status
Available

Server name
carlrabperfsrv.database.windows.net

Location
West US 2

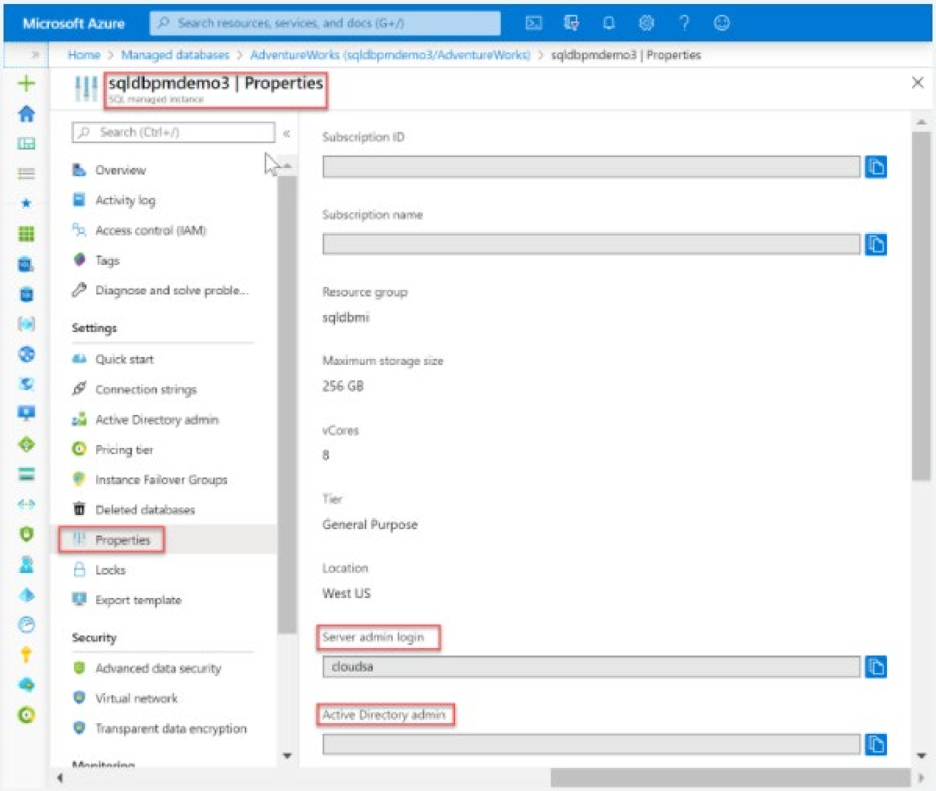
Server admin login
sqladmin

Active Directory admin

Resource group
carlrabperf

Subscription ID

Subscription name



Subscription ID

Subscription name

Resource group
sqldbmi

Maximum storage size
256 GB

vCores
8

Tier
General Purpose

Location
West US

Server admin login
cloudsa

Active Directory admin

*Important: The admin login name can't be changed after it has been created. To reset the password for the server admin, go to the Azure portal, click **SQL Servers**, select the server from the list, and then click **Reset Password**. To reset the password for the SQL Managed Instance, go to the Azure portal, click the instance, and click **Reset password**. You can also use PowerShell or the Azure CLI.*

Create additional logins and users having administrative permissions

At this point, your server or managed instance is only configured for access using a single SQL login and user account. To create additional logins with full or partial administrative permissions, you have the following options (depending on your deployment mode):

Create an Azure Active Directory administrator account with full administrative permissions

Enable Azure Active Directory authentication and create an Azure AD administrator login. One Azure Active Directory account can be configured as an administrator of the Azure SQL deployment with full administrative permissions. This account can be either an individual or security group account. An Azure AD administrator **must** be configured if you want to use Azure AD accounts to connect to SQL Database, SQL Managed Instance, or Azure Synapse. For detailed information on enabling Azure AD authentication for all Azure SQL deployment types, see the following articles:

- Use Azure Active Directory authentication for authentication with SQL

- Configure and manage Azure Active Directory authentication with SQL

In SQL Managed Instance, create SQL logins with full administrative permissions

- Create an additional SQL login in the master database.

- Add the login to the sysadmin fixed server role using the ALTER SERVER ROLE statement. This login will have full administrative permissions.

- Alternatively, create an Azure AD login using the CREATE LOGIN syntax.

In SQL Database, create SQL logins with limited administrative permissions

- Create an additional SQL login in the master database.

- Create a user account in the master database associated with this new login.

- Add the user account to the `dbmanager`, the `loginmanager` role, or both in the `master` database using the ALTER ROLE statement (for Azure Synapse, use the sp_addrolemember statement).

Members of these special master database roles for Azure SQL Database have authority to create and manage databases or to create and manage logins. In databases created by a user that is a member of the `dbmanager` role, the member is mapped to the `db_owner` fixed database role and can log into and manage that database using the `dbo` user account. These roles have no explicit permissions outside of the master database.

https://docs.microsoft.com/en-us/azure/sql-database/sql-database-manage-logins

Question 67: Skipped

Scenario: Your team has deployed a factory to production and realizes there's a bug that needs to be fixed right away, but you can't deploy the current collaboration branch.

What is the best action to take?

- ○ None of the listed options
- ○ Create a rollback to a savepoint
- ○ Deploy a hotfix
  (Correct)
- ○ Deploy a timeshift
- ○ Utilize a workhole

Explanation
Hotfix production environment

If you deploy a factory to production and realize there's a bug that needs to be fixed right away, but you can't deploy the current collaboration branch, you might need to deploy a hotfix. This approach is as known as quick-fix engineering or QFE.

1. In Azure DevOps, go to the release that was deployed to production. Find the last commit that was deployed.

2. From the commit message, get the commit ID of the collaboration branch.

3. Create a new hotfix branch from that commit.

4. Go to the Azure Data Factory UX and switch to the hotfix branch.

5. By using the Azure Data Factory UX, fix the bug. Test your changes.

6. After the fix is verified, select **Export ARM Template** to get the hotfix Resource Manager template.

7. Manually check this build into the publish branch.

8. If you've configured your release pipeline to automatically trigger based on adf_publish check-ins, a new release will start automatically. Otherwise, manually queue a release.

9. Deploy the hotfix release to the test and production factories. This release contains the previous production payload plus the fix that you made in step 5.

10. Add the changes from the hotfix to the development branch so that later releases won't include the same bug.

https://docs.microsoft.com/en-us/azure/data-factory/continuous-integration-deployment

Question 68: Skipped

Scenario: You are working at an online retailer and have been tasked with finding average of sales transactions by storefront.

Which of the following aggregates would you use?

- ○ `df.select(col("storefront")).avg("completedTransactions")`
- ○ `df.select(col("storefront")).avg("completedTransactions").groupBy(col("storefront"))`
- ○ `df.groupBy(col("storefront")).avg("completedTransactions")` (Correct)
- ○ `df.groupBy(col("storefront")).avg(col("completedTransactions"))`

Explanation

The syntax `df.groupBy(col("storefront")).avg("completedTransactions")` groups the data by the storefront Column, then calculates the average value of completed sales transactions.

https://docs.databricks.com/spark/latest/dataframes-datasets/introduction-to-dataframes-python.html

Question 69: Skipped

Which is the correct syntax for overwriting data in Azure Synapse Analytics from a Databricks notebook?

- ○

  `df.write.format("com.databricks.spark.sqldw").mode("overwrite").option("...").option("...").save()`

  (Correct)

- ○

  `df.write.mode("overwrite").option("...").option("...").save()`

- ○

  `df.write.format("com.databricks.spark.sqldw").update().option("...").option("...").save()`

- ○

  `df.write.format("com.databricks.spark.sqldw").overwrite().option("...").option("...").save()`

Explanation

`df.write.format("com.databricks.spark.sqldw").mode("overwrite").option("...").option("...").save()` is the correct syntax for overwriting data in Azure Synapse Analytics from a Databricks notebook.

The key is to specify the correct format, intended write mode, and options that specify the Azure Synapse Analytics properties.

https://docs.microsoft.com/en-us/azure/databricks/delta/delta-batch

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Question 70: Skipped

The following are the facets of Azure Databricks security:

• Data Protection

• IAM/Auth

• Network

• Compliance

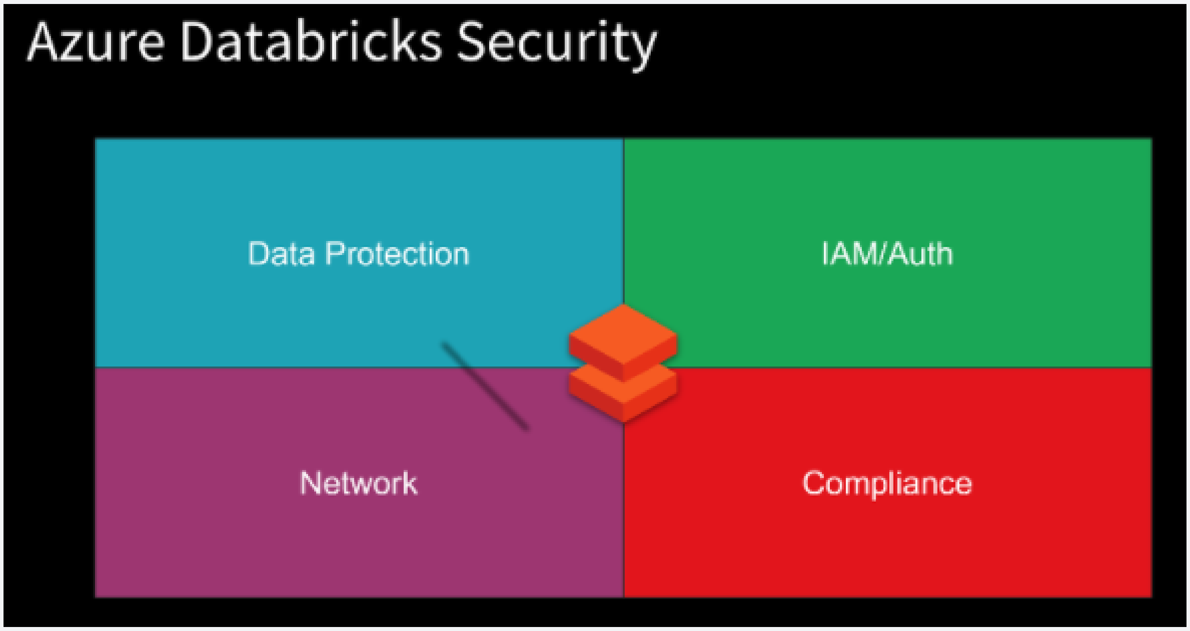
Which of the following comprise Data Protection within Azure Databricks security? (Select five)

- □ VNet Injection
- □ Managed Keys
  (Correct)
- □ TLS
  (Correct)
- □ Azure VNet service endpoints
- □ ACLs
  (Correct)
- □ AAD
  (Correct)
- □ Vault Secrets
  (Correct)
- □ Azure Private Link
- □ VNet Peering

Explanation

The following are the facets of Azure Databricks security:

- Data Protection
- IAM/Auth
- Network
- Compliance



Azure Databricks Security

Data Protection

IAM/Auth

Network

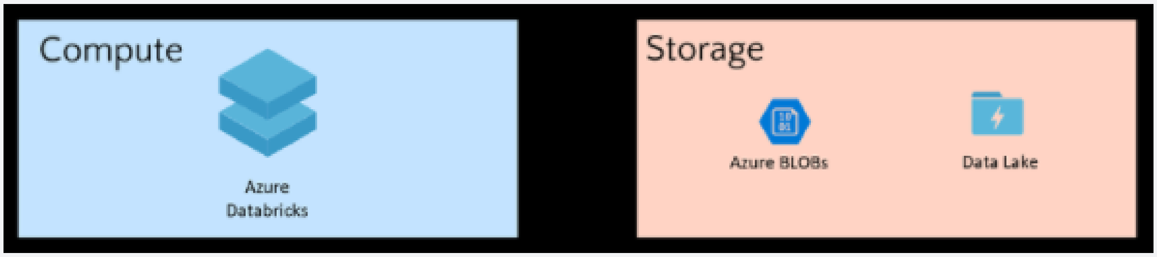
Compliance

Data Protection is comprised of the following:

- Encryption at-rest – Service Managed Keys, User Managed Keys
- Encryption in-transit (Transport Layer Security - TLS)
- File/Folder Level access control lists (ACLs) for Azure Active Directory (AAD) Users, Groups, Service Principals
- ACLs for Clusters, Folders, Notebooks, Tables, Jobs
- Secrets with Azure Key Vault

Encryption at-rest

Azure Databricks has separation of compute and storage.



Azure Databricks is a compute platform. It does not store data, except for notebooks. Clusters are transient in nature. They process the data then are terminated. All data is stored in the customer's subscription. Because the Azure storage services use server-side encryption, communication between these services and the Databricks clusters is seamless.

Storage Services such as Azure Storage Blobs and Azure Data Lake Storage (Gen1/2) provide:

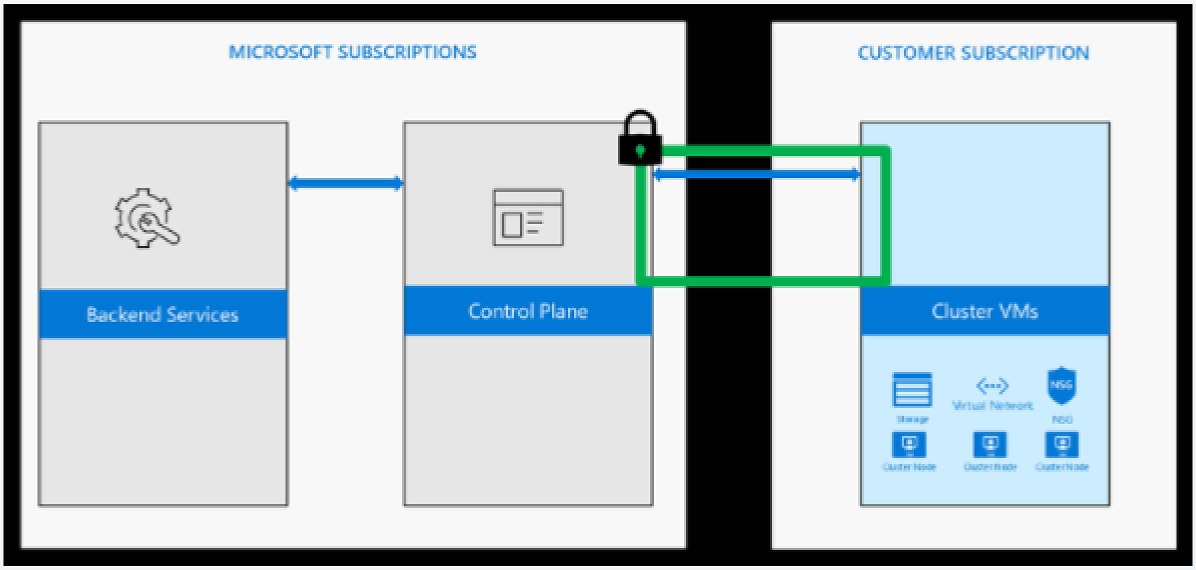
- Encryption of Data - Automatic server-side encryption in addition to encryption on storage attached to the VMs

- Customer Managed Keys - Bring your own keys with Key Vault integration

- File/Folder Level ACLs (Azure Data Lake Storage (Gen1/2))

Encryption in-transit

All the traffic from the Control Plane to the clusters in the customer subscription (Data Plane) is always encrypted with TLS.



When clusters access data from various Azure services, TLS is always used to ensure encryption in-transit.

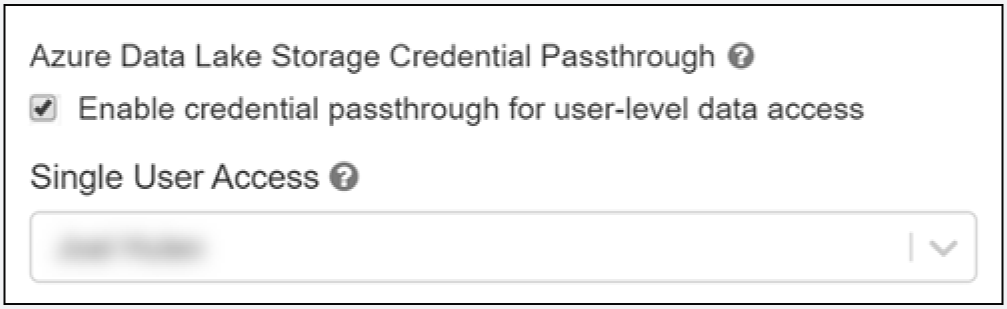
When customers access notebooks via their web browsers, the connection is also secured with TLS.

Access control - ADLS Passthrough

When enabled, authentication automatically takes place in Azure Data Lake Storage (ADLS) from Azure Databricks clusters using the same Azure Active Directory (Azure AD) identity that one uses to log into Azure Databricks. Commands running on a configured cluster will be able to read and write data in ADLS without needing to configure service principal credentials. Any ACLs applied at the folder or file level in ADLS are enforced based on the user's identity.

ADLS Passthrough is configured when you create a cluster in the Azure Databricks workspace. ADLS Gen1 requires Databricks Runtime 5.1+. ADLS Gen2 requires 5.3+.

On a *standard cluster*, when you enable this setting you must set single user access to one of the Azure Active Directory (AAD) users in the Azure Databricks workspace. Only one user is allowed to run commands on this cluster when Credential Passthrough is enabled.



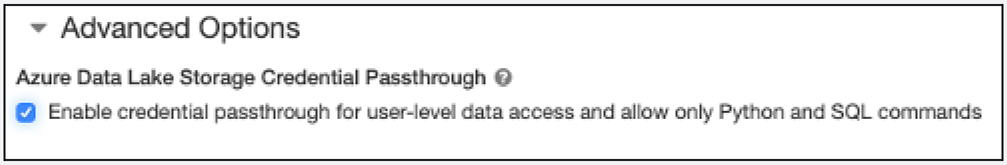
Azure Data Lake Storage Credential Passthrough

☑ Enable credential passthrough for user-level data access

Single User Access

[redacted]

High-concurrency clusters can be shared by multiple users. When you enable ADLS Passthrough on this type of cluster, it does not require you to select a single user.



▾ Advanced Options

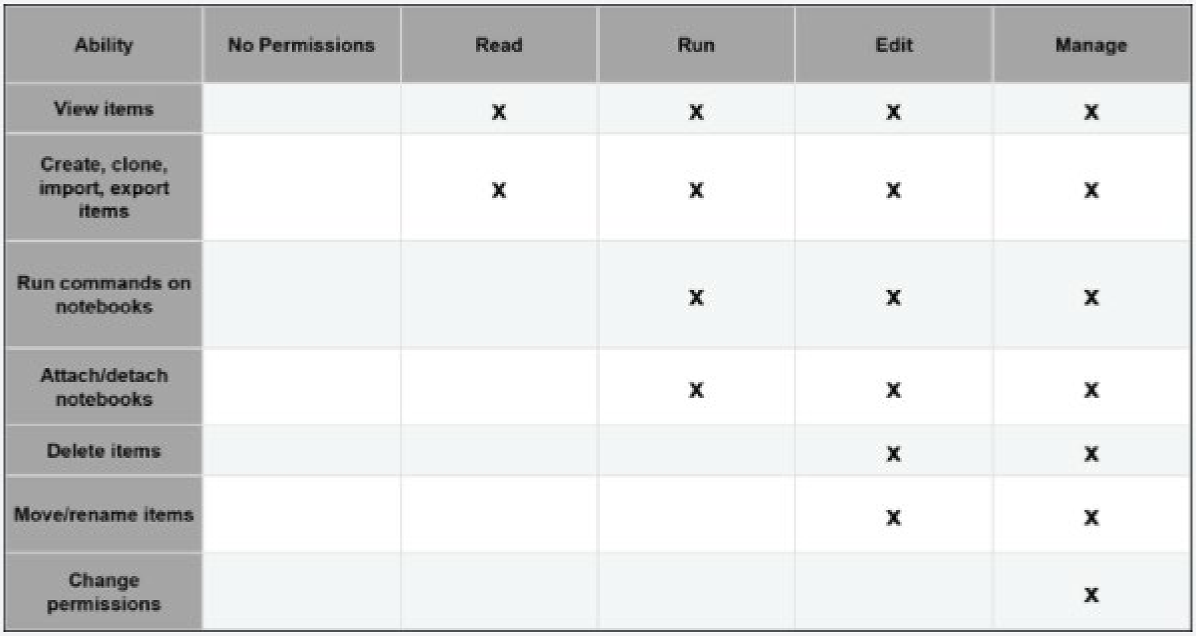
Azure Data Lake Storage Credential Passthrough

☑ Enable credential passthrough for user-level data access and allow only Python and SQL commands

Access control - Folders

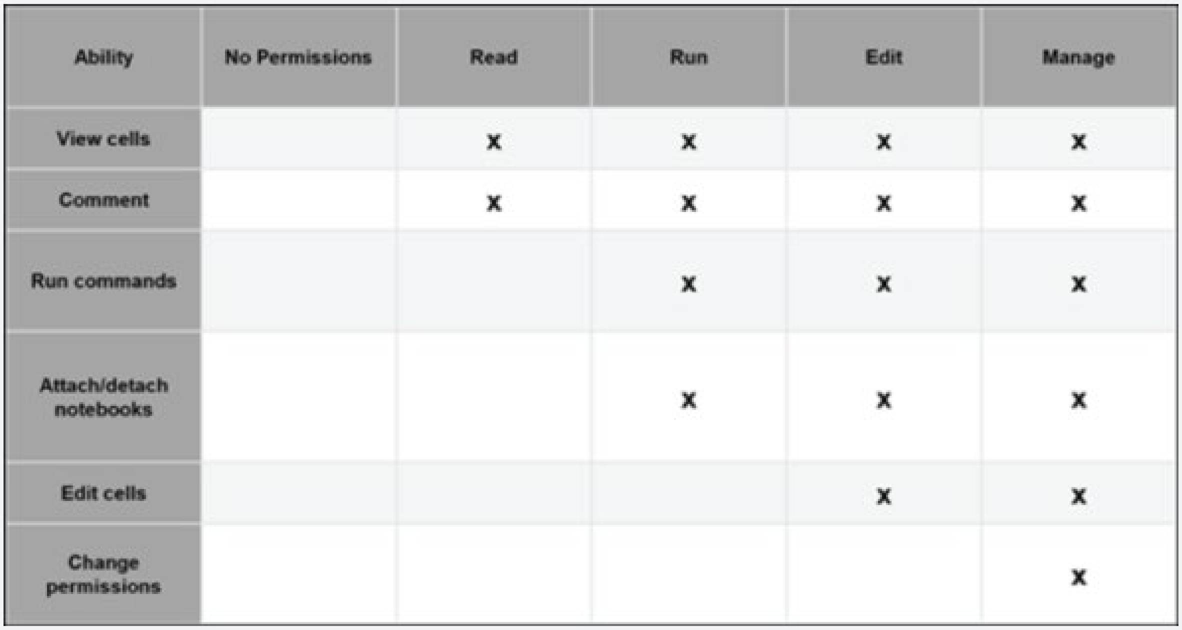
Access control is available only in the Premium SKU. By default, all users can create and modify workspace objects unless an administrator enables workspace access control. With workspace access control, individual permissions determine a user's abilities. This section describes the individual permissions and how to enable and configure workspace access control.

You can assign five permission levels to notebooks and folders: No Permissions, Read, Run, Edit, and Manage. The following tables lists the abilities for each permission.



Ability	No Permissions	Read	Run	Edit	Manage
View items		x	x	x	x
Create, clone, import, export items		x	x	x	x
Run commands on notebooks			x	x	x
Attach/detach notebooks			x	x	x
Delete items				x	x
Move/rename items				x	x
Change permissions					x

Access control - Notebooks



Ability	No Permissions	Read	Run	Edit	Manage
View cells		x	x	x	x
Comment		x	x	x	x
Run commands			x	x	x
Attach/detach notebooks			x	x	x
Edit cells				x	x
Change permissions					x

All notebooks in a folder inherit all permissions settings of that folder. For example, a user that has Run permission on a folder has Run permission on all notebooks in that folder.

To enable workspace access control:

- Go to the Admin Console.

- Select the Access Control tab.

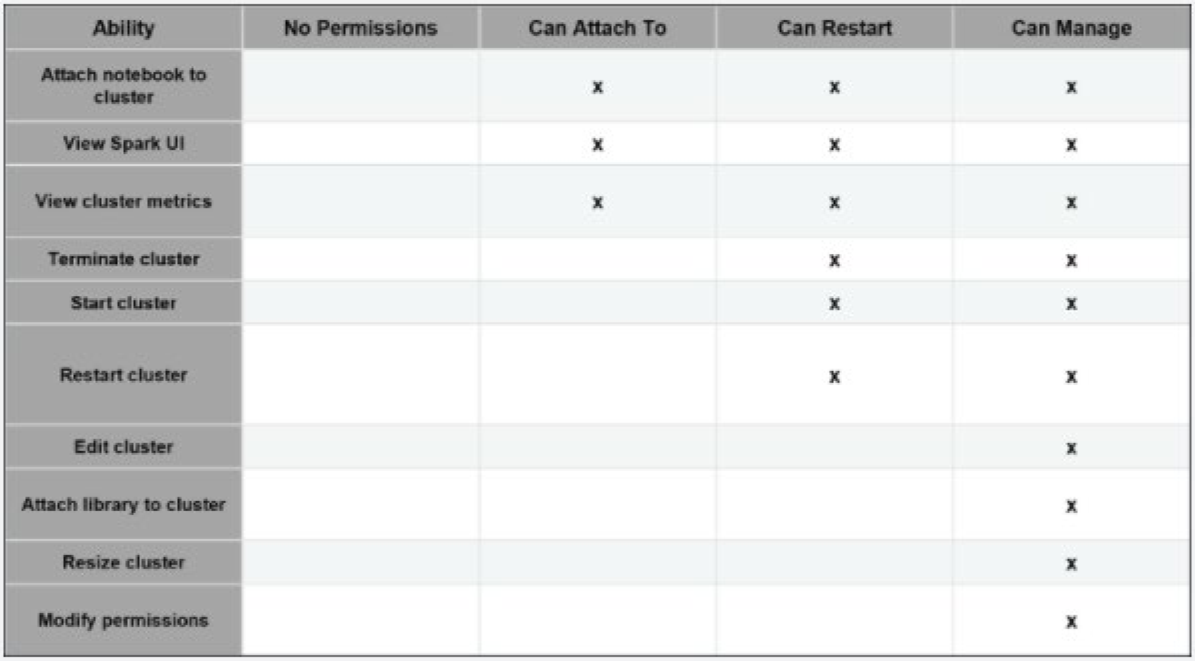
- Click the Enable button next to Workspace Access Control.

- Click Confirm to confirm the change.

Access control - Clusters

All users can view libraries. To control who can attach libraries to clusters, manage access control on clusters.

By default, all users can create and modify clusters unless an administrator enables cluster access control. With cluster access control, permissions determine a user's abilities. There are four permission levels for a cluster: No Permissions, Can Attach To, Can Restart, and Can Manage:



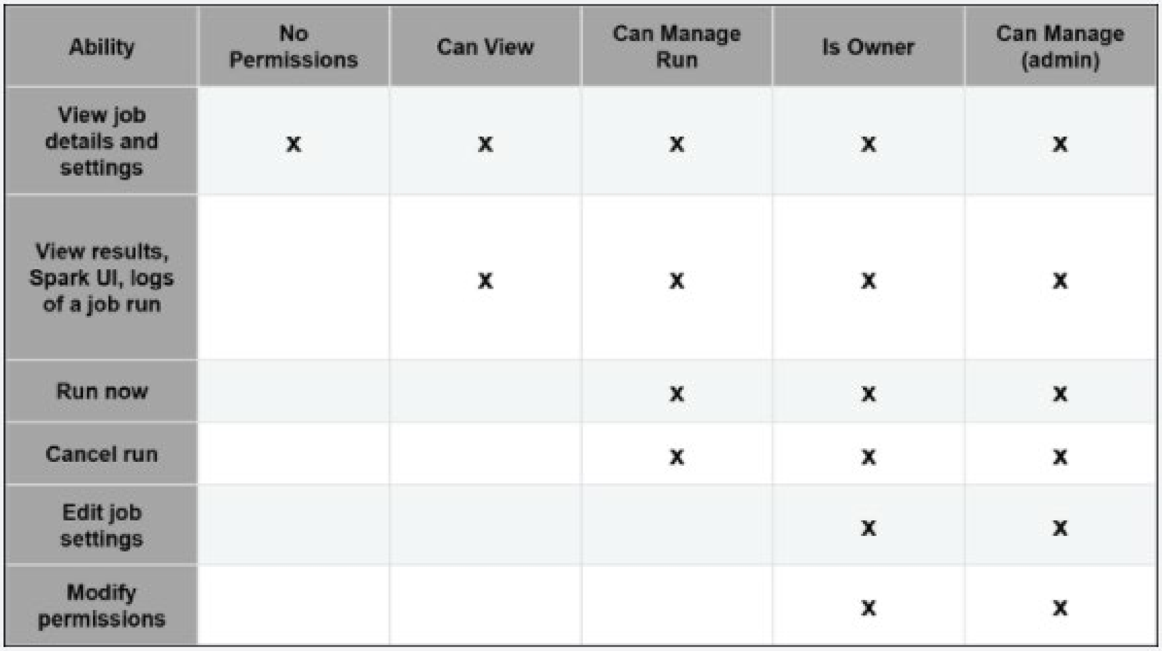
Ability	No Permissions	Can Attach To	Can Restart	Can Manage
Attach notebook to cluster		x	x	x
View Spark UI		x	x	x
View cluster metrics		x	x	x
Terminate cluster			x	x
Start cluster			x	x
Restart cluster			x	x
Edit cluster				x
Attach library to cluster				x
Resize cluster				x
Modify permissions				x

Note: You have Can Manage permission for any cluster that you create.

Access control - Jobs

To control who can run jobs and see the results of job runs, manage access control on jobs.

There are five permission levels for jobs: No Permissions, Can View, Can Manage Run, Is Owner, and Can Manage. The Can Manage permission is reserved for administrators.



Ability	No Permissions	Can View	Can Manage Run	Is Owner	Can Manage (admin)
View job details and settings	x	x	x	x	x
View results, Spark UI, logs of a job run		x	x	x	x
Run now			x	x	x
Cancel run			x	x	x
Edit job settings				x	x
Modify permissions				x	x

Access control - Tables

Table access control (table ACLs) lets you programmatically grant and revoke access to your data from SQL, Python, and PySpark.

By default, all users have access to all data stored in a cluster's managed tables unless an administrator enables table access control for that cluster. Once table access control is enabled for a cluster, users can set permissions for data objects on that cluster.

Before you can grant or revoke privileges on data objects, an administrator must enable table access control for the cluster.

View-based access control model

The Azure Databricks view-based access control model defines the following privileges:

- `SELECT` – gives read access to an object.

- `CREATE` – gives ability to create an object (for example, a table in a database)

- `MODIFY` – gives ability to add/delete/modify data to/from an object.

- `READ_METADATA` – gives ability to view an object and its metadata.

- `CREATE_NAMED_FUNCTION` – gives ability to create a named UDF in an existing catalogue or database.

- `ALL PRIVILEGES` – gives all privileges (gets translated into all the above privileges)

The privileges above can apply to the following classes of objects:

- `CATALOG` - controls access to the entire data catalog.

- `DATABASE` - controls access to a database.

- `TABLE` - controls access to a managed or external table.

- `VIEW` - controls access to SQL views.

- `FUNCTION` - controls access to a named function.

- `ANONYMOUS FUNCTION` - controls access to anonymous or temporary functions.

- `ANY FILE` - controls access to the underlying filesystem.

Secrets

Using the Secrets APIs, Secrets can be securely stored including in an Azure Key Vault or Databricks backend. Authorized users can consume the secrets to access services.

Azure Databricks has two types of secret scopes: Key Vault-backed and Databricks-backed. These secret scopes allow you to store secrets, such as database connection strings, securely. If someone tries to output a secret to a notebook, it is replaced by `[REDACTED]`. This helps prevent someone from viewing the secret or accidentally leaking it when displaying or sharing the notebook.

As a best practice, instead of directly entering your credentials into a notebook, use Azure Databricks secrets to store your credentials and reference them in notebooks and jobs.

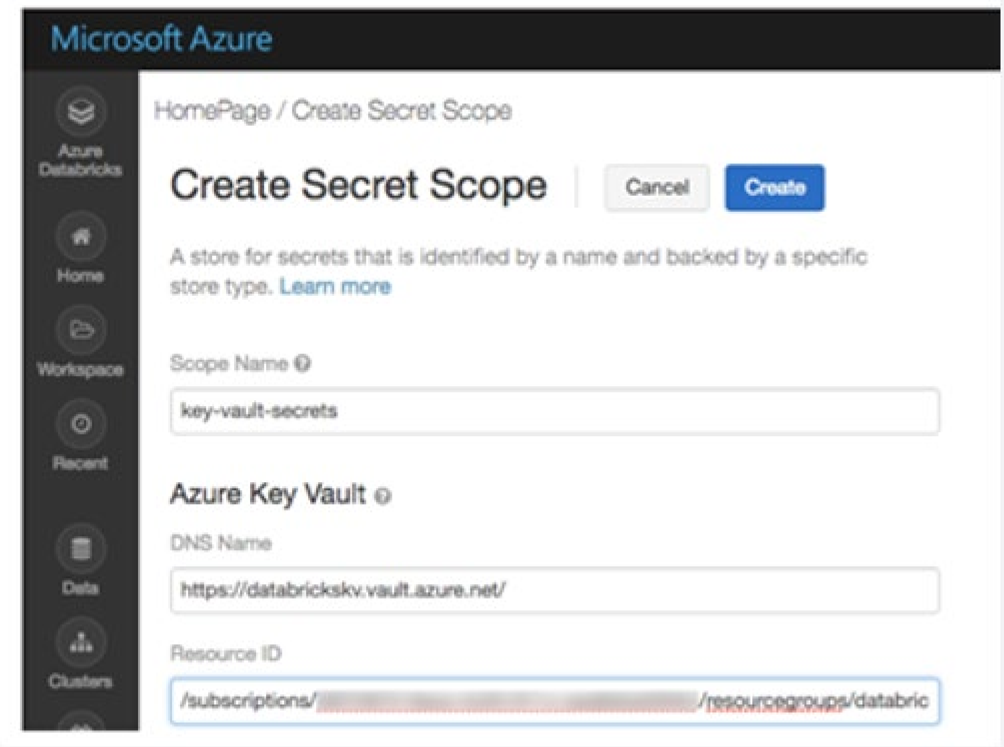
To set up secrets you:

- Create a secret scope. Secret scope names are case insensitive.

- Add secrets to the scope. Secret names are case insensitive.

- If you have the Azure Databricks Premium Plan, assign access control to the secret scope.

Screenshot of creating an Azure Key Vault-backed secret scope:



Create Secret Scope

A store for secrets that is identified by a name and backed by a specific store type. Learn more

Scope Name: key-vault-secrets

Azure Key Vault

DNS Name: https://databrickskv.vault.azure.net/

Resource ID: /subscriptions/[redacted]/resourcegroups/databric

https://docs.microsoft.com/en-us/azure/databricks/scenarios/security-baseline

Question 71: Skipped

Scenario: You are working on a project using Azure Synapse Studio and want to configure a private endpoint. You open up Azure Synapse Studio, go to the manage hub, and see that the private endpoints is greyed out.

Why is the option not available?

- ○
  A managed virtual network has not been created.
  (Correct)
- ○
  Azure Synapse Studio does not support the creation of private endpoints.
- ○
  There are service interruptions which must be troubleshot first.
- ○
  A conditional access policy has to be defined first.

Explanation
In order to create a private endpoint, you first must create a managed virtual network.

https://docs.microsoft.com/en-us/azure/synapse-analytics/security/synapse-private-link-hubs

Question 72: Skipped

Scenario: You have been contracted by Wayne Enterprises, a company owned by Bruce Wayne with market value of over twenty seven million dollars. Bruce founded Wayne Enterprises shortly after he created the Wayne Foundation and he became the president and chairman of the company.

Bruce has come to you because his IT team needs advice on the configuration and synchronization of data between an on-premises Microsoft SQL Server database to Azure SQL Database.

Recently, ad-hoc and reporting queries are being overutilized on the on-premises production instance and your expert advise is required on the following points.

Requirements:

• Execute an initial data synchronization to Azure SQL Database (minimize downtime)

• Execute bi-directional data synchronization after initial synchronization

A synchronization solution must be created and implemented and Bruce and the team look to you as the Azure expert. Which synchronization method should you advise the team to use?

- ○ Azure SQL Data Sync
  (Correct)
- ○ Backup and restore
- ○ SQL Server Agent job
- ○ Data Migration Assistant
- ○ Transactional replication

Explanation

SQL Data Sync is a service built on Azure SQL Database that lets you synchronize the data you select bi-directionally across multiple databases, both on-premises and in the cloud.

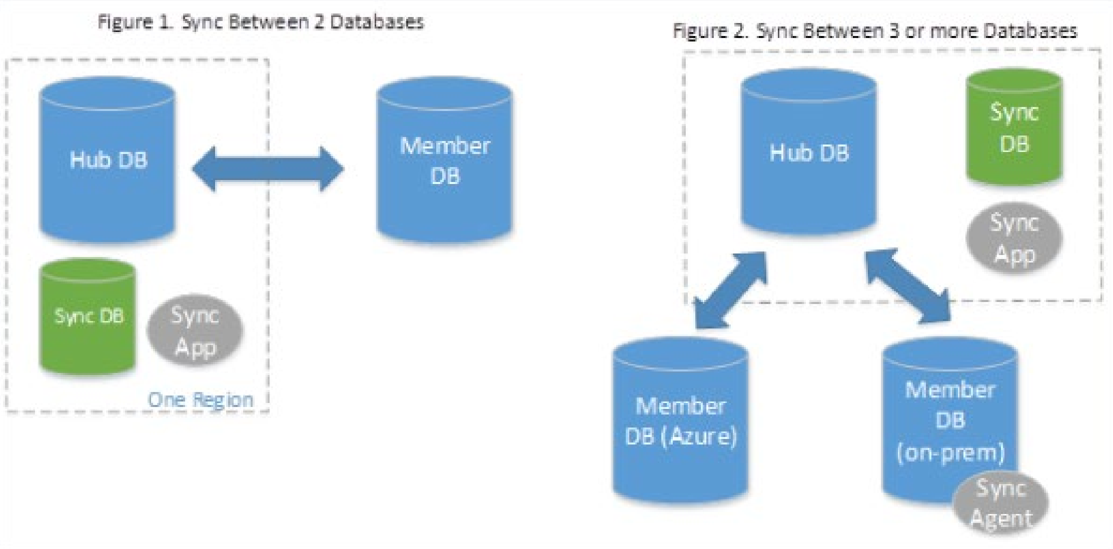
Data Sync is based around the concept of a sync group. A sync group is a group of databases that you want to synchronize.

Data Sync uses a hub and spoke topology to synchronize data. You define one of the databases in the sync group as the hub database. The rest of the databases are member databases. Sync occurs only between the hub and individual members.

• The **Hub Database** must be an Azure SQL Database.

• The **member databases** can be either databases in Azure SQL Database or in instances of SQL Server.

• The **Sync Metadata Database** contains the metadata and log for Data Sync. The Sync Metadata Database has to be an Azure SQL Database located in the same region as the Hub Database. The Sync Metadata Database is customer created and customer owned. You can only have one Sync Metadata Database per region and subscription. Sync Metadata Database cannot be deleted or renamed while sync groups or sync agents exist. Microsoft recommends to create a new, empty database for use as the Sync Metadata Database. Data Sync creates tables in this database and runs a frequent workload.



A sync group has the following properties:

A sync group has the following properties:

• The **Sync Schema** describes which data is being synchronized.

• The **Sync Direction** can be bi-directional or can flow in only one direction. That is, the Sync Direction can be *Hub to Member*, or *Member to Hub*, or both.

• The **Sync Interval** describes how often synchronization occurs.

• The **Conflict Resolution Policy** is a group level policy, which can be *Hub wins* or *Member wins*.

Server instances.

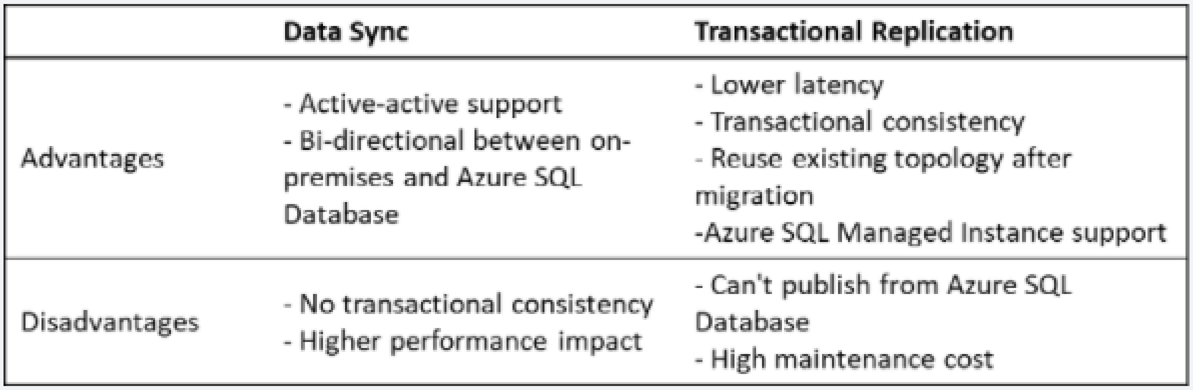
With Data Sync, you can keep data synchronized between your on-premises databases and Azure SQL databases to enable hybrid applications. Here are the main use cases for Data Sync:

• **Hybrid Data Synchronization:** With Data Sync, you can keep data synchronized between your databases in SQL Server and Azure SQL Database to enable hybrid applications. This capability may appeal to customers who are considering moving to the cloud and would like to put some of their application in Azure.

• **Distributed Applications:** In many cases, it's beneficial to separate different workloads across different databases. For example, if you have a large production database, but you also need to run a reporting or analytics workload on this data, it's helpful to have a second database for this additional workload. This approach minimizes the performance impact on your production workload. You can use Data Sync to keep these two databases synchronized.

• **Globally Distributed Applications:** Many businesses span several regions and even several countries/regions. To minimize network latency, it's best to have your data in a region close to you. With Data Sync, you can easily keep databases in regions around the world synchronized.

Compare Data Sync with Transactional Replication



	Data Sync	**Transactional Replication**
Advantages	- Active-active support - Bi-directional between on-premises and Azure SQL Database	- Lower latency - Transactional consistency - Reuse existing topology after migration -Azure SQL Managed Instance support
Disadvantages	- No transactional consistency - Higher performance impact	- Can't publish from Azure SQL Database - High maintenance cost

https://docs.microsoft.com/en-us/azure/azure-sql/database/sql-data-sync-data-sql-server-sql-database

Question 73: Skipped

Connectors are Azure Data Factory objects that enable your Linked Services and Datasets to connect to a wide variety of data sources and sinks. These can include connections to Azure resources and third-party connectors such as Amazon S3 or Google cloud. There are nearly 100 connectors that are available.

Which are among the file formats supported? (Select six)

- □ XLSB format
- □ JSON format (Correct)
- □ TXT format
- □ Delimited text format (Correct)
- □ CSV format
- □ Avro format (Correct)
- □ Binary format (Correct)
- □ Parquet format (Correct)
- □ ORC format (Correct)
- □ XLSX format
- □ PDF format
- □ XLS format

Explanation

Connectors are Azure Data Factory objects that enable your Linked Services and Datasets to connect to a wide variety of data sources and sinks. These can include connections to Azure resources and third-party connectors such as Amazon S3 or Google cloud. There are nearly 100 connectors that are available, and they work with the Copy, Data Flow, Look up, Get Metadata, and Delete activities that can be found within Azure Data Factory.

The file formats that are supported include:

- Avro format

- Binary format

- Delimited text format

- JSON format

- ORC format

- Parquet format

There are too many data stores to list, but the following lists the categories of data stores and two examples of the types of connectors that exist.

Category: Azure

Data Store example: Azure Data Lake Store, Azure Synapse Analytics

Category: Databases

Data Store example: Netezza, Greenplum

Category: NoSQL stores

Data Store example: Cassandra, MongoDB

Category: File

Data Store example: FTP, Google Cloud Storage

Category: Generic protocols

Data Store example: REST, ODBC

Category: Services & Apps

Data Store example: Dynamics, SalesForce

The list of connectors is constantly evolving. You can keep up to date with the latest list, and the activity support by looking at the connectors overview page

https://docs.microsoft.com/en-us/azure/data-factory/connector-overview

Question 74: Skipped

Azure Synapse Analytics has a rich set of tools and methods available to load data into SQL Pools.

Which of the following are you able to load into Azure Synapse Analytics? (Select all that apply)

- ☐
  Data streams
  (Correct)
- ☐
  On-premises
  (Correct)
- ☐
  Semi-structured data
  (Correct)
- ☐
  Non-relational datastores
  (Correct)
- ☐
  Structured data
  (Correct)
- ☐
  Non-Azure clouds
  (Correct)
- ☐
  Data batches
  (Correct)
- ☐
  Relational datastores
  (Correct)

Explanation

Azure Synapse Analytics has a rich set of tools and methods available to load data into SQL Pools. You can load data from relational or non-relational datastores; structured or semi-structured; on premises systems or other clouds; in batches or streams.

Based on the variety of data that you work with, your data loads can include:

Data loads directly from Azure storage with transact-sql and the copy statement

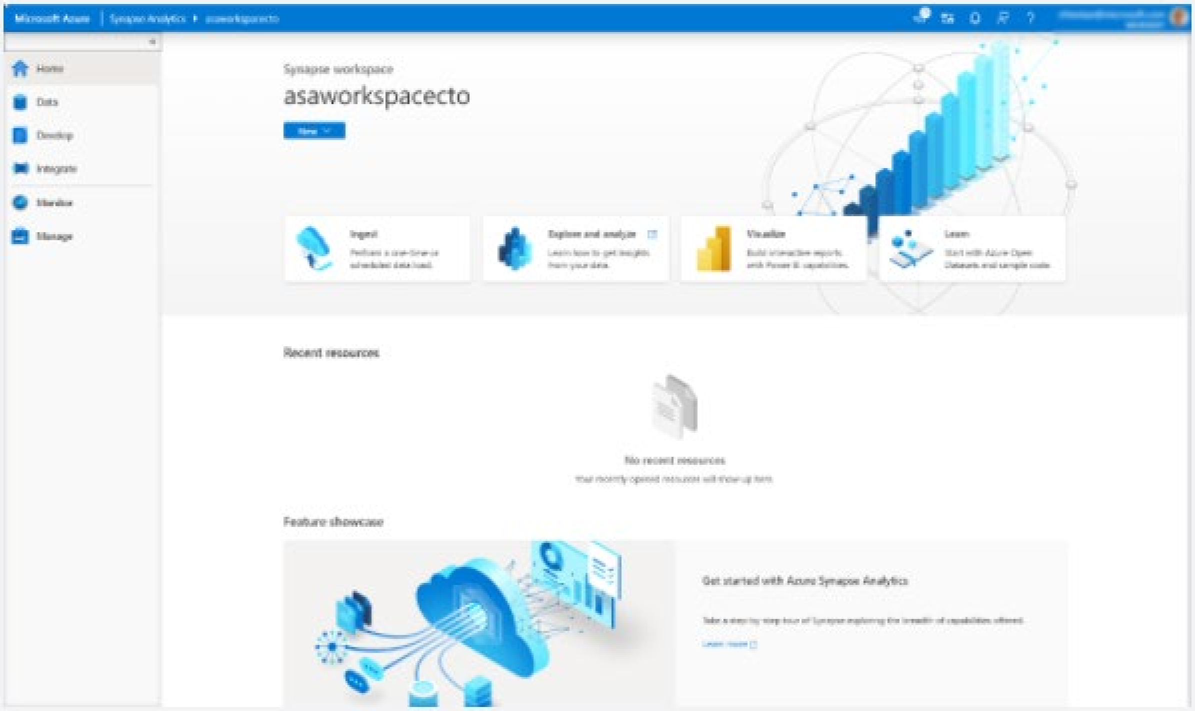
Within Azure Synapse Studio, you can write Transact-SQL code that runs against any configured SQL Pools within the workspace. Similarly, within the same Transact-SQL script, you can read and digest data from Azure Blob Storage or Azure Data Lake and insert it into a table within the SQL Pool.

Perform data loads using Azure synapse pipeline data flows.

Data flows are a key feature within the Azure Synapse Studio experience. You can access the data flows from the Integrate hub. From within the Develop hub, you're able to access configured source repositories and run transformations against them to a variety of destinations referred to as sinks.

Use polybase by defining external tables

Using Transact-SQL, you can use PolyBase to access files that are located directly on Azure Storage as if they were structured tables within your SQL Pool. You define an **external data source** pointing to the location of the file or the folder the files reside in, the external file format, which can be GZip compressed delimited text, ORC, Parquet or JSON, and then the external table with the column attributes that map to the structure from the external files.



Perform a one-time or scheduled data load.

Learn how to get insights from your data.

Build interactive reports with Power BI capabilities.

Start with Azure Open Datasets and sample code.

Your recently opened resources will show up here.

Take a step by step tour of Synapse exploring the breadth of capabilities offered.

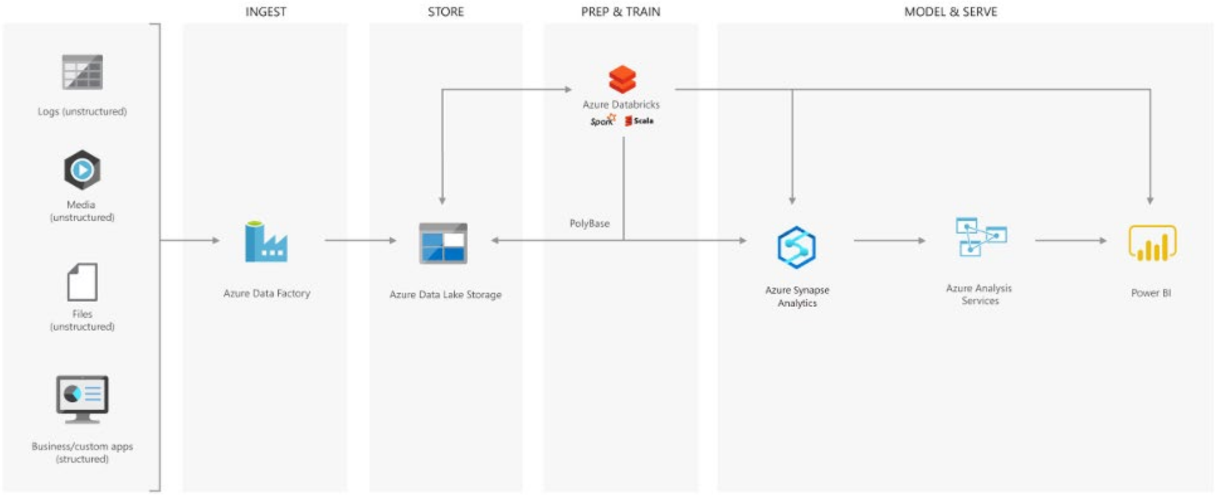
https://docs.microsoft.com/en-us/azure/data-factory/load-azure-sql-data-warehouse

Question 75: Skipped

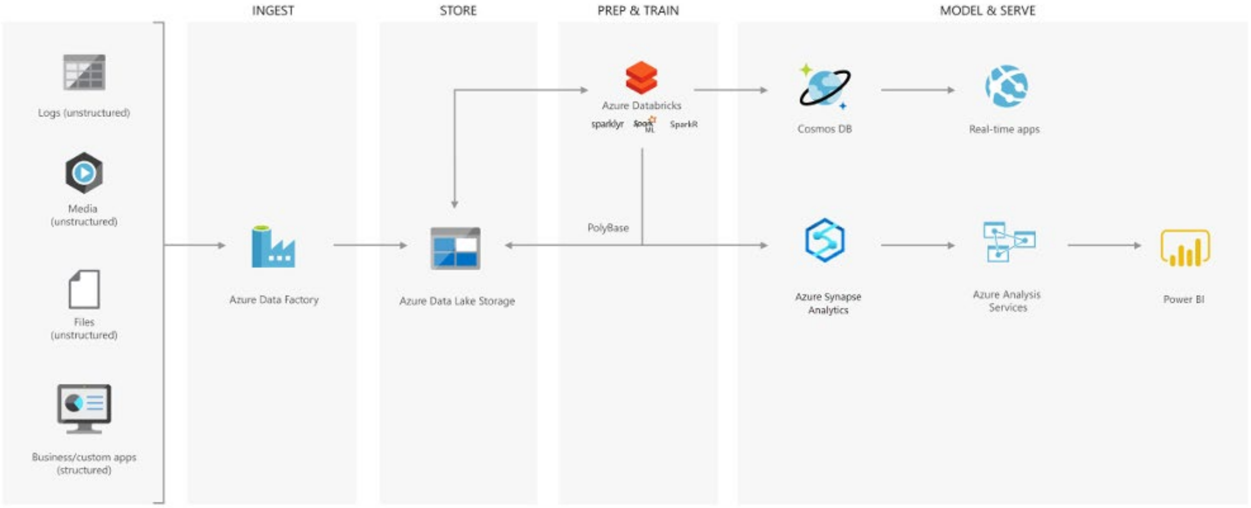
Scenario: You are a Data Engineer for HAMMER Industries, an organization that is working with a transport company to monitor the fleet of Heavy Goods Vehicles (HGV) that drive around Europe. Each HGV is equipped with sensor hardware that will continuously report metric data on the temperature, the speed, and the oil and brake solution levels of an HGV. When the engine is turned off, the sensor also outputs a file with summary information about a trip, including the mileage and elevation of a trip. A trip is a period in which the HGV engine is turned on and off.

Both the real-time data and batch data is processed in a machine learning model to predict a maintenance schedule for each of the HGVs. This data is made available to the downstream application that third-party garage companies can use if an HGV breaks down anywhere in Europe. In addition, historical reports about the HGV should be visually presented to users.

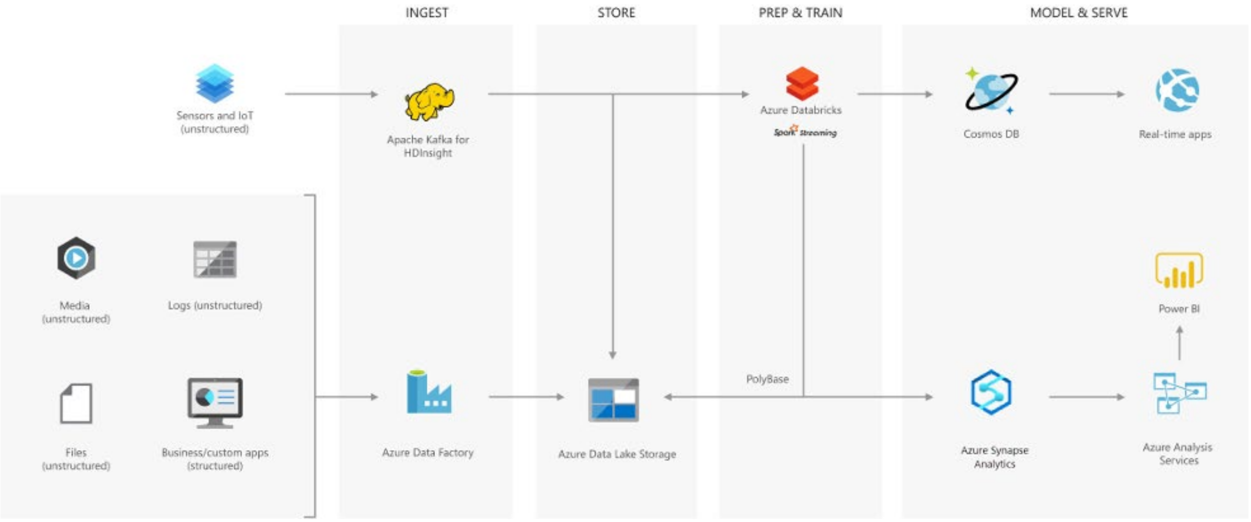
Design A:



Design B:



Design C:



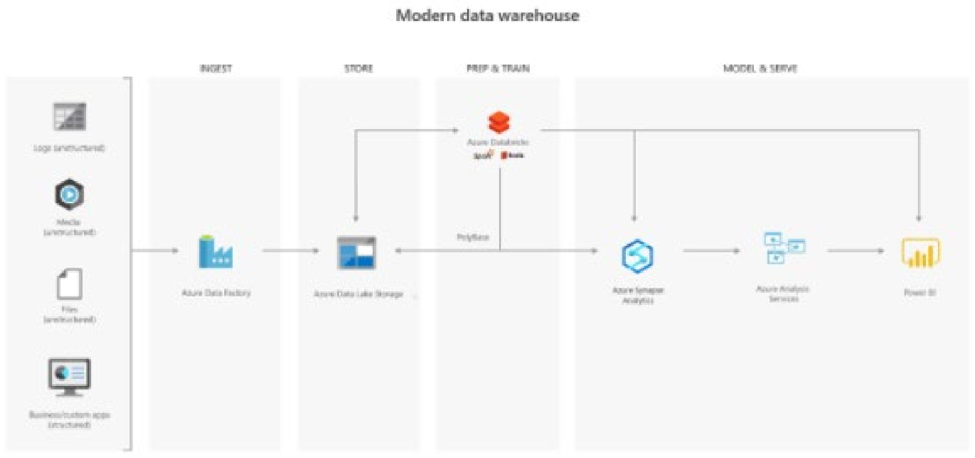
Which architecture would be best suited for the need?

- ○ Design C **(Correct)**
- ○ Design B
- ○ None of the listed options
- ○ Design A

Explanation
Creating a modern data warehouse

Imagine you're a Data Engineering consultant for a Avengers Security. In the past, they've created an on-premises business intelligence solution that used a Microsoft SQL Server Database Engine, SQL Server Integration Services, SQL Server Analysis Services, and SQL Server Reporting Services to provide historical reports. They tried using the Analysis Services Data Mining component to create a predictive analytics solution to predict the buying behaviour of customers. While this approach worked well with low volumes of data, it couldn't scale after more than a gigabyte of data was collected. Furthermore, they were never able to deal with the JSON data that a third-party application generated when a customer used the feedback module of the point of sale (POS) application.

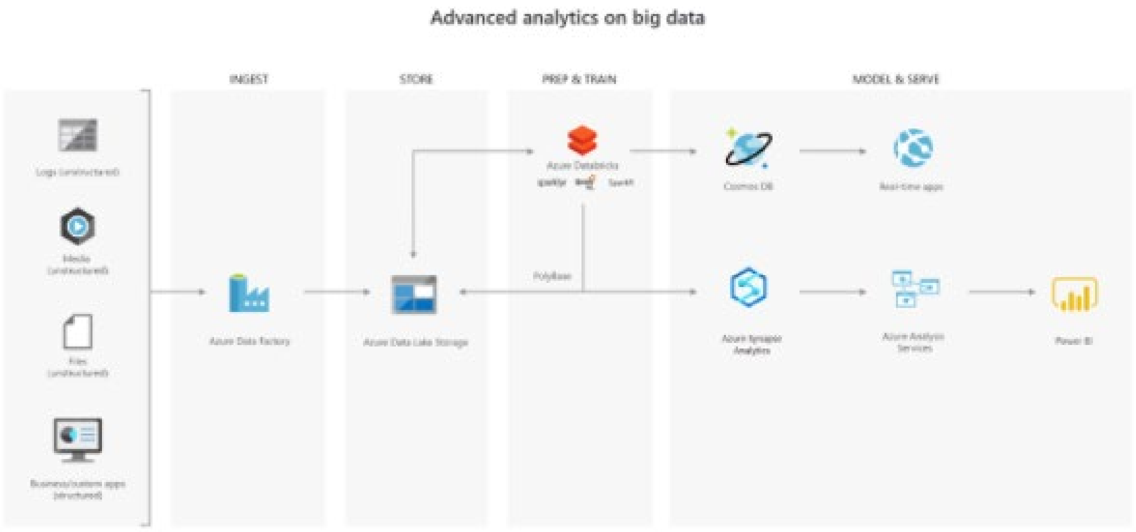
The company has turned to you for help with creating an architecture that can scale with the data needs that are required to create a predictive model and to handle the JSON data so that it's integrated into the BI solution. You suggest the following architecture:



The architecture uses Azure Data Lake Storage at the centre of the solution for a modern data warehouse. Integration Services is replaced by Azure Data Factory to ingest data into the Data Lake from a business application. This is the source for the predictive model that is built into Azure Databricks. PolyBase is used to transfer the historical data into a big data relational format that is held in Azure Synapse Analytics, which also stores the results of the trained model from Databricks. Azure Analysis Services provides the caching capability for SQL Data Warehouse to service many users and to present the data through Power BI reports.

Advanced analytics for big data

In this second use case, Azure Data Lake Storage plays an important role in providing a large-scale data store. Your skills are needed by Hydra Corporation, which is a global seller of bicycles and cycling components through a chain of resellers and on the internet. As their customers browse the product catalogue on their websites and add items to their baskets, a recommendation engine that is built into Azure Databricks recommends other products. They need to make sure that the results of their recommendation engine can scale globally. The recommendations are based on the web log files that are stored on the web servers and transferred to the Azure Databricks model hourly. The response time for the recommendation should be less than 1 ms. You propose the following architecture:

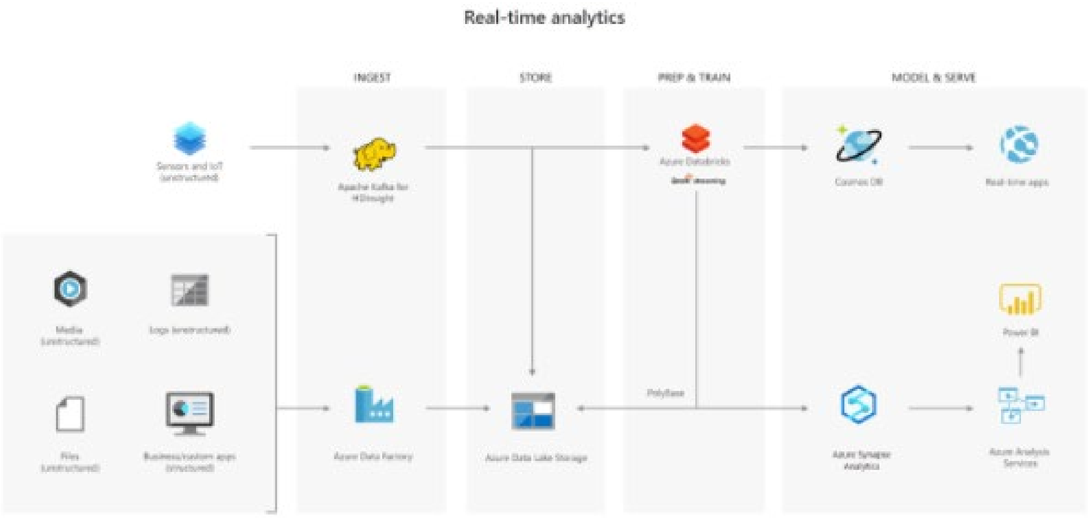


Real-time analytical solutions

To perform real-time analytical solutions, the ingestion phase of the architecture is changed for processing big data solutions. In this architecture, note the introduction of Apache Kafka for Azure HDInsight to ingest streaming data from an Internet of Things (IoT) device, although this could be replaced with Azure IoT Hub and Azure Stream Analytics. The key point is that the data is persisted in Data Lake Storage Gen2 to service other parts of the solution.

In this use case, you are a Data Engineer for HAMMER Industries, an organization that is working with a transport company to monitor the fleet of Heavy Goods Vehicles (HGV) that drive around Europe. Each HGV is equipped with sensor hardware that will continuously report metric data on the temperature, the speed, and the oil and brake solution levels of an HGV. When the engine is turned off, the sensor also outputs a file with summary information about a trip, including the mileage and elevation of a trip. A trip is a period in which the HGV engine is turned on and off.

Both the real-time data and batch data is processed in a machine learning model to predict a maintenance schedule for each of the HGVs. This data is made available to the downstream application that third-party garage companies can use if an HGV breaks down anywhere in Europe. In addition, historical reports about the HGV should be visually presented to users. As a result, the following architecture is proposed:



In this architecture, there are two ingestion streams. Azure Data Factory ingests the summary files that are generated when the HGV engine is turned off. Apache Kafka provides the real-time ingestion engine for the telemetry data. Both data streams are stored in Azure Data Lake Store for use in the future, but they are also passed on to other technologies to meet business needs. Both streaming and batch data are provided to the predictive model in Azure Databricks, and the results are published to Azure Cosmos DB to be used by the third-party garages. PolyBase transfers data from the Data Lake Store into SQL Data Warehouse where Azure Analysis Services creates the HGV reports by using Power BI.

https://docs.microsoft.com/en-us/azure/storage/blobs/data-lake-storage-introduction

Question 76: Skipped

Which Azure Service is Azure Synapse Pipelines based on?

- ○ None of the listed options (Correct)
- ○ Azure Data Explorer
- ○ Azure Synapse Spark pools
- ○ Azure Data Warehouse
- ○ Azure Stream Analytics
- ○ Azure Synapse Studio
- ○ Azure Synapse Link

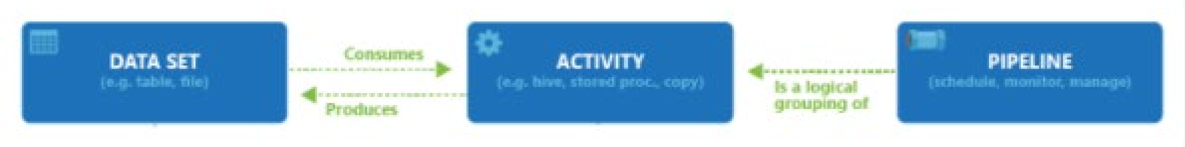
Explanation

Azure Synapse Pipelines is based in the Azure Data Factory service.

A data factory can have one or more pipelines. A pipeline is a logical grouping of activities that together perform a task. For example, a pipeline could contain a set of activities that ingest and clean log data, and then kick off a mapping data flow to analyze the log data. The pipeline allows you to manage the activities as a set instead of each one individually. You deploy and schedule the pipeline instead of the activities independently.

The activities in a pipeline define actions to perform on your data. For example, you may use a copy activity to copy data from SQL Server to an Azure Blob Storage. Then, use a data flow activity or a Databricks Notebook activity to process and transform data from the blob storage to an Azure Synapse Analytics pool on top of which business intelligence reporting solutions are built.

Data Factory has three groupings of activities: data movement activities, data transformation activities, and control activities. An activity can take zero or more input datasets and produce one or more output datasets. The following diagram shows the relationship between pipeline, activity, and dataset in Data Factory:



An input dataset represents the input for an activity in the pipeline, and an output dataset represents the output for the activity. Datasets identify data within different data stores, such as tables, files, folders, and documents. After you create a dataset, you can use it with activities in a pipeline. For example, a dataset can be an input/output dataset of a Copy Activity or an HDInsightHive Activity.

https://docs.microsoft.com/en-us/azure/data-factory/concepts-pipelines-activities

Question 77: Skipped

When queries are submitted, a dedicated SQL pool query optimizer tries to determine which access paths to the data will result in the least amount of effort to retrieve the data required to resolve the query. It is a cost-based optimizer, and compares the cost of various query plans, and then chooses the plan with the lowest cost.

True or False: It is important to update the statistics after you load data or update large ranges of data, so that queries can benefit from the updated statistics information.

- ○ False
- ○ True (Correct)

Explanation

When queries are submitted, a dedicated SQL pool query optimizer tries to determine which access paths to the data will result in the least amount of effort to retrieve the data required to resolve the query. It is a cost-based optimizer, and compares the cost of various query plans, and then chooses the plan with the lowest cost.

Statistics in dedicated SQL pools

To aid this process, statistics are required that describe the amount of data that is present within ranges of values, and range of rows that may be returned to fulfill a query filter or join. Therefore, after loading data into a dedicated SQL pool, collecting statistics on your data is one of the most important things you can do for query optimization.

When you create a database in a dedicated SQL pool in Azure Synapse Analytics, the automatic creation of statistics is turned on by default. This means that statistics are created when you run the following type of Transact-SQL statements:

- `SELECT`
- `INSERT-SELECT`
- `CTAS`
- `UPDATE`
- `DELETE`
- `EXPLAIN` when containing a join or the presence of a predicate is detected

When executing the above Transact-SQL statements, that the statistics creation is performed on the fly, and as a result, there can be a slight degradation in query performance.

To avoid this, statistics are also created on any index that you create that helps aid the query optimize process. As this is an action that is performed in advance of querying the table on which the index is based, it means that the statistics are created in advance. However, you must consider that as new data is loaded into the table, the statistics may become out of date.

As such, **it is important to update the statistics after you load data or update large ranges of data, so that queries can benefit from the updated statistics information.**

You can check if your data warehouse has `AUTO_CREATE_STATISTICS` configured by running the following command:

```
SQL

SELECT name, is_auto_create_stats_on

FROM sys.databases

If your data warehouse doesn't have AUTO_CREATE_STATISTICS enabled, it is recomme
nded that you enable this property by running the following command:

SQL

ALTER DATABASE <yourdatawarehousename>

SET AUTO_CREATE_STATISTICS ON
```

Statistics in serverless SQL pools

Statistics in a serverless SQL pool has the same objective of using a cost-based optimizer to choose an execution plan that will execute the fastest. How it creates its statistics is different.

Serverless SQL pool analyses incoming user queries for missing statistics. If statistics are missing, the query optimizer creates statistics on individual columns in the query predicate or join condition to improve cardinality estimates for the query plan. The `SELECT` statement will trigger automatic creation of statistics. You can also manually create statistics, this is important when working with CSV files, as automatic statistics creation is not enabled for them.

In the following example, a system stored procedure is used to specify the creation of statistics for a specific Transact-SQL statement

```
SQL
```

```
sys.sp_create_openrowset_statistics [ @stmt = ] N'statement_text'
To create statistics for a specific column within a csv file, you can run the following code:
SQL
/* make sure you have the credentials to access the storage account created
IF EXISTS (SELECT * FROM sys.credentials WHERE name = 'https://azureopendatastorage.blob.core.windows.net/censusdatacontainer')
DROP CREDENTIAL [https://azureopendatastorage.blob.core.windows.net/censusdatacontainer]
GO

CREATE CREDENTIAL [https://azureopendatastorage.blob.core.windows.net/censusdatacontainer]
WITH IDENTITY='SHARED ACCESS SIGNATURE',
SECRET = ''
GO
*/

/*
```

The following code will create statistics on a column named year, from a file named `population.csv`

```
*/

EXEC sys.sp_create_openrowset_statistics N'SELECT year
FROM OPENROWSET(
BULK ''https://sqlondemandstorage.blob.core.windows.net/csv/population/population.csv'',
FORMAT = ''CSV'',
FIELDTERMINATOR ='','',
ROWTERMINATOR = ''\n''
)
WITH (
[country_code] VARCHAR (5) COLLATE Latin1_General_BIN2,
[country_name] VARCHAR (100) COLLATE Latin1_General_BIN2,
[year] smallint,

[population] bigint

) AS [r]

‘
```

You should also update the statistics when the data in the files change. In fact, Serverless SQL pool automatically recreates statistics if data is changed significantly. Every time statistics are automatically created, the current state of the dataset is also saved: file paths, sizes, last modification dates.

To update statistics for the year column in the dataset, which is based on the population.csv file, you need to drop and then create them, here is the drop statement:

```
SQL

EXEC sys.sp_drop_openrowset_statistics N'SELECT year

FROM OPENROWSET(

BULK ''https://sqlondemandstorage.blob.core.windows.net/csv/population/population.csv'',

FORMAT = ''CSV'',

FIELDTERMINATOR ='','',

ROWTERMINATOR = ''\n''

)

WITH (

[country_code] VARCHAR (5) COLLATE Latin1_General_BIN2,

[country_name] VARCHAR (100) COLLATE Latin1_General_BIN2,

[year] smallint,

[population] bigint

) AS [r]

‘
```

To update statistics for a statement, you need to drop and create statistics. The following stored procedure is used to drop statistics against a specific Transact-SQL text:

```
SQL

sys.sp_drop_openrowset_statistics [ @stmt = ] N'statement_text’
```

https://docs.microsoft.com/en-us/azure/synapse-analytics/sql/develop-tables-statistics

Question 78: Skipped

Azure Data Factory is composed of four core components. These components work together to provide the platform on which you can compose data-driven workflows with steps to move and transform data.

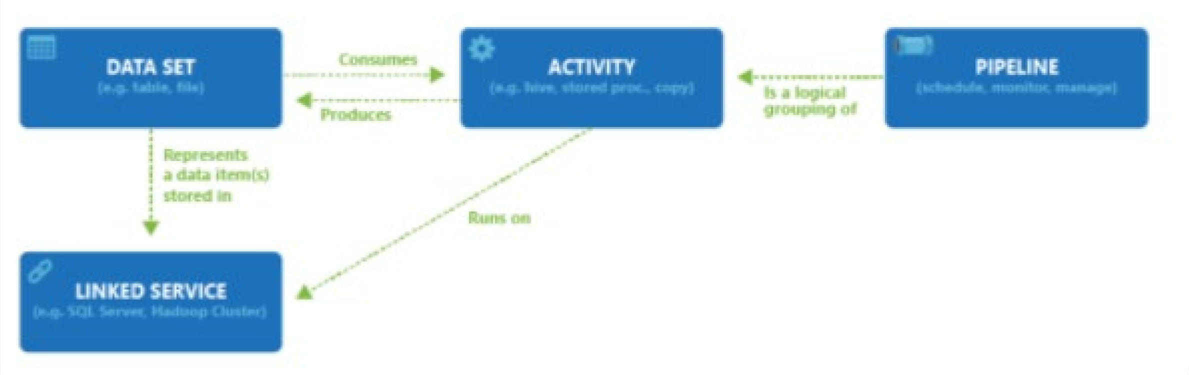
Which component is best described by:

“It is created to perform a specific task by composing the different activities in the task in a single workflow. This can be scheduled to execute, or a trigger can be defined that determines when an execution needs to be kicked off.”

- ○ Linked service
- ○ Dataset
- ○ Pipeline (Correct)
- ○ Activity

Explanation

An Azure subscription might have one or more Azure Data Factory instances. Azure Data Factory is composed of four core components. These components work together to provide the platform on which you can compose data-driven workflows with steps to move and transform data.


DATA SET
(e.g. table, file)
Consumes
Produces
ACTIVITY
(e.g. hive, stored proc., copy)
Is a logical grouping of
PIPELINE
(schedule, monitor, manage)
Represents a data item(s) stored in
Runs on
LINKED SERVICE
(e.g. SQL Server, Hadoop Cluster)

- **Pipeline:** It is created to perform a specific task by composing the different activities in the task in a single workflow. Activities in the pipeline can be data ingestion (Copy data to Azure) -> data processing (Perform Hive Query). Using pipeline as a single task user can schedule the task and manage all the activities in a single process also it is used to run the multiple operation parallel. Multiple activities can be logically grouped together with an object referred to as a **Pipeline**, and these can be *scheduled* to execute, or a *trigger* can be defined that determines when a pipeline execution needs to be kicked off. There are different types of triggers for different types of events.

- **Activity:** It is a specific action performed on the data in a pipeline like the transformation or ingestion of the data. Each pipeline can have one or more activities in it. If the data is copied from one source to destination using Copy Monitor then it is a data movement activity. If data transformation is performed on the data using a hive query or spark job then it is a data transformation activity.

- **Datasets:** It is basically collected data users required which are used as input for the ETL process. Datasets have different formats; they can be in JSON, CSV, ORC, or text format.

- **Linked services:** It has information on the different data sources and the data factory uses this information to connect to data originating sources. It is mainly used to locate the data stores in the machines and also represent the compute services for the activity to be executed like running spark jobs on spark clusters or running hive queries using the hive services from the cloud.

https://www.educba.com/azure-data-factory/

Question 79: Skipped

If you are performing analytics on the data, set up the storage account as an Azure Data Lake Storage Gen2 account by setting the Hierarchical Namespace option to which of the following?

- ○ Disabled
- ○ Auto-scale
- ○ OFF
- ○ ON
- ○ Enabled (Correct)

Explanation

In Azure Blob storage, you can store large amounts of unstructured ("object") data, in a single hierarchy, also known as a flat namespace. You can access this data by using HTTP or HTTPs. Azure Data Lake Storage Gen2 builds on blob storage and optimizes I/O of high-volume data by using hierarchical namespaces that you turned on in the previous exercise. Hierarchical namespaces organize blob data into *directories* and stores metadata about each directory and the files within it. This structure allows operations, such as directory renames and deletes, to be performed in a single atomic operation. Flat namespaces, by contrast, require several operations proportionate to the number of objects in the structure. Hierarchical namespaces keep the data organized, which yields better storage and retrieval performance for an analytical use case and lowers the cost of analysis.

Azure Blob storage vs. Azure Data Lake Storage

If you want to store data *without performing analysis on the data*, set the **Hierarchical Namespace** option to **Disabled** to set up the storage account as an Azure Blob storage account. You can also use blob storage to archive rarely used data or to store website assets such as images and media.

If you are performing analytics on the data, set up the storage account as an Azure Data Lake Storage Gen2 account by setting the **Hierarchical Namespace** option to **Enabled**. Because Azure Data Lake Storage Gen2 is integrated into the Azure Storage platform, applications can use either the Blob APIs or the Azure Data Lake Storage Gen2 file system APIs to access data.

https://blog.pragmaticworks.com/azure-data-lake-vs-azure-blob-storage-in-data-warehousing

Question 80: Skipped

Which feature of Spark determines how your code is executed?

- ○ Java Garbage Collection
- ○ Cluster Configuration
- ○ Tungsten Record Format
- ○ Catalyst Optimizer (Correct)

Explanation

Spark SQL uses Catalyst's general tree transformation framework in four phases - Analysis, Logical Optimization, Physical Planning, and Code Generation.

Because the Databricks API is declarative, a large number of optimizations are available to us.

Some of the examples include:

• Optimizing data type for storage

• Rewriting queries for performance

• Predicate push downs

Among the most powerful components of Spark are Spark SQL. At its core lies the Catalyst optimizer. This extensible query optimizer supports both rule-based and cost-based optimization.

When you execute code, Spark SQL uses Catalyst's general tree transformation framework in four phases, as shown below:

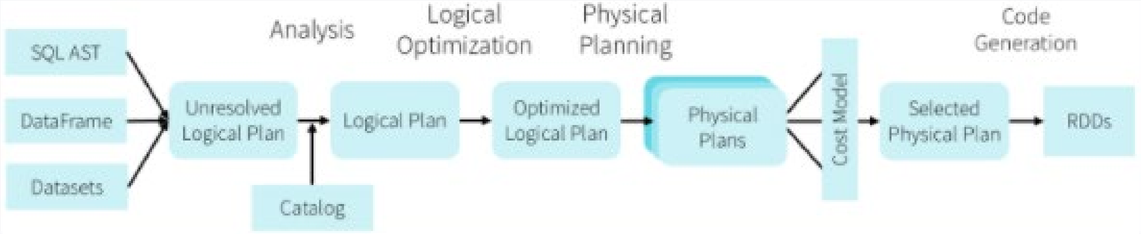
1. analyzing a logical plan to resolve references

2. logical plan optimization

3. physical planning

4. code generation to compile parts of the query to Java bytecode

In the physical planning phase, Catalyst may generate multiple plans and compare them based on cost. All other phases are purely rule-based.



Catalyst is based on functional programming constructs in Scala and designed with these key two purposes:

• Easily add new optimization techniques and features to Spark SQL

• Enable external developers to extend the optimizer (e.g. adding data source specific rules, support for new data types, etc.)

https://data-flair.training/blogs/spark-sql-optimization/

Question 81: Skipped

Scenario: You have been contracted by Wayne Enterprises, a company owned by Bruce Wayne with market value of over twenty seven million dollars. Bruce founded Wayne Enterprises shortly after he created the Wayne Foundation and he became the president and chairman of the company.

Bruce has come to you because his IT team plans to use Microsoft Azure Databricks and they are not as familiar with Azure as they would like to be. You have been hired as a consultant by Wayne Enterprises.

The plan is to create an Azure Databricks workspace that has a tiered structure. The workspace will contain the following three workloads:
• A workload for data engineers who will use Python and SQL.
• A workload for jobs that will run notebooks that use Python, Scala, and SOL.
• A workload that data scientists will use to perform ad hoc analysis in Scala and R.

The enterprise architecture team at Wayne Enterprises identifies the following standards for Databricks environments:
• The data engineers must share a cluster.
• The job cluster will be managed by using a request process whereby data scientists and data engineers provide packaged notebooks for deployment to the cluster.
• All the data scientists must be assigned their own cluster that terminates automatically after 120 minutes of inactivity. Currently, there are three data scientists.

Required: The team needs to create the Databricks clusters for the workloads.

Solution: The team creates a Standard cluster for each data scientist, a High Concurrency cluster for the data engineers, and a Standard cluster for the jobs.

Does this meet the requirement?

- ○ No (Correct)
- ○ Yes

Explanation

The solution offered does not meet the requirement of "A workload for jobs that will run notebooks that use Python, Scala, and SOL". Scala is only supported by Standard

Standard clusters

Standard clusters are recommended for a single user. Standard clusters can run workloads developed in any language: Python, R, Scala, and SQL.

High Concurrency clusters

A High Concurrency cluster is a managed cloud resource. The key benefits of High Concurrency clusters are that they provide Apache Spark-native fine-grained sharing for maximum resource utilization and minimum query latencies.

High Concurrency clusters work only for SQL, Python, and R. The performance and security of High Concurrency clusters is provided by running user code in separate processes, which is not possible in Scala.

In addition, only High Concurrency clusters support table access control.

https://docs.microsoft.com/en-us/azure/databricks/clusters/configure

Question 82: Skipped

True or False: Concurrency and the allocation of resources across connected users are also a factor that can limit the load performance into Azure Synapse Analytics SQL pools.

To optimize the load execution operations, recommendations are to reduce or minimize the number of simultaneous load jobs that are running or assigning higher resource classes that reduce the number of active running tasks.

- ○ False
- ○ True (Correct)

Explanation

Concurrency and the allocation of resources across connected users are also a factor that can limit the load performance into Azure Synapse Analytics SQL pools.

SQL Pools have the concept of concurrency slots, which manage the allocation of memory to connected users. To optimize the load execution operations, consider reducing or minimizing the number of simultaneous load jobs that are running or assigning higher resource classes that reduce the number of active running tasks.

https://docs.microsoft.com/en-us/azure/synapse-analytics/sql-data-warehouse/memory-concurrency-limits

Question 83: Skipped

Scenario: O'Shaughnessy's is a fast food restaurant. The chain has stores nationwide and is rivalled by Big Belly Burgers. You have been hired by the company to advise on the implementation of Azure migrating from an on-prem datacentre.

The IT team is working on a project to implement a lambda architecture on Microsoft Azure using an open-source big data solution for the purpose of aggregating, processing and maintaining data. During testing it is noted that the analytical data store is performing below expectations and management has come to you with the following requirement specifications.

Requirements:

• The solution must provide data warehousing

• The solution must reduce ongoing management activities

• The solution must deliver SQL query responses under one second

• The solution must create an HDInsight cluster to which fulfills all the listed requirements

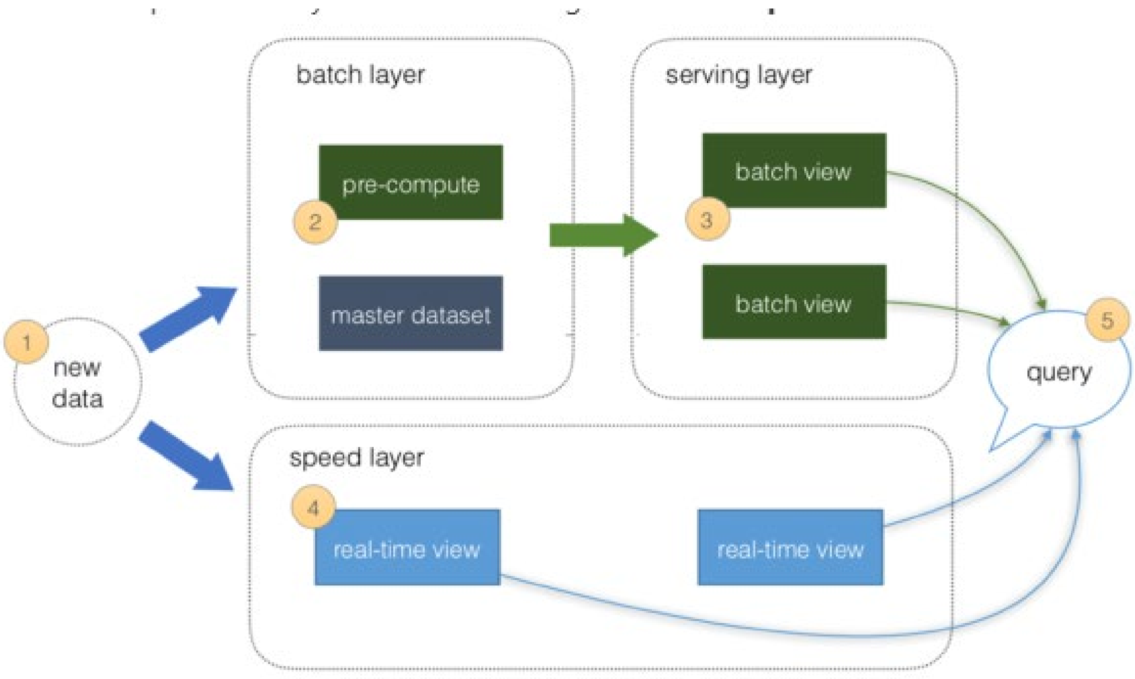
As the expert consultant, the IT team is looking to you for direction. Which type of cluster should you advise them to create?

- ○ Apache Hadoop
- ○ Apache Spark
  (Correct)
- ○ Interactive Query
- ○ Apache HBase

Explanation

Lambda architecture is a data-processing architecture designed to handle massive quantities of data by taking advantage of both **batch** processing and **stream** processing methods, and minimizing the latency involved in querying **big data**.

It is a **Generic**, **Scalable**, and **Fault-tolerant** data processing architecture to address batch and speed latency scenarios with big data and **map-reduce**.



The system consists of three layers: Batch Layer, Speed Layer & Service Layer

1. All data is pushed into both the Batch layer and Speed layer.

2. The **Batch layer** has a master dataset (immutable, append-only set of raw data) and pre-computes the batch views.

3. The **Serving layer** has Batch views for fast queries.

4. The **Speed Layer** compensates for processing time (to the serving layer) and deals with recent data only.

5. All queries can be answered by merging results from Batch views and Real-time views or pinging them individually.

Lambda Architecture with Azure:

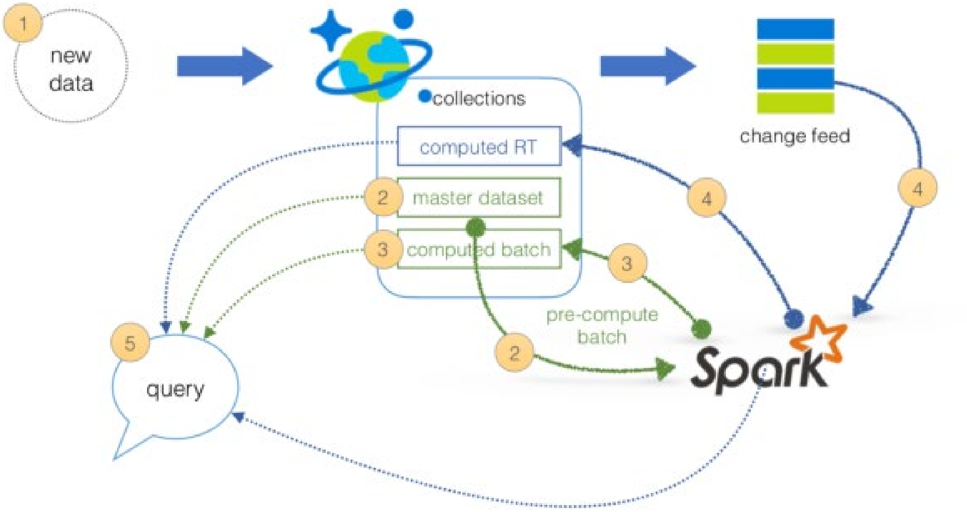
Azure offers you a combination of following technologies to accelerate real-time big data analytics:

1. Azure Cosmos DB, a globally distributed and multi-model database service.

2. Apache Spark for Azure HDInsight, a processing framework that runs large-scale data analytics applications.

3. Azure Cosmos DB change feed, which streams new data to the batch layer for HDInsight to process.

4. The Spark to Azure Cosmos DB Connector



How Azure simplifies the Lambda Architecture:

1. All data is pushed into **Azure Cosmos DB** for processing.

2. The **Batch layer** has a master dataset (immutable, append-only set of raw data) stored in Azure Cosmos DB. Using **HDI Spark**, you can pre-compute your aggregations to be stored in your computed **Batch Views**.

3. The **Serving layer** is an Azure Cosmos DB database with collections for the master dataset and computed Batch View for fast queries.

4. The **Speed layer** compensates for processing time (to the serving layer) and deals with recent data only. It utilizes **HDI Spark** to read the Azure Cosmos DB change feed. This enables you to persist your data as well as to query and process it concurrently.

5. All queries can be answered by merging results from batch views and real-time views, or pinging them individually.

https://docs.microsoft.com/en-us/azure/cosmos-db/lambda-architecture

Question 84: Skipped

An Azure Stream Analytics job supports which of the following input types? (Select three)

- □
  Azure IoT Hub
  (Correct)
- □
  Azure Data Lake Storage
- □
  Azure Event Hub
  (Correct)
- □
  Azure Table Storage
- □
  Azure Queue Storage
- □
  Azure Blob Storage
  (Correct)

Explanation

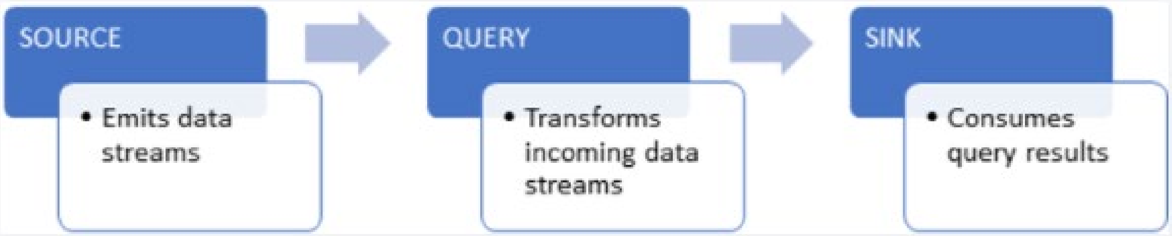
In Azure Stream Analytics, a *job* is a unit of execution. A Stream Analytics job pipeline consists of three parts:

• An **input** that provides the source of the data stream.

• A **transformation query** that acts on the input. For example, a transformation query could aggregate the data.

• An **output** that identifies the destination of the transformed data.

The Stream Analytics pipeline provides a transformed data flow from input to output, as the following diagram shows.



An Azure Stream Analytics job supports three input types:

- **Azure Event Hub**

Azure Event Hub consumes live streaming data from applications with low latency and high throughput.

- **Azure IoT Hub**

Azure IoT Hub consumes live streaming events from IoT devices. This service enables bi-directional communication scenarios where commands can be sent back to IoT devices to trigger specific actions based on analyzing streams they send to the service.

- **Azure Blob Storage**

Azure Blob Storage is used as the input source to consume files persisted in blob storage.

https://docs.microsoft.com/en-us/azure/stream-analytics/stream-analytics-monitoring

Question 85: Skipped

Identify the missing word(s) in the following sentence within the context of Microsoft Azure.

When working with large data sets, it can take a long time to run the sort of queries that clients need. These queries can't be performed in real time, and often require algorithms such as MapReduce that operate in parallel across the entire data set. The results are then stored separately from the raw data and used for querying.

One drawback to this approach is that it introduces latency. If processing takes a few hours, a query may return results that are several hours old. Ideally, you would like to get some results in real time (perhaps with some loss of accuracy), and combine these results with the results from the batch analytics.

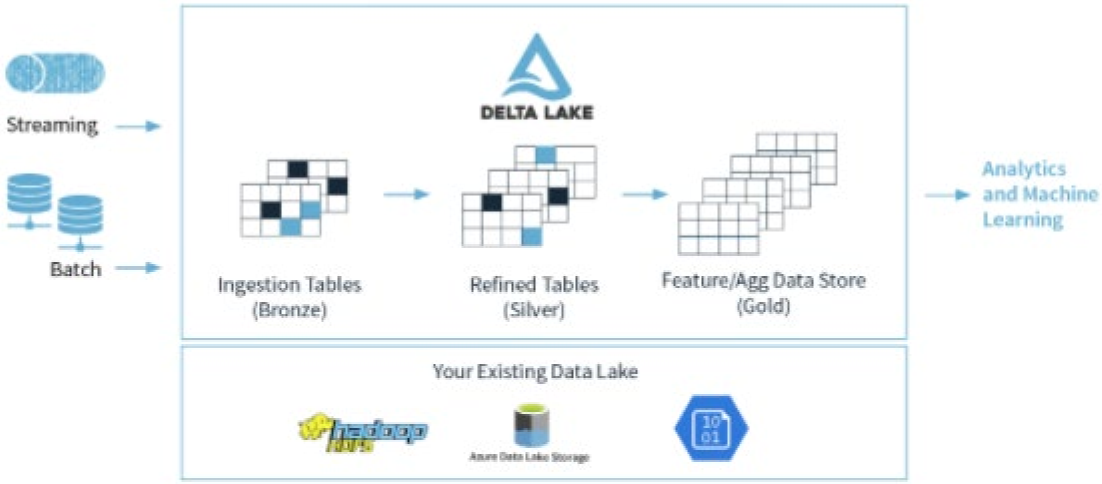
The Lambda architecture is a big data processing architecture that addresses this problem by combining both batch- and real-time processing methods. It features an append-only immutable data source that serves as system of record. Timestamped events are appended to existing events (nothing is overwritten). Data is implicitly ordered by time of arrival.

The [?] is a vast improvement upon the traditional Lambda architecture. At each stage, we enrich our data through a unified pipeline that allows us to combine batch and streaming workflows through a shared filestore with ACID-compliant transactions.

- ○
  No-SQL architecture
- ○
  Delta Lake architecture
  (Correct)
- ○
  Anaconda architecture
- ○
  Serverless architecture
- ○
  Data Lake architecture
- ○
  Data Sea architecture

Explanation

An example of a Delta Lake Architecture might be as shown in the diagram below.



- Many **devices** generate data across different ingestion paths.
- Streaming data can be ingested from **IoT Hub** or **Event Hub**.
- Batch data can be ingested by **Azure Data Factory** or **Azure Databricks**.
- Extracted, Transformed data is loaded into a **Delta Lake**.

Lambda architecture

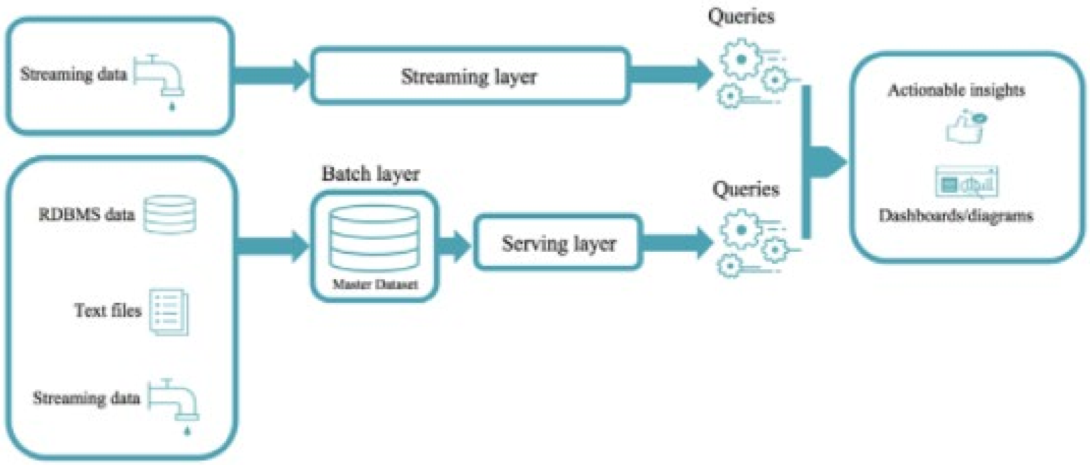
When working with large data sets, it can take a long time to run the sort of queries that clients need. These queries can't be performed in real time, and often require algorithms such as MapReduce that operate in parallel across the entire data set. The results are then stored separately from the raw data and used for querying.

One drawback to this approach is that it introduces latency. If processing takes a few hours, a query may return results that are several hours old. Ideally, you would like to get some results in real time (perhaps with some loss of accuracy), and combine these results with the results from the batch analytics.

The **lambda architecture** is a big data processing architecture that addresses this problem by combining both batch- and real-time processing methods. It features an append-only immutable data source that serves as system of record. Timestamped events are appended to existing events (nothing is overwritten). Data is implicitly ordered by time of arrival.

Notice how there are really two pipelines here, one batch and one streaming, hence the name *lambda* architecture.

It is difficult to combine processing of batch and real-time data as is evidenced by the diagram below:



Delta Lake architecture

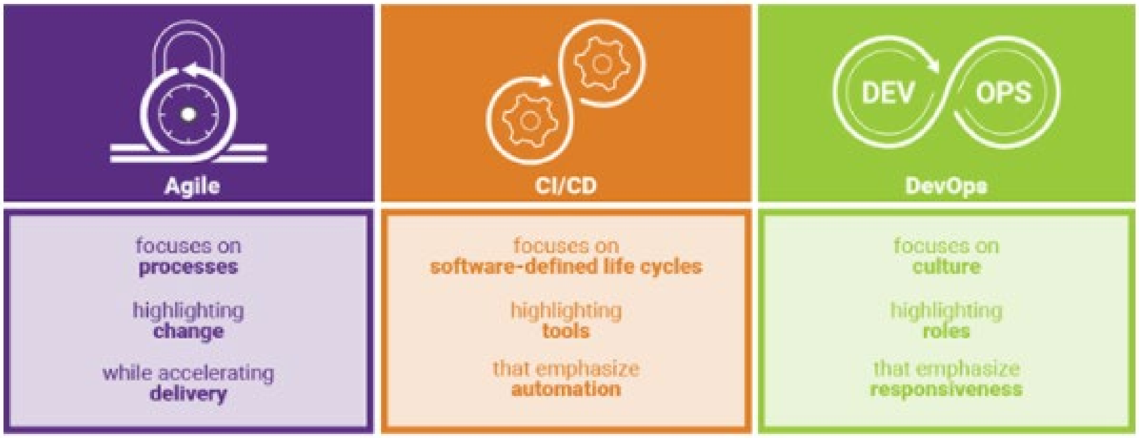
The Delta Lake Architecture is a vast improvement upon the traditional Lambda architecture. At each stage, we enrich our data through a unified pipeline that allows us to combine batch and streaming workflows through a shared filestore with ACID-compliant transactions.

Bronze tables contain raw data ingested from various sources (JSON files, RDBMS data, IoT data, etc.).

Silver tables will provide a more refined view of our data. We can join fields from various bronze tables to enrich streaming records, or update account statuses based on recent activity.

Gold tables provide business level aggregates often used for reporting and dashboarding. This would include aggregations such as daily active website users, weekly sales per store, or gross revenue per quarter by department.

The end outputs are actionable insights, dashboards, and reports of business metrics.



By considering our business logic at all steps of the extract-transform-load (ETL) pipeline, we can ensure that storage and compute costs are optimized by reducing unnecessary duplication of data and limiting ad hoc querying against full historic data.

Each stage can be configured as a batch or streaming job, and ACID transactions ensure that we succeed or fail completely.

https://www.jamesserra.com/archive/2019/10/databricks-delta-lake/

Question 86: Skipped

A DataFrame creates a data structure and it's one of the core data structures in Spark. In Spark, it is seen as a distributed collection of data that is organized into columns that have names.

Synapse Spark can be used to read and transform objects into a flat structure through data frames. Synapse SQL serverless can be used to query such objects directly and return those results as a regular table. With Synapse Spark, you can transform nested structures into columns and array elements into multiple rows.

The steps show the techniques involved to deal with complex data types have been shuffled.

a. Flatten nested schema Use the function to flatten the nested schema of the data frame (df) into a new data frame.

b. Define a function for flattening We define a function to flatten the nested schema.

c. Flatten child nested Schema Use the function you create to flatten the nested schema of the data frame into a new data frame.

d. Explode Arrays Transform the array in the data frame into a new dataframe where you also define the column that you want to select.

Which is the correct technique sequence to deal with complex data types?

- ○ b → a → c → d
- ○ a → c → b → d
- ○ b → a → d → c (Correct)
- ○ c → b → d → a

Explanation

A DataFrame creates a data structure and it's one of the core data structures in Spark. In Spark, it is seen as a distributed collection of data that is organized into columns that have names.

Some use cases for transforming complex data types are as follows:

• Complex data types are increasingly common and represent a challenge for data engineers as analyzing nested schema and arrays tend to include time-consuming and complex SQL queries.

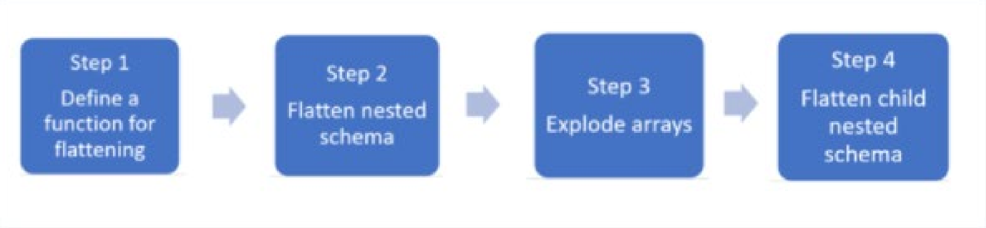
• It can be difficult to rename or cast the nested columns data type.

• Performance issues arise when working with deeply nested objects.

• Data Engineers need to understand how to efficiently process complex data types and make them easily accessible to everyone.

Synapse Spark can be used to read and transform objects into a flat structure through data frames. Synapse SQL serverless can be used to query such objects directly and return those results as a regular table. With Synapse Spark, it's easy to transform nested structures into columns and array elements into multiple rows.

In the overview below, the steps show the techniques involved to deal with complex data types:



Step 1
Define a function for flattening

Step 2
Flatten nested schema

Step 3
Explode arrays

Step 4
Flatten child nested schema

• Step 1: Define a function for flattening We define a function to flatten the nested schema.

• Step 2: Flatten nested schema Use the function to flatten the nested schema of the data frame (df) into a new data frame.

• Step 3: Explode Arrays Transform the array in the data frame into a new dataframe where you also define the column that you want to select.

• Step 4: Flatten child nested Schema Use the function you create to flatten the nested schema of the data frame into a new data frame.

https://medium.com/@saikrishna_55717/flattening-nested-data-json-xml-using-apache-spark-75fa4c8ea2a7

Question 87: Skipped

When working with Azure Data Factory, a dataset is a named view of data that simply points or references the data you want to use in your activities as inputs and outputs.

A dataset in Data Factory can be defined in a JSON format for programmatic creation as follows:

```
JSON
{
"name": "<name of dataset>",
"properties": {
"type": "<type of dataset: AzureBlob, AzureSql etc...>",
"linkedServiceName": {
"referenceName": "<name of linked service>",
"type": "LinkedServiceReference",
},
"schema": [
{
"name": "<Name of the column>",
"type": "<Name of the type>"
}
],
"typeProperties": {
"<type specific property>": "<value>",
"<type specific property 2>": "<value 2>",
}
}
}
```

Which of the JSON properties are required? (Select all that apply)

- □ structure
- □ type (Correct)
- □ typeProperties (Correct)
- □ name (Correct)

Explanation

When working with Azure Data Factory, a dataset is a named view of data that simply points or references the data you want to use in your activities as inputs and outputs. Datasets identify data within different data stores, such as tables, files, folders, and documents. For example, an Azure Blob dataset specifies the blob container and folder in Blob storage from which the activity should read the data.

A dataset in Data Factory can be defined as an object within the Copy Data Activity, as a separate object, or in a JSON format for programmatic creation as follows:

```
JSON
{
"name": "<name of dataset>",
"properties": {
"type": "<type of dataset: AzureBlob, AzureSql etc...>",
"linkedServiceName": {
"referenceName": "<name of linked service>",
"type": "LinkedServiceReference",
},
"schema": [
{
"name": "<Name of the column>",
"type": "<Name of the type>"
}
],
"typeProperties": {
"<type specific property>": "<value>",
"<type specific property 2>": "<value 2>",
}
}
}
```

The following describes properties in the above JSON:

Property: name

Name of the dataset.

Required: Yes

Property: type

Type of the dataset. Specify one of the types supported by Data Factory (for example: AzureBlob, AzureSqlTable).

Required: Yes

Property: structure

Schema of the dataset.

Required: No

Property: typeProperties

The type properties are different for each type (for example: Azure Blob, Azure SQL table).

Required: Yes

https://docs.microsoft.com/en-us/azure/data-factory/v1/data-factory-create-datasets

Question 88: Skipped

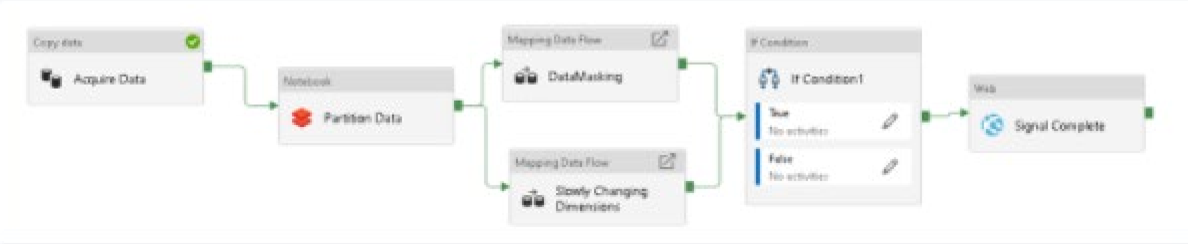
Identify the missing word(s) in the following sentence within the context of Microsoft Azure.

Azure Data Factory is the cloud-based [?] and data integration service that allows you to create data-driven workflows for orchestrating data movement and transforming data at scale. You can build complex [?] processes that transform data visually with data flows or by using compute services such as Azure HDInsight Hadoop, Azure Databricks, and Azure Synapse Analytics.

- ○ OLTP
- ○ CI/CD
- ○ OLAP
- ○ ETL **(Correct)**
- ○ ELT

Explanation

The need to trigger the batch movement of data, or to set up a regular schedule is a requirement for most analytics solutions. Azure Data Factory (ADF) is the service that can be used to fulfill such a requirement. ADF provides a cloud-based data integration service that orchestrates the movement and transformation of data between various data stores and compute resources.



Azure Data Factory is the cloud-based ETL (Extract, Transform, and Load) and data integration service that allows you to create data-driven workflows for orchestrating data movement and transforming data at scale. Using Azure Data Factory, you can create and schedule data-driven workflows (called pipelines) that can ingest data from disparate data stores. You can build complex ETL processes that transform data visually with data flows or by using compute services such as Azure HDInsight Hadoop, Azure Databricks, and Azure Synapse Analytics.

Much of the functionality of Azure Data Factory appears in Azure Synapse Analytics as a feature referred to as Pipelines, which enables you to integrate data pipelines between SQL Pools, Spark Pools and SQL Serverless, providing a one stop shop for all your analytical needs.

https://techcommunity.microsoft.com/t5/azure-data-factory/etl-in-the-cloud-is-made-easy-together-with-azure-data-factory/ba-p/1189736

Question 89: Skipped

Which of the following services allow customers to store semi-structured datasets in Azure.

- □
  Azure Blob Storage
  (Correct)
- □
  Azure File Storage
  (Correct)
- □
  Azure Cosmos DB
  (Correct)
- □
  Azure SQL Datawarehouse
- □
  Azure Table Storage
  (Correct)
- □
  Azure Content Delivery Network (CDN)
- □
  Azure SQL for VM
- □
  Azure SQL Database

Explanation

Azure Table Storage and Cosmos DB are both semi-structured (NoSQL) database services in Azure.

https://docs.microsoft.com/en-us/azure/cosmos-db/table-storage-overview

Azure Blob Storage and Azure File Storage are primarily for unstructured but we can store semi-structured data as well.

https://docs.microsoft.com/en-us/azure/search/search-semi-structured-data

Question 90: Skipped

Although you have the opportunity to ingest data at the source directly into a data warehouse, it is more typical to store the source data within a staging area, which is also referred to as a landing zone. This typically is a neutral storage area that sits between the source systems and the data warehouse.

Which are main reasons for adding a staging area into the architecture of a modern data warehouse? (Select all that apply)

- □ None of the listed options
- □ To rerun failed data warehouse loads from a staging area **(Correct)**
- □ All of the listed options
- □ Higher availability of data
- □ Data storage cost savings
- □ To join data together from different source systems **(Correct)**
- □ Enables you to deal with the ingestion of source systems on different schedules. **(Correct)**
- □ To reduce contention on source systems. **(Correct)**
- □ Quicker ETL/ELT processing times

Explanation

Although you have the opportunity to ingest data at the source directly into a data warehouse, it is more typical to store the source data within a staging area, which is also referred to as a landing zone. This typically is a neutral storage area that sits between the source systems and the data warehouse. The main reason for adding a staging area into the architecture of a modern data warehouse is for any one of the following reasons:

To reduce contention on source systems

Source systems typically play an important role in fulfilling business operations that either bring in revenue to an organization, or provides a function that is mission critical to the business. As a result, ingesting data from these systems must minimize the resource usage against the source system so it does not disrupt it. As a result, some data warehouse design strategies will involve grabbing data at a source, and “dumping” the data into a staging area.

This approach involves no transformation or cleansing. It simply grabs the data, so it minimizes the contention on the source system. This may also involve having the source system output data into text files, that are then collected by your Extract, Transform and Load (ETL) process.

Enables you to deal with the ingestion of source systems on different schedules.

Staging environments provide a great place to store data from different source systems regardless of the schedule on which the data is ingested. For example, you may grab data from some source systems in the early evening because this is the time when they are at their quietest, and then it may not be until the early hours of the morning until you can grab data from other system as they have backup process running on them first before you are able to ingest the data. Having a staging area enables you to handle these different schedules

To join data together from different source systems

A staging environment provides the opportunity to bring together a single view of data from different source systems. As the staging area is independent from the source systems and the data warehouse, you have the freedom to perform any work you need without impacting these systems.

You can even create additional tables that can aid the process of joining data together from different source systems, referred to as mapping tables. In this scenario, imagine that you have a customer’s table in one source system, that has a column named `FirstName`. In a second source system, perhaps running an AS400 system, you have customer’s table that has a column named `FIRNAME` that also represents the first name of the customer too.

You can create a separate table that contains metadata that maps the data in a column from one source system, with another column from another source system that represent the same business entity. In this case `firstname`.

To rerun failed data warehouse loads from a staging area

Not all data warehouse loads will complete successfully, so your data warehouse has to be able to handle scenarios where a rerun of the ETL process may have to occur during core business hours, and needs to occur without disrupting the source systems again. By holding onto the staging data, you are able to rerun the ETL process from the staging area, rather than the source system.

In a modern data warehouse architecture, the source data can be so varied. The variety and volume of data that is generated and analyzed today is increasing. Companies have multiple sources of data, from websites to Point of Sale (POS) systems, and more recently from social media sites to Internet of Things (IoT) devices. Each source provides an essential aspect of data that needs to be collected, analyzed, and potentially acted upon.

Based on this, Azure Data Lake Gen 2 is the ideal storage solution for hosting staging data as it contains a set of capabilities dedicated to big data analytics known as a data lake. A data lake is a repository of data that is stored in its natural format, usually as blobs or files. Azure Data Lake Storage is a comprehensive, scalable, and cost-effective data lake solution for big data analytics built into Azure.

Azure Data Lake Storage combines a file system with a storage platform to help you quickly identify insights into your data. Data Lake Storage Gen2 builds on Azure Blob storage capabilities to optimize it specifically for analytics workloads. This integration enables analytics performance, the tiering and data lifecycle management capabilities of Blob storage, and the high-availability, security, and durability capabilities of Azure Storage.

https://docs.microsoft.com/en-us/azure/architecture/solution-ideas/articles/modern-data-warehouse