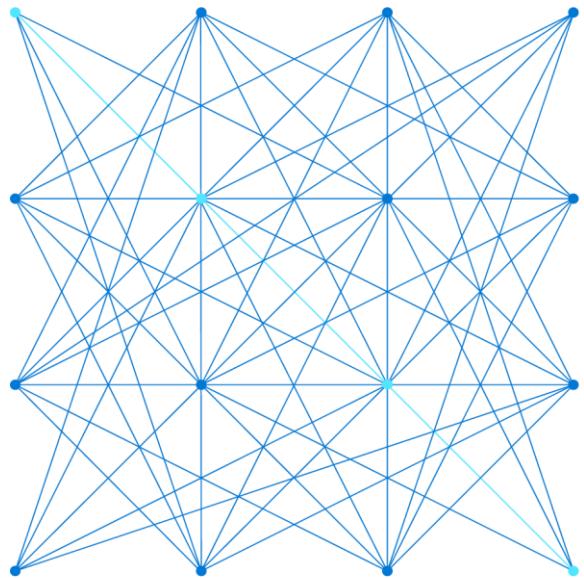


1



Microsoft Azure Data Fundamentals [DP-900]



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2

Tissana Tanaklang

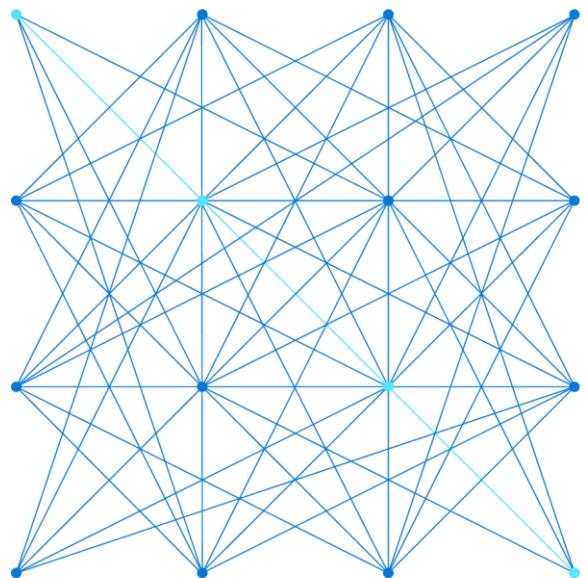
Software and Solution Development Trainer
Iverson Training Center Co., Ltd.
tissana@iverson.co.th ,
tissana_t@hotmail.com



3



Module 1: Explore core data concepts



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4

What is data?

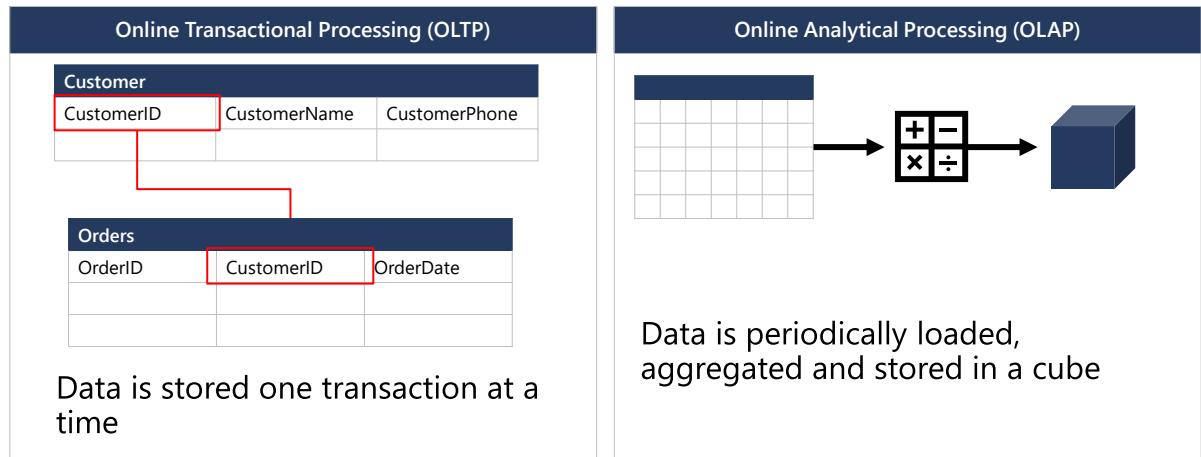
Collection of facts, numbers, descriptions, objects , stored in a structured, semi-structured, unstructured way



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5

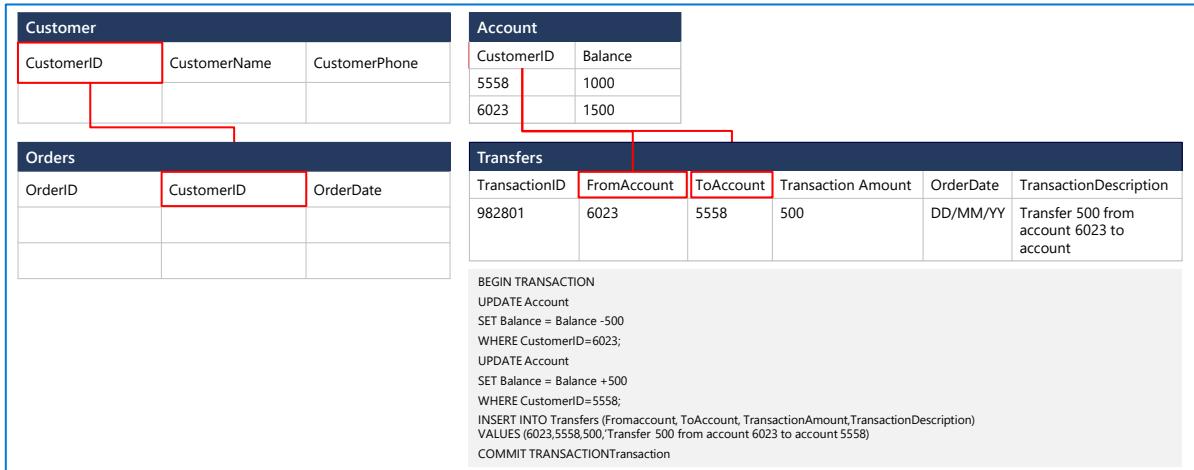
Transactional vs analytical data stores



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6

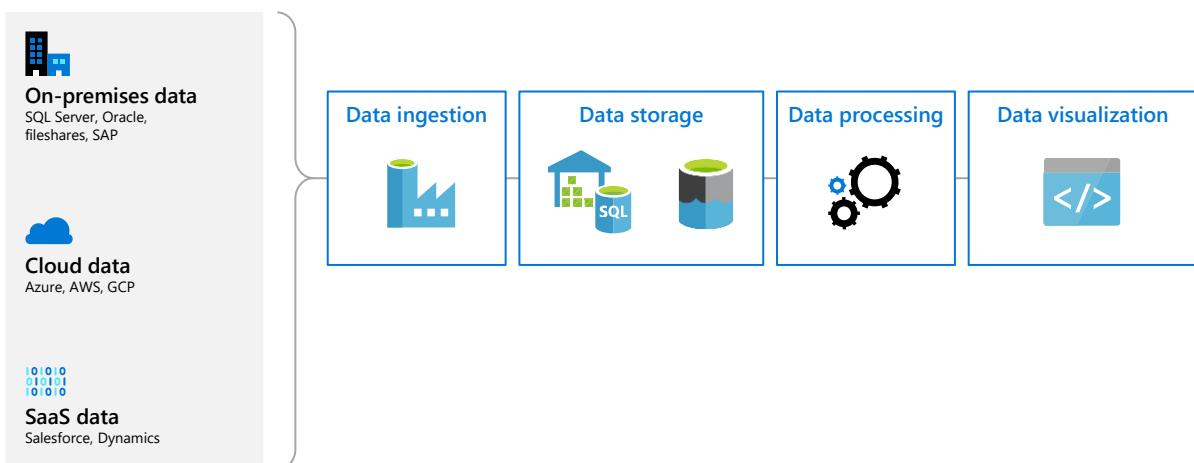
Transactional workloads



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7

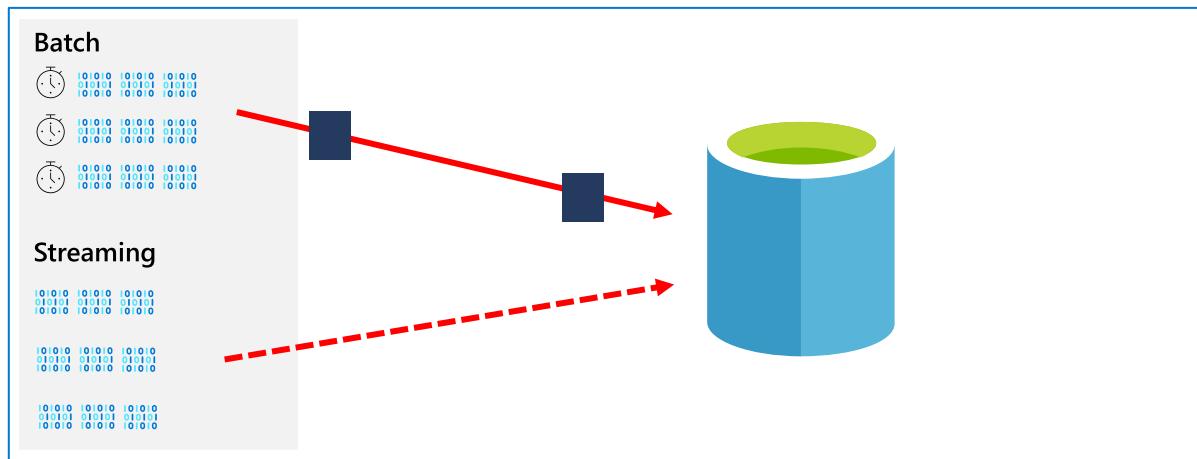
Analytical system



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8

Batch data/streaming data



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9

Question

Workload Types

- Batch
- Streaming

Answer Area

- Workload type
- Workload type
- Workload type

Data for a product catalog will be loaded every 12 hours to a data warehouse.

Data for online purchases will be loaded to a data warehouse as the purchases occur.

Updates to inventory data will be loaded to a data warehouse every 1,000 transactions.

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10

Answer

Batch

Data for a product catalog will be loaded every 12 hours to a data warehouse.

Streaming

Data for online purchases will be loaded to a data warehouse as the purchases occur.

Batch

Updates to inventory data will be loaded to a data warehouse every 1,000 transactions.

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11

Roles in data

Database Administrator

Database Management
Implements Data Security
Backups
User Access
Monitors performance



Data Engineer

Data Pipelines and processes
Data Ingestion storage
Prepare data for Analytics
Prepare data for analytical processing



Data Analyst

Provides insights into the data
Visual Reporting
Modeling Data for Analysis
Combines data for visualization and analysis



12

Common tools – Database administrator

Azure Data Studio	SQL Server Management Studio	Azure Portal/CLI
Graphical interface for managing on-premises and cloud-based data services	Graphical interface for managing on-premises and cloud-based data services	Tools for management and provisioning of Azure Data Services
Runs on Windows, macOS, Linux	Runs on Windows Comprehensive Database Administration tool	Manual and automation of scripts using Azure Resource Manager or Command Line Interface scripting

13

Common tools – Data engineering

Azure Synapse Studio	SQL Server Management Studio	Azure Portal/CLI
Azure Portal integrated to manage Azure Synapse Data Ingestion (Azure Data Factory) Management of Azure Synapse assets (SQL Pools/Spark Pool)	Graphical interface for managing on-premises and cloud-based data services Runs on Windows Comprehensive Database Administration tool	Tools for management and provisioning of Azure resources Manual and automation of scripts using Azure Resource Manager or Command Line Interface scripting

14

Common tools – Data analyst

Power BI Desktop	Power BI Portal/ Power BI Service	Power BI Report Builder
Data Visualization tool	Authoring and management of Power BI reports	Data Visualization tool for paginated reports
Model and Visualize Data	Authoring of Power BI dashboards	Model and Visualize paginated reports
Management of Azure Synapse assets (SQL Pools/Spark Pool)	Share Reports/Datasets	

15

Identify relational database use cases



Online transaction processing:

For example order systems that perform many small transactional updates



Data warehousing:

Large amounts of data can be imported from multiple sources and structured to enable high-performance queries

Question

A relational database must be used when

a dynamic schema is required.
data will be stored as key/value pairs.
storing large images and videos.
strong consistency guarantees are required.

17

A decorative graphic consisting of several thick blue lines. One line starts at the top left, another from below it, and they both curve down and meet at a point. From this point, a single line continues straight to the right, ending at the bottom right corner of the slide.

Answer

A relational database must be used when

a dynamic schema is required.
data will be stored as key/value pairs.
storing large images and videos.
strong consistency guarantees are required.

18

A decorative graphic consisting of several thick blue lines. One line starts at the top left, another from below it, and they both curve down and meet at a point. From this point, a single line continues straight to the right, ending at the bottom right corner of the slide.

Tables

Customers		
CustomerID	CustomerName	CustomerPhone
100	Muisto Linna	XXX-XXX-XXXX
101	Noam Maoz	XXX-XXX-XXXX
102	Vanja Matkovic	XXX-XXX-XXXX
103	Qamar Mounir	XXX-XXX-XXXX
104	Zhenis Omar	XXX-XXX-XXXX
105	Claude Paulet	XXX-XXX-XXXX
106	Alex Pettersen	XXX-XXX-XXXX
107	Francis Ribeiro	XXX-XXX-XXXX

Data is stored in a table

Table consists of rows and columns

All rows have same # of columns

Each column is defined by a datatype

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19

Entities

Customers		
CustomerID	CustomerName	CustomerPhone
100	Muisto Linna	XXX-XXX-XXXX
101	Noam Maoz	XXX-XXX-XXXX
102	Vanja Matkovic	XXX-XXX-XXXX
103	Qamar Mounir	XXX-XXX-XXXX
104	Zhenis Omar	XXX-XXX-XXXX
105	Claude Paulet	XXX-XXX-XXXX
106	Alex Pettersen	XXX-XXX-XXXX

An entity is a representation of an item which can be physical (such as a customer or a product), or virtual (such as an order).

Entities are connected by relations enabling interaction. For example, a customer can place an order for a product

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20

Normalization

Customers			Orders		
CustomerID	CustomerName	CustomerPhone	OrderID	CustomerName	CustomerPhone
100	Muisto Linna	XXX-XXX-XXXX	AD100	Noam Maoz	XXX-XXX-XXXX
101	Noam Maoz	XXX-XXX-XXXX	AD101	Noam Maoz	XXX-XXX-XXXX
102	Vanja Matkovic	XXX-XXX-XXXX	AD102	Noam Maoz	XXX-XXX-XXXX
103	Qamar Mounir	XXX-XXX-XXXX	AX103	Qamar Mounir	XXX-XXX-XXXX
104	Zhenis Omar	XXX-XXX-XXXX	AS104	Qamar Mounir	XXX-XXX-XXXX
105	Claude Paulet	XXX-XXX-XXXX	AR105	Claude Paulet	XXX-XXX-XXXX
106	Alex Pettersen	XXX-XXX-XXXX	MK106	Muisto Linna	XXX-XXX-XXXX

Data is normalized to:

Reduce storage

Avoid data duplication

Improve data quality

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Question

Statements	Yes	No
------------	-----	----

Normalization involves eliminating relationships between database tables.

Normalizing a database reduces data redundancy.

Normalization improves data integrity.

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22

Answer

Statements	Yes	No
Normalization involves eliminating relationships between database tables.	<input type="radio"/>	<input checked="" type="radio"/>
Normalizing a database reduces data redundancy.	<input checked="" type="radio"/>	<input type="radio"/>
Normalization improves data integrity.	<input checked="" type="radio"/>	<input type="radio"/>

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23

Relations

Customers			Orders		
CustomerID	CustomerName	CustomerPhone	OrderID	CustomerID	SalesPersonID
100	Muisto Linna	XXX-XXX-XXXX	AD100	101	200
101	Noam Maoz	XXX-XXX-XXXX	AD101	101	200
102	Vanja Matkovic	XXX-XXX-XXXX	AD102	101	200
103	Qamar Mounir	XXX-XXX-XXXX	AX103	103	201
104	Zhenis Omar	XXX-XXX-XXXX	AS104	103	201
105	Claude Paulet	XXX-XXX-XXXX	AR105	105	200
106	Alex Pettersen	XXX-XXX-XXXX	MK106	105	201

In a normalized database schema:

Primary Keys and Foreign keys are used to define relationships

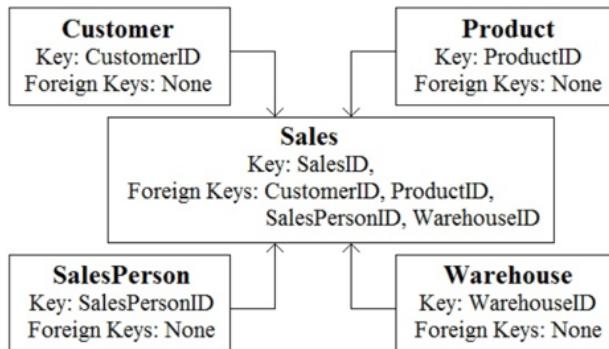
No data duplication exists (other than key values in 3rd Normal Form (3NF)

Data is retrieved by joining tables together in a query

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24

Question



The data model is a [answer choice].

transactional model
star schema
snowflake schema
fact
dimension
bridge

Customer is a [answer choice] table.

25

Answer

The data model is a [answer choice].

transactional model
star schema
snowflake schema

Customer is a [answer choice] table.

fact
dimension
bridge

26

Indexes

Customers			IDX-CustomerRegion	
CustomerID	CustomerName	CustomerPhone	CustomerID	Region
100	Muisto Linna	XXX-XXX-XXXX	100	France
101	Noam Maoz	XXX-XXX-XXXX	101	Brazil
102	Vanja Matkovic	XXX-XXX-XXXX	102	Croatia
103	Qamar Mounir	XXX-XXX-XXXX	103	Jordan
104	Zhenis Omar	XXX-XXX-XXXX	104	Spain
105	Claude Paulet	XXX-XXX-XXXX	105	France
106	Alex Pettersen	XXX-XXX-XXXX	106	USA

An index:

Optimizes search queries for faster data retrieval

Reduces the amount of data pages that need to be read to retrieve the data in a SQL Statement

Data is retrieved by joining tables together in a query

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27

View

Customers			Orders			Create the definition of a view: CREATE VIEW vw_customerorders AS SELECT Customers.CustomerID, Customers.CustomerName, Orders.OrderID FROM Customers JOIN Orders on Customers.CustomerID = Orders.CustomerID Retrieve the orders placed by customer 102 using the view: SELECT CustomerName, OrderID from vw_customerorders WHERE CustomerID=102
CustomerID	CustomerName	CustomerPhone	OrderID	CustomerID	SalesPersonID	
100	Muisto Linna	XXX-XXX-XXXX	AD100	101	200	
101	Noam Maoz	XXX-XXX-XXXX	AD101	101	200	
102	Vanja Matkovic	XXX-XXX-XXXX	AD102	101	200	
103	Qamar Mounir	XXX-XXX-XXXX	AX103	103	201	
104	Zhenis Omar	XXX-XXX-XXXX	AS104	103	201	
105	Claude Paulet	XXX-XXX-XXXX	AR105	105	200	
106	Alex Pettersen	XXX-XXX-XXXX	MK106	105	201	
			DB205	100	205	

A view is a virtual table based on the result set of query:

Views are created to simplify the query

Combine relational data into a single pane view

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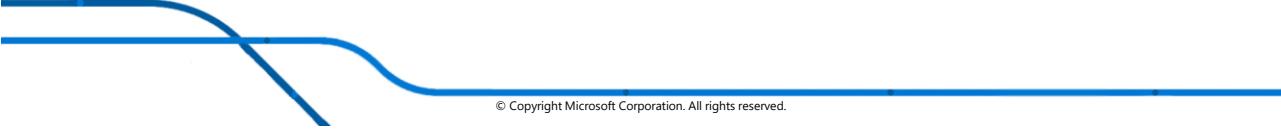
28

Question

▼	
A heap	
A stored procedure	
A view	
An index	

▼ is a virtual table that contains content defined by a query.

29



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Answer

▼	
A heap	
A stored procedure	
A view	
An index	

▼ is a virtual table that contains content defined by a query.

30



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Question

You have a SQL query that combines customer data and order data. The query includes calculated columns.

You need to persist the SQL query so that other users can use the query.

What should you create?

- A. an index
- B. a view
- C. a scalar function
- D. a table



31

Answer

You have a SQL query that combines customer data and order data. The query includes calculated columns.

You need to persist the SQL query so that other users can use the query.

What should you create?

- A. an index
- B. a view**
- C. a scalar function
- D. a table



32

Question

Terms

Index
View
Table

Answer Area

A database object that holds data

A database object whose content is defined by a query

A database object that helps improve the speed of data retrieval

33

Answer

Terms

Index
View
Table

Answer Area

Table
View
Index

A database object that holds data

A database object whose content is defined by a query

A database object that helps improve the speed of data retrieval

34

Question

Statements	Yes	No
Relational database tables contain columns and rows	<input type="radio"/>	<input type="radio"/>
Indexes in a relational database describe the data types in a table	<input type="radio"/>	<input type="radio"/>
A database view is a virtual table whose content is defined by a query	<input type="radio"/>	<input type="radio"/>

35

Answer

Statements	Yes	No
Relational database tables contain columns and rows	<input checked="" type="radio"/>	<input type="radio"/>
Indexes in a relational database describe the data types in a table	<input type="radio"/>	<input checked="" type="radio"/>
A database view is a virtual table whose content is defined by a query	<input checked="" type="radio"/>	<input type="radio"/>

36

Explore characteristics of non-relational data

Entities

```
## Customer 1 ID: 1
Name: Mark Hanson
Telephone: [ Home: 1-999-9999999, Business: 1-888-8888888, Cell: 1-777- 7777777 ]
Address: [ Home: 121 Main Street, Some City, NY, 10110,
           Business: 87 Big Building, Some City, NY, 10111 ]
## Customer 2 ID: 2
Title: Mr
Name: Jeff Hay
Telephone: [ Home: 0044-1999-333333, Mobile: 0044-17545-444444 ]
Address: [ UK: 86 High Street, Some Town, A County, GL8888, UK,
           US: 777 7th Street, Another City, CA, 90111 ]
```

Non-relational collections can have:

Multiple entities in the same collection or container with different fields

Have a different, non-tabular schema

Are often defined by labeling each field with the name it represents

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37

Identify non-relational database use cases



IoT and Telematics:

Often require to ingest large amounts of data in frequent burst of activity, data is either semi structured or structured, often requires real time processing



Retail and Marketing:

Common scenarios for globally distributed data, document storage



Gaming:

In-game stats, social media integration, leaderboards, low-latency applications



Web and Mobile:

Commonly used with web click analytics, modern applications including bots

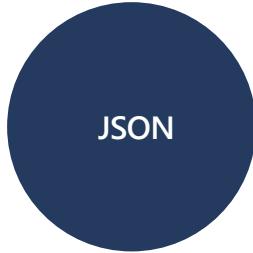
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38

Types of non-relational data

What is semi-structured data?

Data structure is defined within the actual data by fields. Format/file types include:



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Question

```

"customer" : {
    "first name" : "Ben",
    "last name" : "Smith",
    "address" : {
        "line 1" : "161 Azure Ln",
        "line 2" : "Palo Alto",
        "ZIP code" : "54762"
    },
    "social media": [
        {
            "service" : "twitter",
            "handle" : "@bensmith"
        },
        {
            "service" : "linkedin",
            "handle" : "bensmith"
        }
    ],
    "phone numbers": [
        {
            "type" : "mobile",
            "number" : "555-555-5555"
        }
    ]
}

```

Answer Area

Customer is [answer choice].

a nested array
a nested object
a root object

Address is [answer choice].

a nested array
a nested object
a root object

Social media is [answer choice].

a nested array
a nested object
a root object

40

Answer

Customer is [answer choice].	<table border="1"> <tr><td>a nested array</td></tr> <tr><td>a nested object</td></tr> <tr style="background-color: #90EE90;"><td>a root object</td></tr> </table>	a nested array	a nested object	a root object
a nested array				
a nested object				
a root object				
Address is [answer choice].	<table border="1"> <tr><td>a nested array</td></tr> <tr><td>a nested object</td></tr> <tr style="background-color: #90EE90;"><td>a root object</td></tr> </table>	a nested array	a nested object	a root object
a nested array				
a nested object				
a root object				
Social media is [answer choice].	<table border="1"> <tr><td>a nested array</td></tr> <tr><td>a nested object</td></tr> <tr style="background-color: #90EE90;"><td>a root object</td></tr> </table>	a nested array	a nested object	a root object
a nested array				
a nested object				
a root object				

41

What is unstructured data?



Does not naturally contain fields:

Examples: video, audio, media streams, documents



Often used to extract data organization and categorize or identify "structures"



Frequently used in combination with Machine Learning or Cognitive Services capabilities to "extract data" by using:

Text Analytics

Sentiment Analysis with Cognitive APIs

Vision API

What is NoSQL?

Loose term, to describe non-relational



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Key-Value Stores

Key	Value
AAAAA	110100111010100110101111...
AABAB	1001100001011001101011110...
DFA766	0000000000101010110101010...
FABCC4	1110110110101010100101101...

Opaque to
data store

A key-value store is the simplest (and often quickest) type of NoSQL database for inserting and querying data.

44

Question

A key/value data store is optimized for

enforcing constraints
simple lookups
table joins
transactions

45



Answer

A key/value data store is optimized for

enforcing constraints
simple lookups
table joins
transactions

46



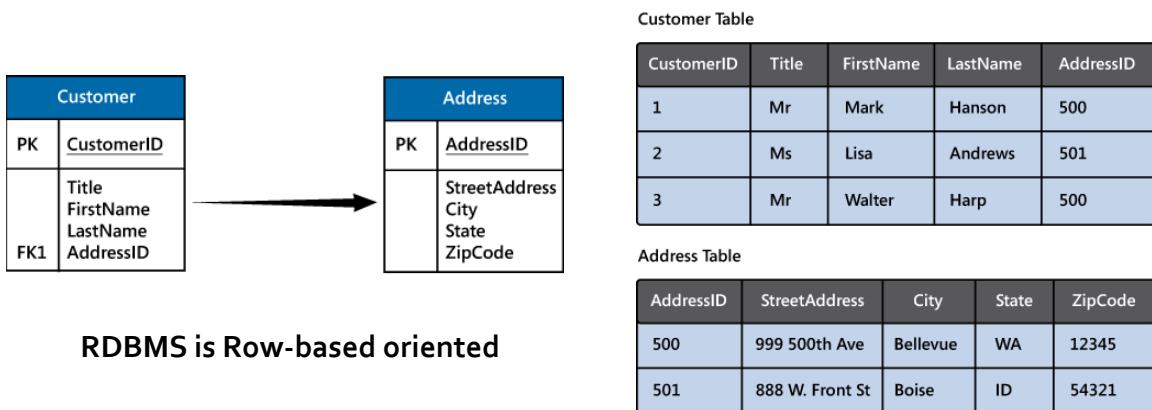
Document Databases

Key	Document
1001	{ "CustomerID": 99, "OrderItems": [{ "ProductID": 2010, "Quantity": 2, "Cost": 520 }, { "ProductID": 4365, "Quantity": 1, "Cost": 18 }], "OrderDate": "04/01/2017" }
1002	{ "CustomerID": 220, "OrderItems": [{ "ProductID": 1285, "Quantity": 1, "Cost": 120 }], "OrderDate": "05/08/2017" }

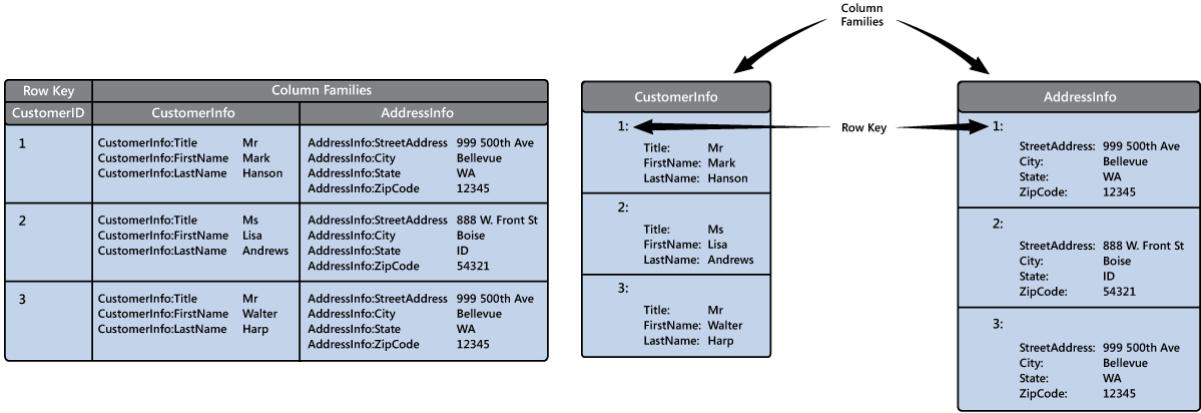
A document database represents the opposite end of the NoSQL spectrum from a key-value store. In a document database, each document has a unique ID, but the fields in the documents are transparent to the database management system. Document databases typically store data in JSON format,

47

Column Family Databases



48



49

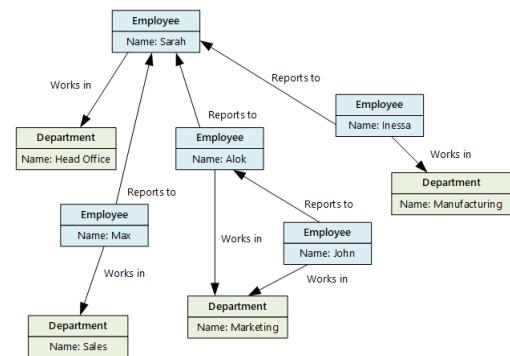
What is a graph database?



Stores entities centric around relationships



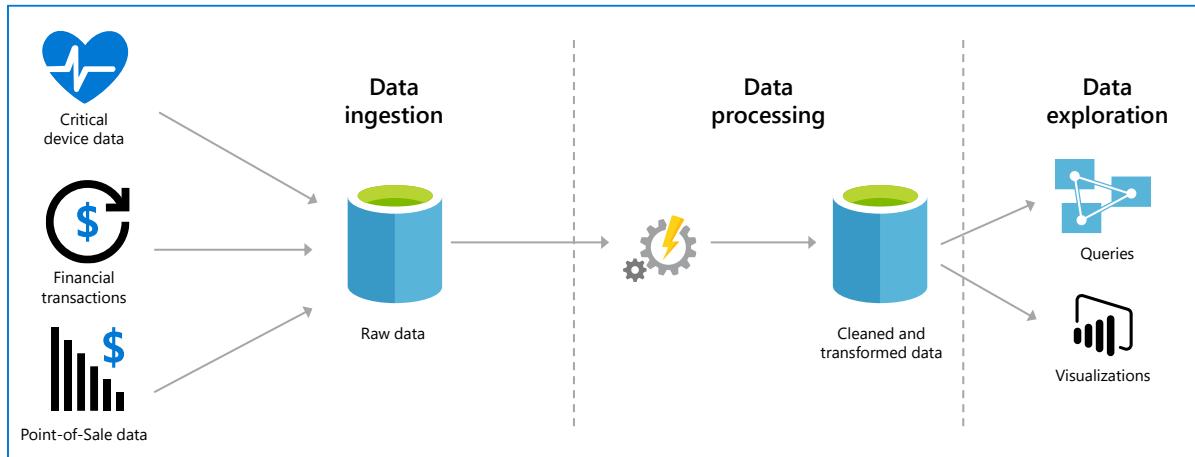
Enables applications to perform queries traversing a network of nodes and edges



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50

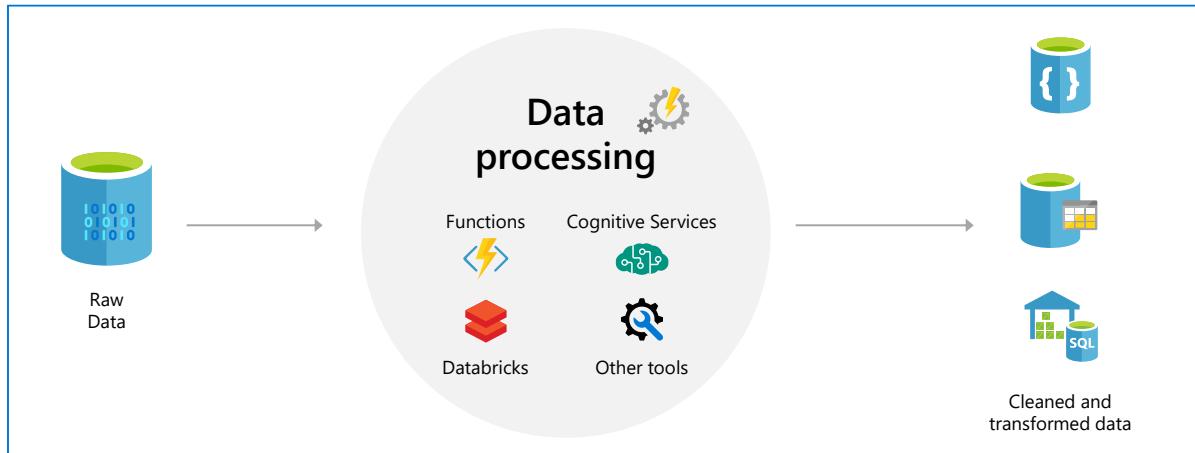
What is data ingestion?



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51

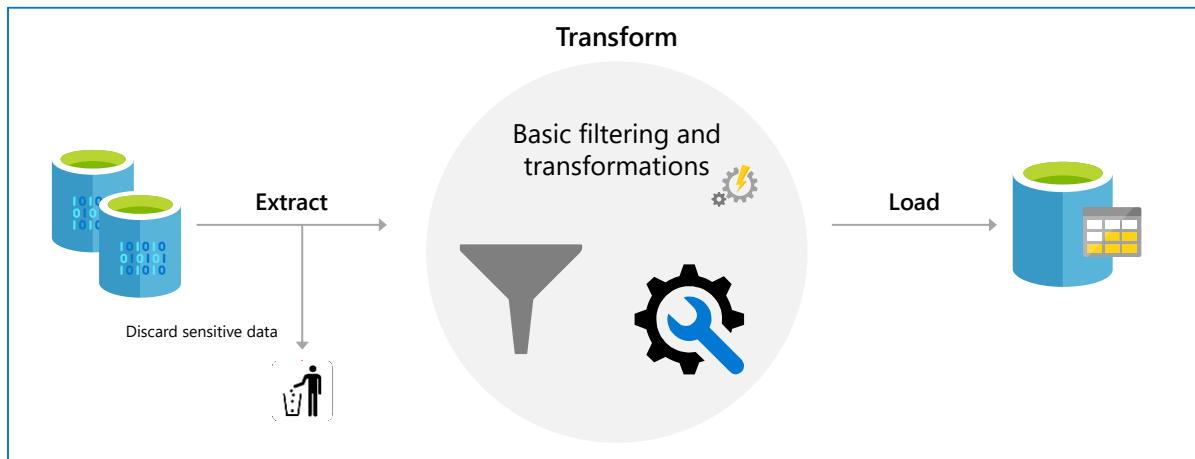
What is data processing?



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What is ETL?



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53

Question

An extract, transform, and load (ETL) process requires

- a matching schema in the data source and the data target.
- a target data store powerful enough to transform data.
- data that is fully processed before being loaded to the target data store.
- that the data target be a relational database.

54

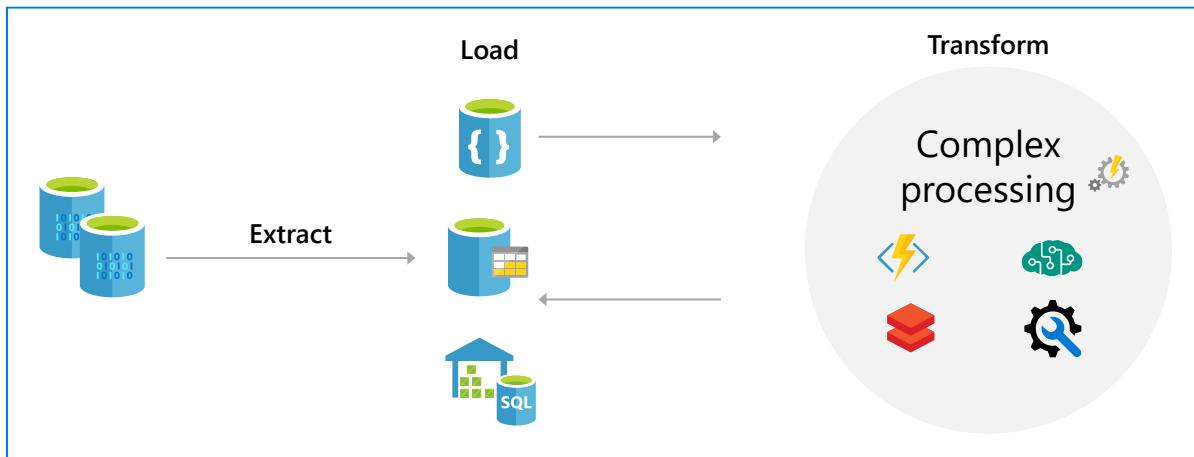
Answer

An extract, transform, and load (ETL) process requires

- a matching schema in the data source and the data target.
- a target data store powerful enough to transform data.
- data that is fully processed before being loaded to the target data store.
- that the data target be a relational database.

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What is ELT?



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Question

Locations

- An in-memory data integration tool
- The CRM system
- The data warehouse

Answer Area

Extract: Location

Load: Location

Transform: Location

57



Answer

Extract:

The CRM system

Load:

The data warehouse

Transform:

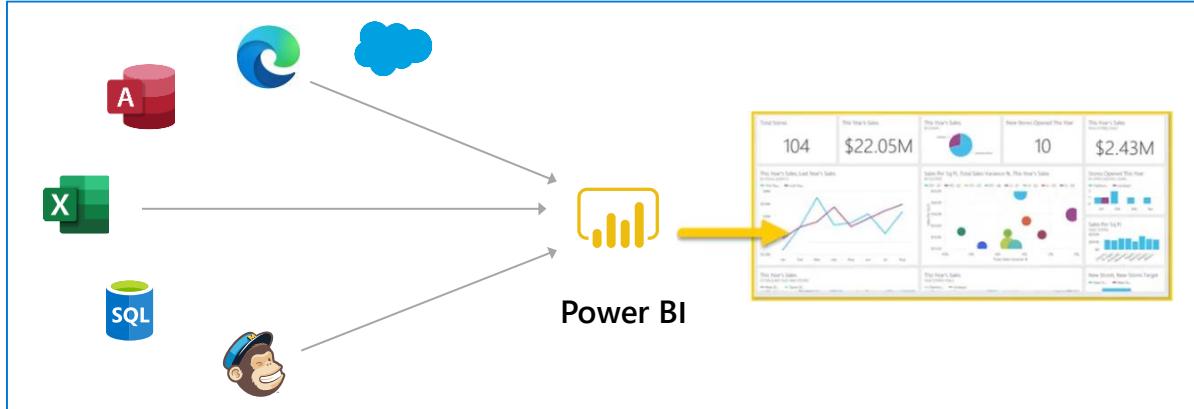
An in-memory data integration tool

58



Explore data visualization

Power BI: A collection of software, services, apps, and connectors

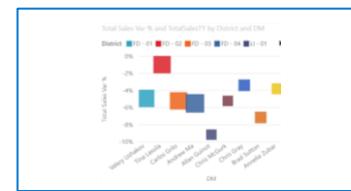
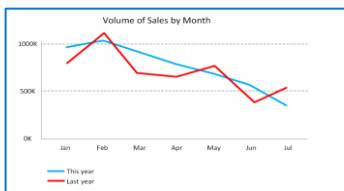


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Power BI

Visualizations



Quarter Year	Q1 Revenue	YTD Revenue	Q2 Revenue	YTD Revenue
2015	\$45,186	\$45,186	\$70,609	\$115,795
2016	\$52,154	\$52,154	\$73,542	\$125,696
2017	\$51,388	\$51,388	\$68,149	\$118,537
2018	\$48,281	\$48,281	\$66,853	\$115,134
2019	\$53,345	\$53,345	\$49,135	\$102,280

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Explore data analytics



Descriptive



Diagnostic



Predictive



Prescriptive



Cognitive

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Question

Descriptive analytics tells you

what is most likely to occur in the future.
what occurred in the past.
which actions you can perform to affect outcomes.
why something occurred in the past.

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62

Answer

Descriptive analytics tells you

what is most likely to occur in the future.
what occurred in the past.
which actions you can perform to affect outcomes.
why something occurred in the past.

63

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Question

Transcribing audio files is an example of

cognitive
descriptive
predictive
prescriptive

64

Answer

Transcribing audio files is an example of

cognitive
descriptive
predictive
prescriptive

analytics.

65



Question

A visualization that shows a university's current student enrollment versus the maximum capacity is an example of

cognitive
descriptive
predictive
prescriptive

analytics.

66



Answer

A visualization that shows a university's current student enrollment versus the maximum capacity is an example of

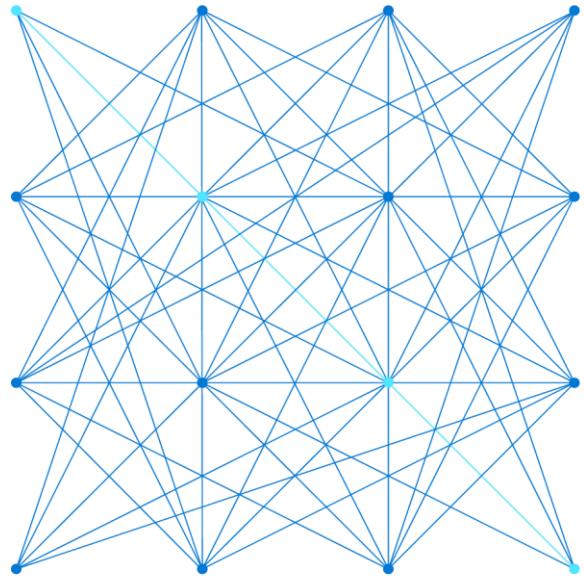
cognitive
descriptive
predictive
prescriptive

analytics.

67



Module 2: Explore relational data in Azure



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Question

Relational data uses

▼
collections
columns
keys
partitions

to enforce relationships between different tables.

69

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Answer

Relational data uses

▼
collections
columns
keys
partitions

to enforce relationships between different tables.

70

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What are Azure Data Services?



SQL Server on Azure Virtual Machines

Best for re-hosting and apps requiring OS-level access and control
Automated manageability features and OS-level access



Azure SQL Managed Instance

Best for modernizing existing apps
Offers high compatibility with SQL Server and native VNET support



Azure SQL Database

Best for building new apps in the cloud
Pre-provisioned or serverless compute and Hyperscale storage to meet demanding workload requirements

— Infrastructure as a Service — | Platform as a Service — — —

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Question

Your company needs to implement a relational database in Azure. The solution must minimize ongoing maintenance. Which Azure service should you use?

- A.** Azure HDInsight
- B.** Azure SQL Database
- C.** Azure Cosmos DB
- D.** SQL Server on Azure virtual machines

72

Answer

Your company needs to implement a relational database in Azure. The solution must minimize ongoing maintenance. Which Azure service should you use?

- A. Azure HDInsight
- B. Azure SQL Database**
- C. Azure Cosmos DB
- D. SQL Server on Azure virtual machines

73

Question

Statements	Yes	No
Platform as a service (PaaS) database offerings in Azure provide built-in high availability.	<input type="radio"/>	<input checked="" type="radio"/>
Platform as a service (PaaS) database offerings in Azure provide configurable scaling options.	<input checked="" type="radio"/>	<input type="radio"/>
Platform as a service (PaaS) database offerings in Azure reduce the administrative overhead for managing hardware.	<input type="radio"/>	<input checked="" type="radio"/>

74

Answer

Statements

Yes

No

Platform as a service (PaaS) database offerings in Azure provide built-in high availability.



Platform as a service (PaaS) database offerings in Azure provide configurable scaling options.



Platform as a service (PaaS) database offerings in Azure reduce the administrative overhead for managing hardware.



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Create an Azure SQL database

Home > New > SQL Database > Create SQL Database

Create SQL Database

Basics Networking Additional settings Tags Review + create

Create a SQL database with your preferred configurations. Complete the Basics tab then go to Review + Create to provision with smart defaults, or visit each tab to customize. [Learn more](#)

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * chtestao Select existing... Create new

Resource group * Select existing... Create new

Database details

Enter required settings for this database, including picking a logical server and configuring the compute and storage resources

Database name *

Server * Select a server Create new

The value must not be empty.

Want to use SQL elastic pool? * Yes No

Compute + storage * Please select a server first Configure database

Dashboard > New > Create SQL Database

Create SQL Database

1 Basics [Advanced](#)

2 Basics Additional settings Tags Review + create

Customize additional configuration parameters including collation & sample data.

Data source

Start with a blank database, restore from a backup or select sample data to populate your new database.

* Use existing data None Backup Sample

* Backup None Backup Sample

3 You can also restore a database to a server blade. [Learn more](#)

4 Select a backup

myserver (West Europe)

- database1 (2019-09-16 (12:05:30 UTC))
- database2 (2019-09-16 (12:06:45 UTC))
- database3 (2019-09-16 (12:07:51 UTC))
- database4 (2019-09-16 (12:08:38 UTC))
- database5 (2019-09-16 (12:09:23 UTC))
- database6 (2019-09-16 (12:10:41 UTC))
- database7 (2019-09-16 (12:11:38 UTC))

Database Collation

Database collation defines the rules that sort and compare data, and cannot be changed after database creation. The default database collation is SQL_Latin1_General_CI_AS. [Learn more](#)

76

Question

Statements	Yes	No
You must apply patches to Azure SQL databases regularly.	<input type="radio"/>	<input type="radio"/>
You need a Microsoft 365 subscription to create an Azure SQL database.	<input type="radio"/>	<input type="radio"/>
You can use existing Microsoft SQL Server licenses to reduce the cost of Azure SQL databases.	<input type="radio"/>	<input type="radio"/>

77

Answer

Statements	Yes	No
You must apply patches to Azure SQL databases regularly.	<input type="radio"/>	<input checked="" type="radio"/>
You need a Microsoft 365 subscription to create an Azure SQL database.	<input type="radio"/>	<input checked="" type="radio"/>
You can use existing Microsoft SQL Server licenses to reduce the cost of Azure SQL databases.	<input checked="" type="radio"/>	<input type="radio"/>

78

PostgreSQL, MySQL, MariaDB



PostgreSQL is the most popular and wanted database for modern apps



MySQL is a leading open source relational database for LAMP stack apps



MariaDB is a community-developed fork of MySQL with strong focus on the user community

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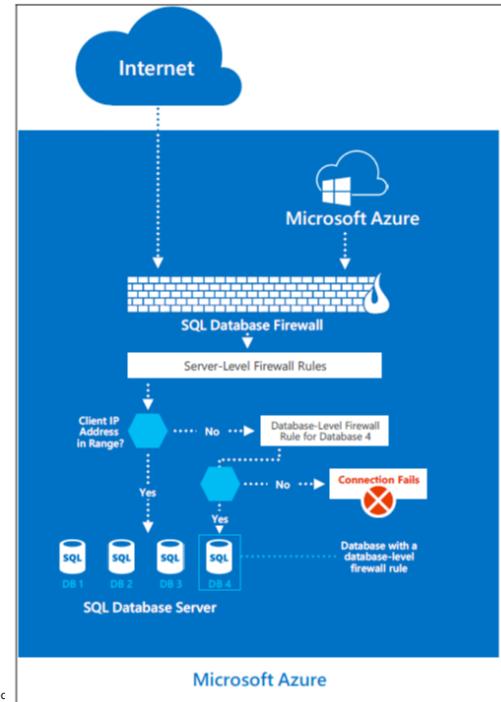
Configure relational data services

Basics	Network connectivity	Additional settings	Tags (DB)	Review & create
Subscription Resource group Managed Instance/ Server name Database Name (DB) Admin Login Password Region Opt-in for pools (DB) Compute + storage	Public vs Private access VNet/Firewall rules Connection type (MI)	Data source (DB) Server Collation (MI) Database Collation (DB) Time zone (MI) Opt-in for Advanced data security (DB)		Terms and Privacy

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80

Server-Level Firewall Rules



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81

Question

By default, each Azure SQL database is protected by

a network security group (NSG).
a server-level firewall.
Azure Firewall.
Azure Front Door.

82

Answer

By default, each Azure SQL database is protected by

a network security group (NSG).
a server-level firewall.
Azure Firewall.
Azure Front Door.



83

Authentication and Access Control



"Mixed Mode" authentication **forced**

SQL Auth for deployment: server admin:

Server-level principal for logical server for DB

Member of sysadmin server role for MI



Need Windows Auth? Use Azure AD Authentication Azure Managed Instance:

Azure AD Server Admin

SQL or Azure AD Logins

Database Users

SQL Server Contained Database supported



Azure SQL Database:

Azure AD Server Admin

SQL logins

loginmanager and dbmanager roles for limited server admins

Database Users

Contained Database Users including Azure AD (recommended)

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84

Question

You need to ensure that users use multi-factor authentication (MFA) when connecting to an Azure SQL database. Which type of authentication should you use?

- A. service principal authentication
- B. Azure Active Directory (Azure AD) authentication
- C. SQL authentication
- D. certificate authentication

85

Answer

You need to ensure that users use multi-factor authentication (MFA) when connecting to an Azure SQL database. Which type of authentication should you use?

- A. service principal authentication
- B. Azure Active Directory (Azure AD) authentication**
- C. SQL authentication
- D. certificate authentication

86

Introduction to SQL



SQL is a standard language for use with relational databases



SQL standards are maintained by ANSI and ISO



Proprietary RDBMS systems have their own extensions of SQL such as T-SQL, PL/SQL, pgSQL

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SQL Statement types

DML	DDL	DCL
Data Manipulation Language Used to query and manipulate data SELECT, INSERT, UPDATE, DELETE	Data Definition Language Used to define database objects CREATE, ALTER, DROP, RENAME	Data Control Language Used to manage security permissions GRANT, REVOKE, DENY

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Question

Which statement is an example of Data Manipulation Language (DML)?

- A. REVOKE
- B. DISABLE
- C. INSERT
- D. GRANT

89

Answer

Which statement is an example of Data Manipulation Language (DML)?

- A. REVOKE
- B. DISABLE
- C. INSERT
- D. GRANT

90

Use DML statements

Statement	Description
SELECT	Select/read from a table
INSERT	Insert new rows in a table
UPDATE	Edit/Update existing rows in a table
DELETE	Delete existing rows in a table

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Question

You have an inventory management database that contains the following table.

ProductName	Quantity
Product1	100
Product2	129
Product3	176

Which statement should you use in a SQL query to change the inventory quantity of Product1 to 270?

- A. INSERT
- B. MERGE
- C. UPDATE
- D. CREATE

92

Answer

You have an inventory management database that contains the following table.

ProductName	Quantity
Product1	100
Product2	129
Product3	176

Which statement should you use in a SQL query to change the inventory quantity of Product1 to 270?

- A. INSERT
 - B. MERGE
 - C. UPDATE
 - D. CREATE
- 

93

Elements of the SELECT Statement

Clause	Expression
SELECT	<select list>
FROM	<table or view>
WHERE	<search condition>
GROUP BY	<group by list>
ORDER BY	<order by list>

Example of SELECT statement

```
SELECT EmployeeId, YEAR(OrderDate) AS OrderYear
FROM Sales.Orders
WHERE CustomerId = 71
GROUP BY EmployeeId, YEAR(OrderDate)
HAVING COUNT(*) > 1
ORDER BY EmployeeId, OrderYear;
```

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Example of INSERT statement

The INSERT ... VALUES statement inserts a new row

```
INSERT INTO Sales.OrderDetails
(orderid, productid, unitprice, qty, discount)
VALUES (10255,39,18,2,0.05);
```

Table and row constructors add multirow capability to INSERT ... VALUES

```
INSERT INTO Sales.OrderDetails
(orderid, productid, unitprice, qty, discount)

VALUES
(10256,39,18,2,0.05),
(10258,39,18,5,0.10);
```

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96

Question

You have the following SQL query.

```
INSERT INTO dbo.Products (ProductID, ProductName, Price, ProductDescription)
VALUES (1, 'Clamp', 12.48, 'Workbench clamp') ;
```

What are dbo.Products and ProductName? To answer, select the appropriate options in the answer area.

NOTE: Each correct selection is worth one point.

Hot Area:

Answer Area

Dbo.Products :

A column
A database
A table
An index

ProductName :

A column
A database
A table
An index

97

Answer

Answer Area

Dbo.Products :

A column
A database
A table
An index

ProductName :

A column
A database
A table
An index

98

Use DDL statements

Statement	Description
CREATE	Create a new object in the database, such as a table or a view
ALTER	Modify the structure of an object. For instance, altering a table to add a new column.
DROP	Remove an object from the database.
RENAME	Rename an existing object.

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Example of CREATE statement

```
CREATE TABLE Mytable
(Mycolumn1 int NOT NULL PRIMARY KEY, Mycolumn2 VARCHAR(50) NOT
NULL , Mycolumn2 VARCHAR(10) NOT NULL
```

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Question

Which statement is an example of Data Definition Language (DDL)?

- A. SELECT
- B. JOIN
- C. MERGE
- D. CREATE

101



Answer

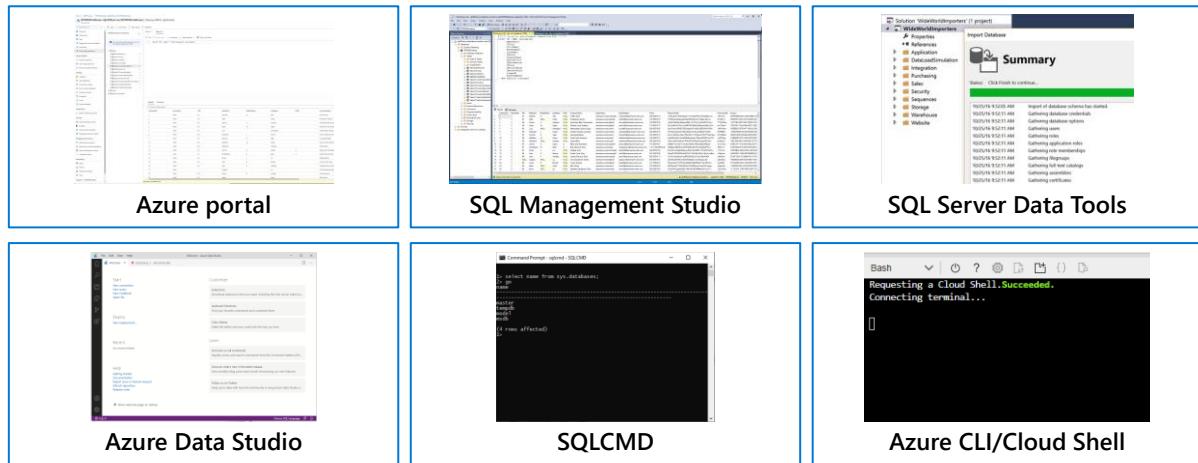
Which statement is an example of Data Definition Language (DDL)?

- A. SELECT
- B. JOIN
- C. MERGE
- D. CREATE

102



Query tools



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103

Question

You are writing a set of SQL queries that administrators will use to troubleshoot an Azure SQL database. You need to embed documents and query results into a SQL notebook. What should you use?

- A.** Microsoft SQL Server Management Studio (SSMS)
- B.** Azure Data Studio
- C.** Azure CLI
- D.** Azure PowerShell

104

Answer

You are writing a set of SQL queries that administrators will use to troubleshoot an Azure SQL database.

You need to embed documents and query results into a SQL notebook.

What should you use?

- A. Microsoft SQL Server Management Studio (SSMS)
- B. Azure Data Studio**
- C. Azure CLI
- D. Azure PowerShell

105

Question

Which command-line tool can you use to query Azure SQL databases?

- A. sqlcmd**
- B. bcp
- C. azdata
- D. Azure CLI

106

Answer

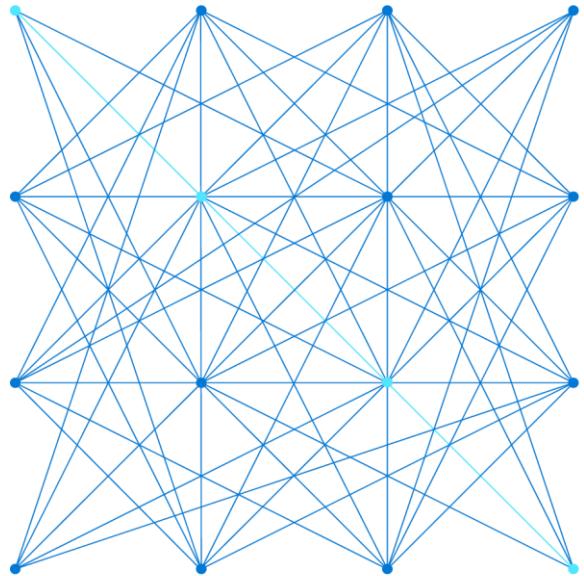
Which command-line tool can you use to query Azure SQL databases?

- A. sqlcmd
- B. bcp
- C. azdata
- D. Azure CLI

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Module 3: Explore non-relational data in Azure



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Create a storage account

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Storage account settings

[Home](#) > [New](#) > [Storage account](#) > [Create storage account](#)

Create storage account

[Basics](#) [Networking](#) [Advanced](#) [Tags](#) [Review + create](#)

Azure Storage is a Microsoft-managed service providing cloud storage that is highly available, secure, durable, scalable, and redundant. Azure Storage includes Azure Blobs (objects), Azure Data Lake Storage Gen2, Azure Files, Azure Queues, and Azure Tables. The cost of your storage account depends on the usage and the options you choose below. [Learn more about Azure storage accounts](#).

Project details
Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription *	dtestao
Resource group *	Select existing... Create new

Instance details
The default deployment model is Resource Manager, which supports the latest Azure features. You may choose to deploy using the classic deployment model instead. [Choose classic deployment model](#)

Storage account name *	
Location *	(US) South Central US
Performance	<input checked="" type="radio"/> Standard <input type="radio"/> Premium
Account kind	StorageV2 (general purpose v2)
Replication	Read-access geo-redundant storage (RA-GRS)
Access tier (default)	<input type="radio"/> Cool <input checked="" type="radio"/> Hot

110

Question

You need to create an Azure Storage account.

Data in the account must replicate outside the Azure region automatically.

Which two types of replication can you use for the storage account? Each correct answer presents a complete solution.

NOTE: Each correct selection is worth one point.

- A. zone-redundant storage (ZRS)
- B. read-access geo-redundant storage (RA-GRS)
- C. locally-redundant storage (LRS)
- D. geo-redundant storage (GRS)

111



Answer

You need to create an Azure Storage account.

Data in the account must replicate outside the Azure region automatically.

Which two types of replication can you use for the storage account? Each correct answer presents a complete solution.

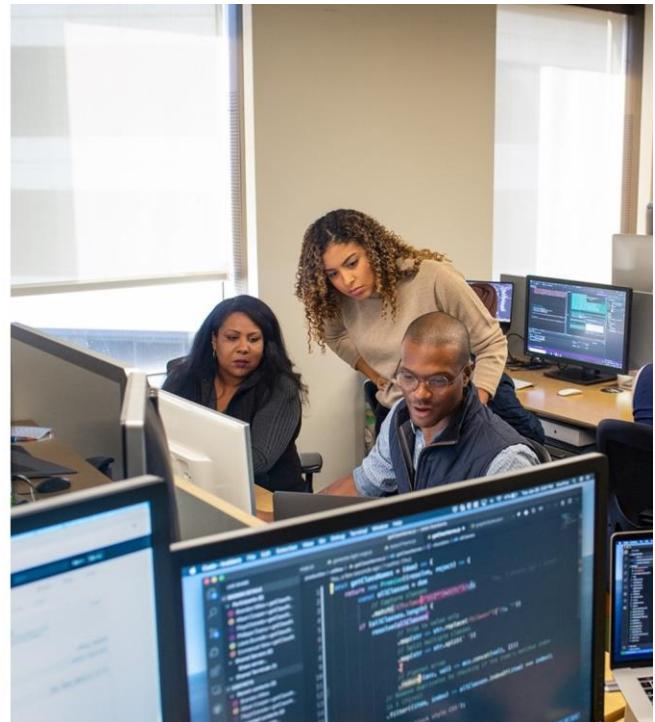
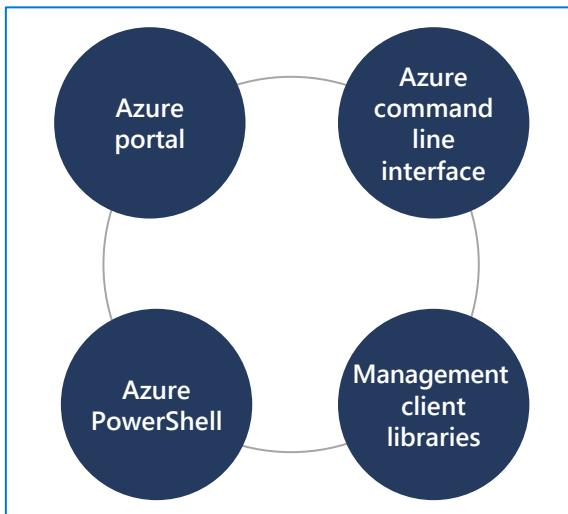
NOTE: Each correct selection is worth one point.

- A. zone-redundant storage (ZRS)
- B. read-access geo-redundant storage (RA-GRS)**
- C. locally-redundant storage (LRS)**
- D. geo-redundant storage (GRS)**

112



Storage account creation tool



113

Azure Blob storage

Overview

- Activity log
- Tags
- Diagnose and solve problems
- Access Control (IAM)
- Data transfer
- Events
- Storage Explorer (preview)

Settings

- Access keys
- Geo-replication
- CORS
- Configuration

Essentials

Resource group (change) : DataFundamentals

Status : Primary Available, Secondary Available	Performance/Access tier : Standard/Hot
Location : East US 2, Central US	Replication : Read-access geo-redundant storage (RA-GRS)
Subscription (change) : CM Azure Subscription	Account kind : StorageV2 (general purpose v2)
Subscription ID : 09c9876d-233f-4906-b0ac-d31970596a44	
Tags (change) : Click here to add tags	

Containers Scalable, cost-effective storage for unstructured data [Learn more](#)

File shares Serverless SMB and NFS file shares [Learn more](#)

Tables Tabular data storage [Learn more](#)

Queues Effectively scale apps according to traffic [Learn more](#)

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114

Question

You manage an application that stores data in a shared folder on a Windows server.

You need to move the shared folder to Azure Storage.

Which type of Azure Storage should you use?

- A.** queue
- B.** blob
- C.** file
- D.** table

115

Answer

You manage an application that stores data in a shared folder on a Windows server.

You need to move the shared folder to Azure Storage.

Which type of Azure Storage should you use?

- A.** queue
- B.** blob
- C.** file
- D.** table

116

Question

You have an application that runs on Windows and requires access to a mapped drive.
Which Azure service should you use?

- A. Azure Files
- B. Azure Blob storage
- C. Azure Cosmos DB
- D. Azure Table storage



117

Answer

You have an application that runs on Windows and requires access to a mapped drive.
Which Azure service should you use?

- A. Azure Files**
- B. Azure Blob storage
- C. Azure Cosmos DB
- D. Azure Table storage



118

Question

Services	Answer Area
Azure Blob storage	Service Enables the use of SQL queries against data stored in JSON documents
Azure Cosmos DB	Service Enables users to access data by using the Server Message Block (SMB) version 3 protocol
Azure Files	
Azure Table storage	

119

Answer

Azure Cosmos DB	Enables the use of SQL queries against data stored in JSON documents
Azure Files	Enables users to access data by using the Server Message Block (SMB) version 3 protocol

120

Explore Azure Blob storage

Block blobs	Page blobs	Append blobs
<p>Has a maximum size of 4.7TB</p> <p>Best for storing large, discrete, binary objects that changes infrequently</p> <p>Each individual block can store up to 100MB of data</p> <p>A block blob can contain up to 50000 blocks</p>	<p>Can hold up to 8TB of data</p> <p>Is organized as a collection of fixed sized-512 byte pages</p> <p>Used to implement virtual disk storage for virtual machines</p>	<p>The maximum size is just over 195GB</p> <p>Is a block blob that is used to optimize append operations</p> <p>Each individual block can store up to 4MB of data</p>

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Provisioning Data Lake storage

The screenshot shows the 'Create storage account' wizard in the Azure portal. The 'Basics' tab is selected. The 'PROJECT DETAILS' section includes fields for 'Subscription' (Visual Studio Enterprise) and 'Resource group' (selected existing). The 'INSTANCE DETAILS' section includes fields for 'Storage account name' (e.g., 'eastus'), 'Location' (East US), 'Performance' (Standard), 'Account kind' (StorageV2 (general purpose v2)), 'Replication' (Read-access geo-redundant storage (RA-GRS)), and 'Access tier (default)' (Hot). The 'SECURITY' section has 'Secure transfer required' set to 'Enabled'. The 'VIRTUAL NETWORKS' section has 'Allow access from' set to 'All networks'. The 'DATA LAKE STORAGE GEN2 (PREVIEW)' section has 'Hierarchical namespace' set to 'Enabled'. A red box highlights the 'Hierarchical namespace' setting.

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Question

Statements	Yes	No
When ingesting data from Azure Data Lake Storage across Azure regions, you will incur costs for bandwidth.	<input type="radio"/>	<input type="radio"/>
You can use blob, table, and file storage in the same Azure Storage account.	<input type="radio"/>	<input type="radio"/>
You implement Azure Data Lake Storage by creating an Azure Storage account.	<input type="radio"/>	<input type="radio"/>

123

Answer

Statements	Yes	No
When ingesting data from Azure Data Lake Storage across Azure regions, you will incur costs for bandwidth.	<input checked="" type="radio"/>	<input type="radio"/>
You can use blob, table, and file storage in the same Azure Storage account.	<input checked="" type="radio"/>	<input type="radio"/>
You implement Azure Data Lake Storage by creating an Azure Storage account.	<input checked="" type="radio"/>	<input type="radio"/>

124

Question

To configure an Azure Storage account to support both security at the folder level and atomic directory manipulation,

- | |
|--|
| enable the hierarchical namespace. |
| set Account kind to BlobStorage. |
| set Performance to Premium. |
| set Replication to Read-access geo-redundant storage (RA-GRS). |

125



Answer

To configure an Azure Storage account to support both security at the folder level and atomic directory manipulation,

- | |
|--|
| enable the hierarchical namespace. |
| set Account kind to BlobStorage. |
| set Performance to Premium. |
| set Replication to Read-access geo-redundant storage (RA-GRS). |

126



Explore Azure Table storage

Key (Customer ID)	Value (Customer Data)					
C1	AAAAA	BBB	101 Block Street	YY	999	888
C2	MM	NN	21 A Street	5 B Avenue		
C3	DDD	EEE	FFF	111	222	66 C Road

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Explore Azure Cosmos DB



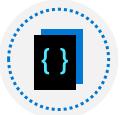
Scalability



Performance



Availability



Programming
model

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Create an Azure Cosmos DB account

The screenshot shows the 'Create an Azure Cosmos DB account' wizard on the 'Basics' step. It includes fields for 'Subscription' (set to 'chtestao'), 'Resource Group' (set to 'Select existing...'), 'Account Name' ('Enter account name'), 'API' (set to 'Core (SQL)'), 'Location' (set to '(US) West US'), and 'Geo-Redundancy' (set to 'Enable'). There are also sections for 'Apache Spark' and 'Multi-region Writes'. A note at the bottom states: 'Up to 33% off multi-region writes is available to qualifying new accounts only. Accounts must be created between December 1, 2019 and February 29, 2020. Offer limited to accounts with both account locations and geo-redundancy, and applies only to multi-region writes in those same regions. Both Geo-Redundancy and Multi-region Writes must be enabled in account settings. Actual discount will vary based on number of qualifying regions selected.'

129

Creating a Database and a Container in Cosmos DB

The screenshot shows the 'Add Container' dialog box. It includes fields for 'Database id' (radio buttons for 'Create new' or 'Use existing', with 'Create new' selected and 'Type a new database id' input field), 'Provision database throughput' (checkbox checked), 'Throughput (400 - 100,000 RU/s)' (radio buttons for 'Autopilot (preview)' or 'Manual', with 'Manual' selected and '400' input field), and 'Container id' (input field 'e.g., Container1'). Other sections include 'Partition key' (input field 'e.g., /address/zipCode'), 'My partition key is larger than 100 bytes' (checkbox unchecked), and 'Unique keys' (button '+ Add unique key'). A note at the top states: 'Start at \$24/mo per database, multiple containers included'.

130

Question

At which two levels can you set the throughput for an Azure Cosmos DB account? Each correct answer presents a complete solution. (Choose two.)
NOTE: Each correct selection is worth one point.

- A. database
- B. item
- C. container
- D. partition

131

Answer

At which two levels can you set the throughput for an Azure Cosmos DB account? Each correct answer presents a complete solution. (Choose two.)
NOTE: Each correct selection is worth one point.

- A. database
- B. item
- C. container
- D. partition

132

Question

You have an Azure Cosmos DB account that uses the Core (SQL) API.

Which two settings can you configure at the container level? Each correct answer presents a complete solution. (Choose two.)

NOTE: Each correct selection is worth one point.

- A. the throughput
- B. the read region
- C. the partition key
- D. the API

133

Answer

You have an Azure Cosmos DB account that uses the Core (SQL) API.

Which two settings can you configure at the container level? Each correct answer presents a complete solution. (Choose two.)

NOTE: Each correct selection is worth one point.

- A. the throughput**
- B. the read region**
- C. the partition key**
- D. the API

134

Cosmos DB APIs

SQL API	Table API	MongoDB API	Cassandra API	Gremlin API
<ul style="list-style-type: none"> Supports SQL-like query language 	<ul style="list-style-type: none"> Compatible with Azure Table Storage 	<ul style="list-style-type: none"> Compatible with MongoDB 	<ul style="list-style-type: none"> Compatible with Cassandra 	<ul style="list-style-type: none"> A graph database

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Query Azure Cosmos DB

Aggregation Function Basics

```
COUNT( <fields_to_count> )
SUM( <numeric_fields> )
AVG( <numeric_fields> )
MAX( <numeric_fields> )
MIN( <numeric_fields> )
```

SQL API examples

```
SELECT COUNT(*) FROM Products p
SELECT SUM(p.quantity) FROM Products p
WHERE p.expired = 0
SELECT AVG(p.price) AS 'Average Price'
FROM Products p
SELECT p1.ID, p.Name, p1.Description,
p1.Price FROM Products p1
WHERE p1.Price = (SELECT MIN(p2.Price) FROM
Product p2)
```

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Question

Data Types	Answer Area	
Image files	Data type	Azure Blob storage
Key/value pairs	Data type	Azure Cosmos DB Gremlin API
Relationships between employees	Data type	Azure Table storage

137



Answer

Data Types	Answer Area	
Image files	Image files	Azure Blob storage
Key/value pairs	Relationships between employees	Azure Cosmos DB Gremlin API
Relationships between employees	Key/value pairs	Azure Table storage

138



Question

When using the Azure Cosmos DB Gremlin API, the container resource type is projected as a

graph.
table.
partition key.
document.

139



Answer

When using the Azure Cosmos DB Gremlin API, the container resource type is projected as a

graph.
table.
partition key.
document.

140



Question

Your company is designing a data store that will contain student data. The data has the following format.

StudentNumber	StudentInformation
7634634	First name: Ben Last: Smith Preferred Name: Benjamin
7634634	First Name: Dominik Last Name: Paiha Email Address: dpaiha@contoso.com MCP ID: 931817
7634636	First Name: Reshma Last Name: Patel Phone number: 514-555-1101
7634637	First Name: Yun-Feng Last Name: Peng

Which type of data store should you use?



- A. graph
- B. key/value
- C. object
- D. columnar

141

Answer

Your company is designing a data store that will contain student data. The data has the following format.

StudentNumber	StudentInformation
7634634	First name: Ben Last: Smith Preferred Name: Benjamin
7634634	First Name: Dominik Last Name: Paiha Email Address: dpaiha@contoso.com MCP ID: 931817
7634636	First Name: Reshma Last Name: Patel Phone number: 514-555-1101
7634637	First Name: Yun-Feng Last Name: Peng

Which type of data store should you use?



- A. graph
- B. key/value
- C. object
- D. columnar

142

Question

Which type of non-relational data store supports a flexible schema, stores data as JSON files, and stores all the data for an entity in the same document?

- A. document
- B. columnar
- C. graph
- D. time series

143



Answer

Which type of non-relational data store supports a flexible schema, stores data as JSON files, and stores all the data for an entity in the same document?

- A. document
- B. columnar
- C. graph
- D. time series

144



Question

APIs

- Cassandra API
- Gremlin API
- MongoDB API
- Table API

Answer Area

- Graph data
- JSON documents
- Key/value data

145



Answer

APIs

- Cassandra API
- Gremlin API
- MongoDB API
- Table API

Answer Area

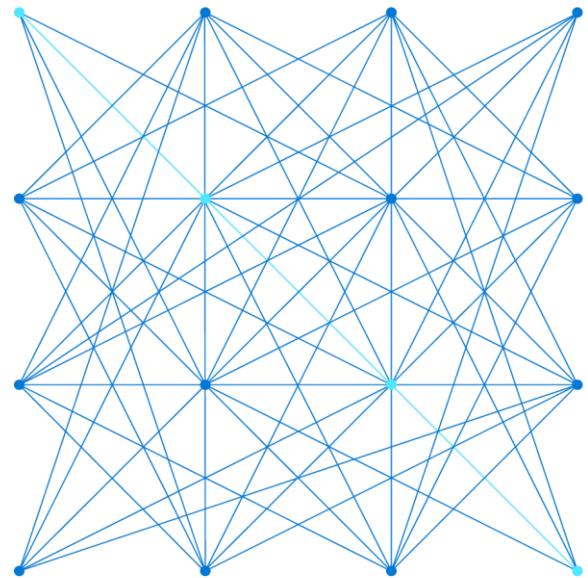
- Gremlin API Graph data
- MongoDB API JSON documents
- Table API Key/value data

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Module 4: Explore modern data warehouse analytics



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What to use for Data

-  →
 - When you need a **low cost, high throughput** data store
 - When you need to store **No-SQL** data
 - When you **do not need to query** the data directly. **No ad hoc query** support
 - Suits the storage of archive or **relatively static data**
 - Suits acting as a **HDInsight Hadoop** data store

-  →
 - When you need a **low cost, high throughput** data store
 - **Unlimited storage for No-SQL** data
 - When you **do not need to query** the data directly. **No ad hoc query** support
 - Suits the storage of archive or **relatively static data**
 - Suits acting as a **Databricks, HDInsight** and **IoT** data store

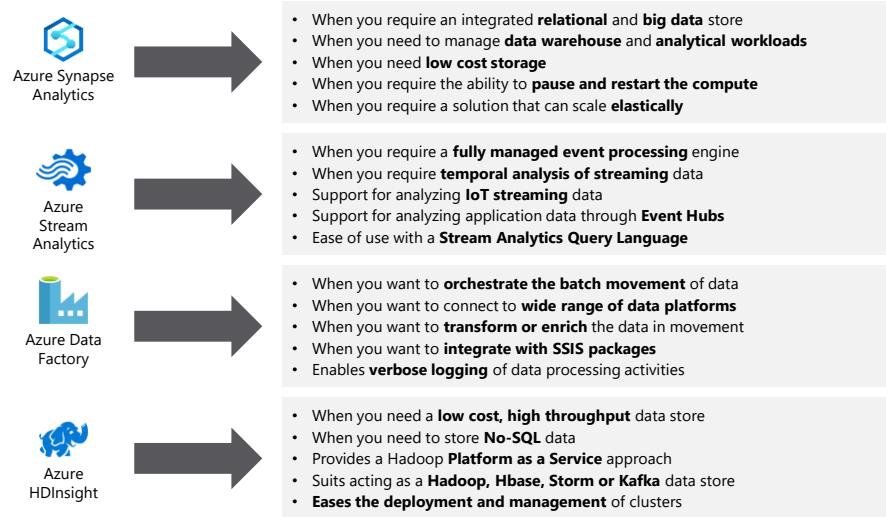
-  →
 - **Eases the deployment** of a Spark based cluster
 - Enables the **fastest processing** of Machine Learning solutions
 - **Enables collaboration** between data engineers and data scientists
 - Provides **tight enterprise security integration** with Azure Active Directory
 - **Integration with other Azure Services and Power BI**

-  →
 - Provides **global distribution** for both structured and unstructured data stores
 - **Millisecond query response** time
 - **99.999% availability** of data
 - **Worldwide elastic scale** of both the storage and throughput
 - **Multiple consistency levels** to control data integrity with concurrency

-  →
 - When you require a **relational** data store
 - When you need to manage **transactional workloads**
 - When you need to manage a **high volume on inserts and reads**
 - When you need a service that **requires high concurrency**
 - When you require a solution that can scale **elastically**

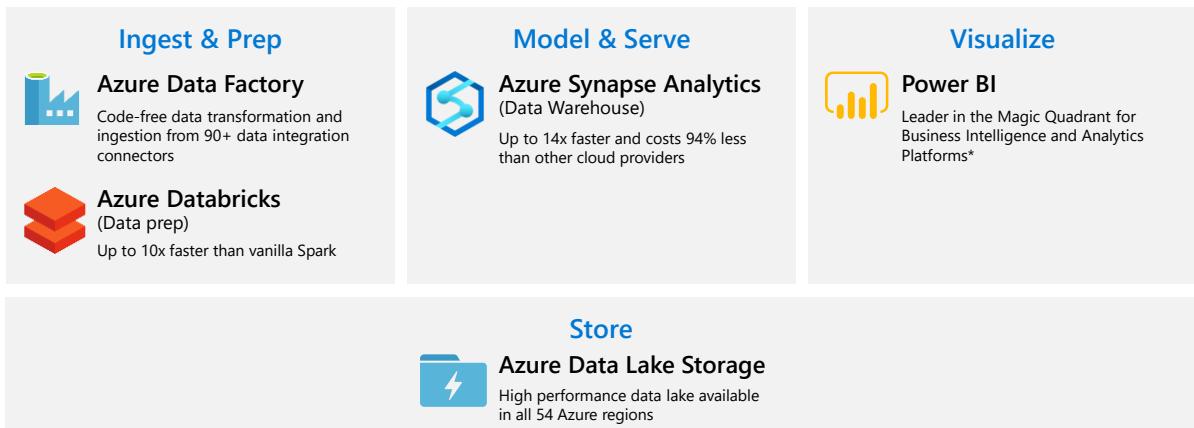
148

What to use for Data



149

What is modern data warehousing?



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150

Question

In a data warehousing workload, data

from a single source is distributed to multiple locations
from multiple sources is combined in a single location
is added to a queue for multiple systems to process
is used to train machine learning models

151



Answer

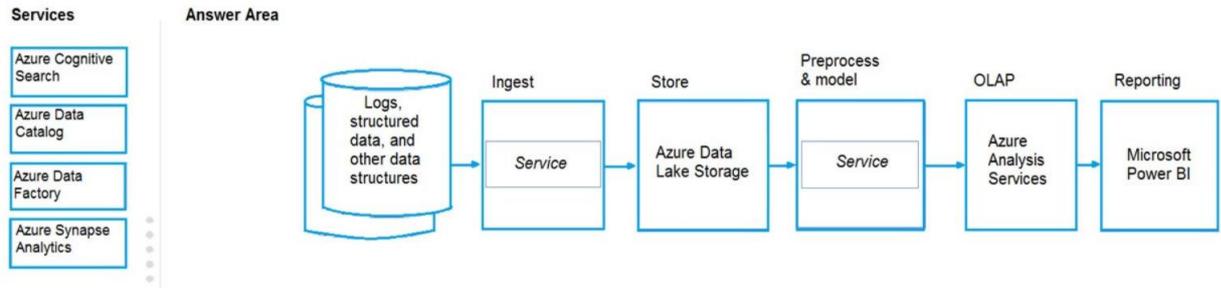
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152

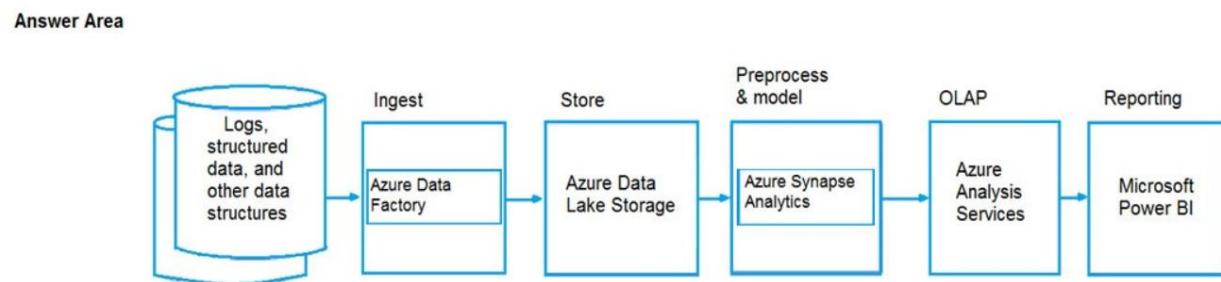


Question



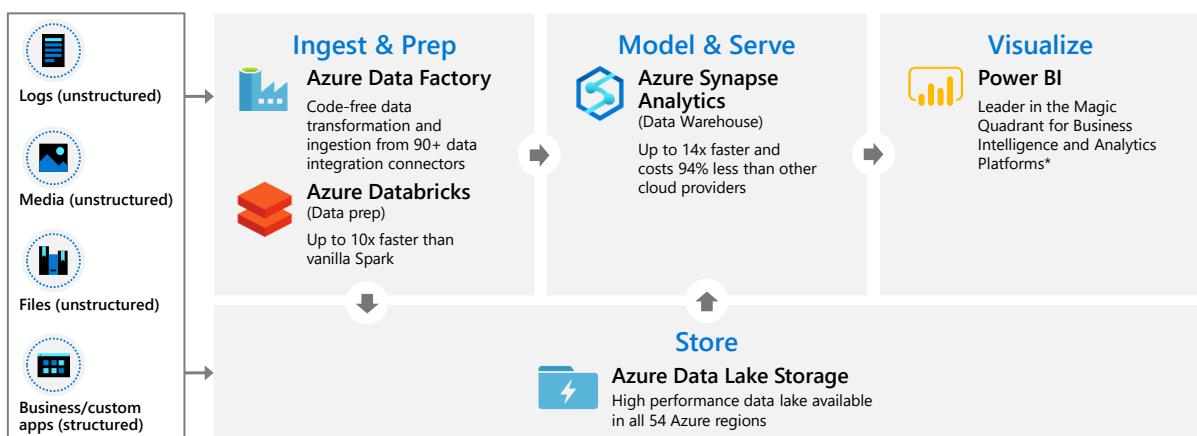
153

Answer



154

Combine batch and stream processing



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155

Question

You need to gather real-time telemetry data from a mobile application. Which type of workload describes this scenario?

- A. Online Transaction Processing (OLTP)**
- B. batch**
- C. massively parallel processing (MPP)**
- D. streaming**



156

Answer

You need to gather real-time telemetry data from a mobile application. Which type of workload describes this scenario?

- A. Online Transaction Processing (OLTP)
- B. batch
- C. massively parallel processing (MPP)
- D. streaming



157

Explore Azure data services for modern data warehousing

[What is Azure Data Factory](#)



A cloud-based data integration service that allows you to orchestrate and automate data movement and data transformation

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158

Question

Components	Answer Area
Dataset	Component A representation of data structures within data stores
Linked service	Component The information used to connect to external resources
Mapping data flow	Component A logical grouping of activities that performs a unit of work and can be scheduled
Pipeline	

159

Answer

Dataset	A representation of data structures within data stores
Linked service	The information used to connect to external resources
Pipeline	A logical grouping of activities that performs a unit of work and can be scheduled

160

Question

Activity Types

Control
Data movement
Data transformation

Answer Area

	Copy
	Mapping data flow
	Until

161



Answer

Activity Types

Control
Data movement
Data transformation

Answer Area

Data movement	Copy
Data transformation	Mapping data flow
Control	Until

162



Question

In Azure Data Factory, you can use

a control flow
a dataset
a linked service
an integration runtime

▼ to orchestrate pipeline

activities that depend on the output of other pipeline activities.

163

Answer

In Azure Data Factory, you can use

a control flow
a dataset
a linked service
an integration runtime

▼ to orchestrate pipeline

activities that depend on the output of other pipeline activities.

164

What is Azure Databricks?

 <p>Apache Spark-based platform: Simplifies the provisioning and collaboration of Apache Spark-based analytical solutions</p>	 <p>Enterprise Security: Utilizes the security capabilities of Azure</p>	 <p>Integration with Azure services: Can integrate with a variety of Azure data platform services and Power BI</p>
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Question

Statements	Yes	No
Azure Databricks is an Apache Spark-based collaborative analytics platform.	<input type="radio"/>	<input type="radio"/>
Azure Analysis Services is used for transactional workloads.	<input type="radio"/>	<input type="radio"/>
Azure Data Factory orchestrates data integration workflows.	<input type="radio"/>	<input type="radio"/>

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166

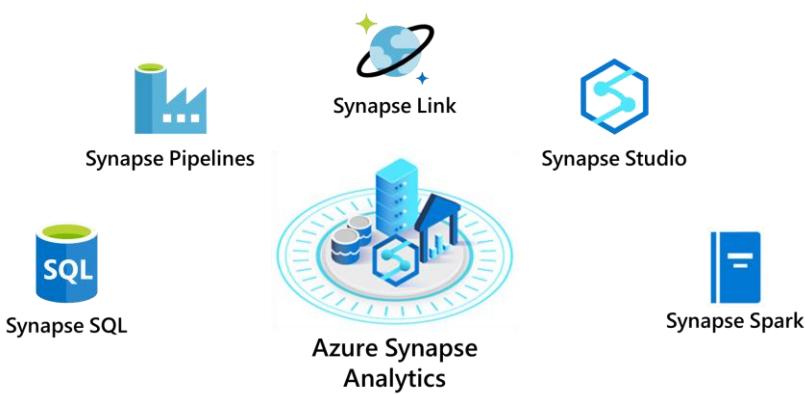
Answer

Statements	Yes	No
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167

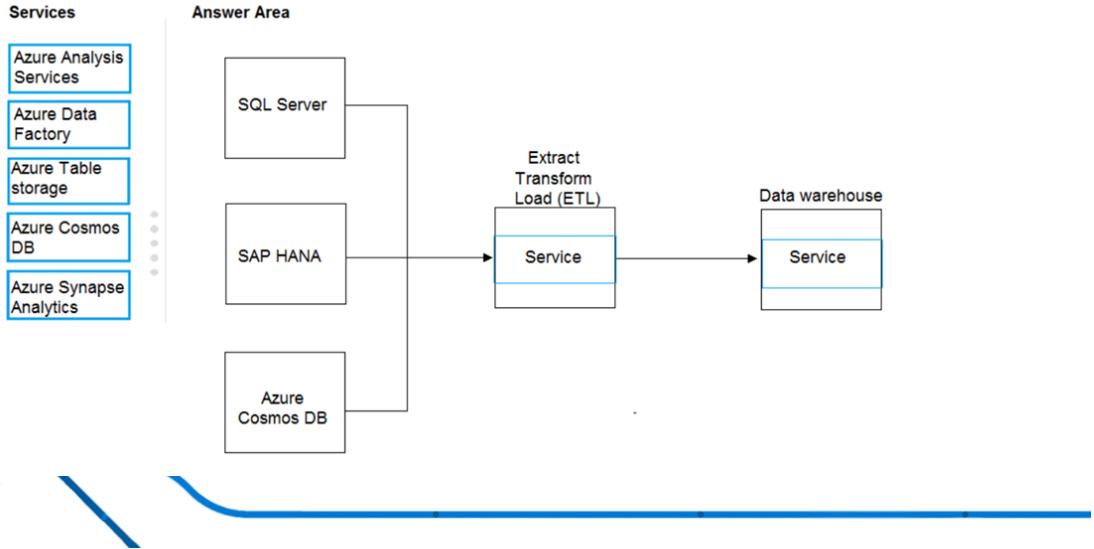
What is Azure Synapse Analytics?



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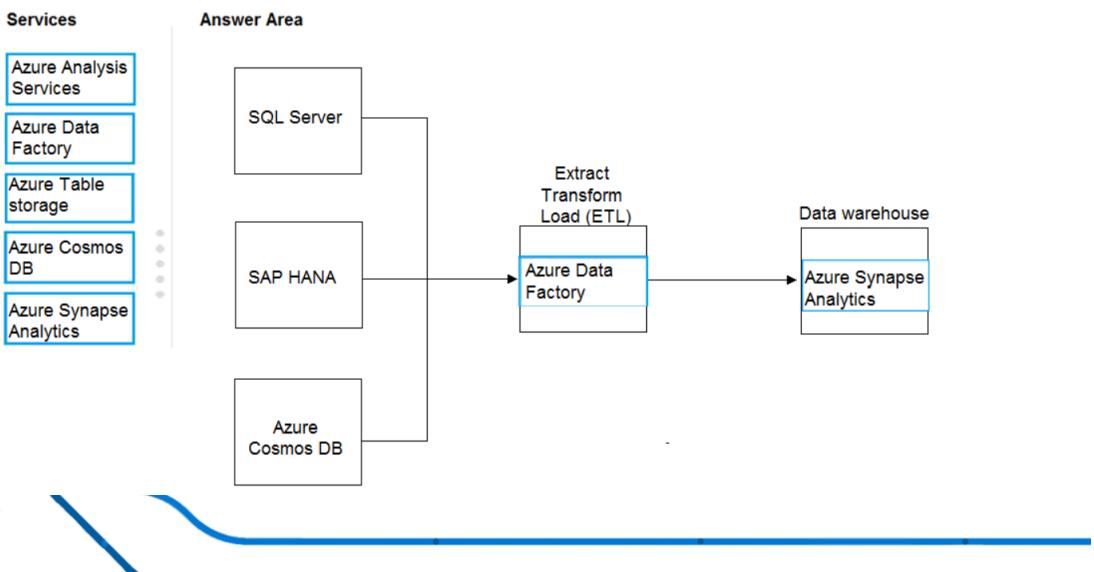
168

Question



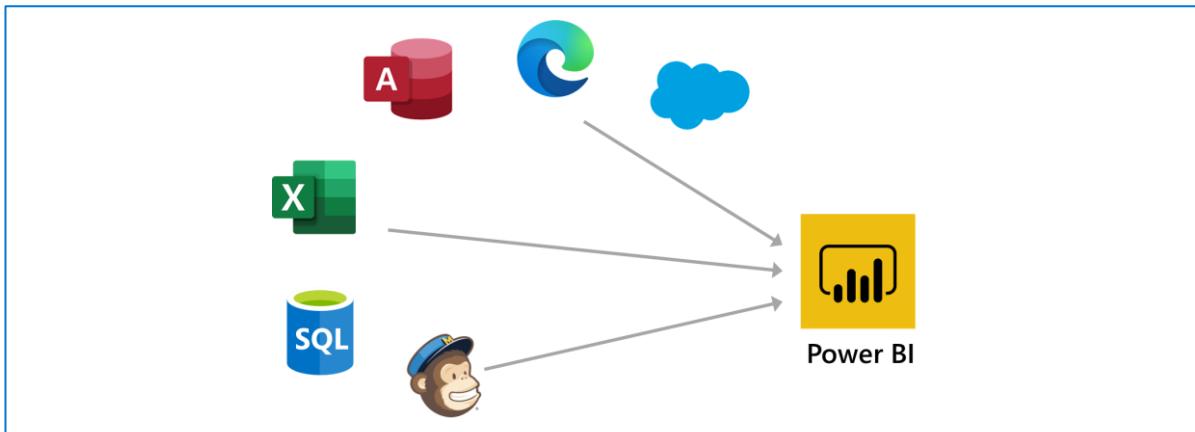
169

Answer



170

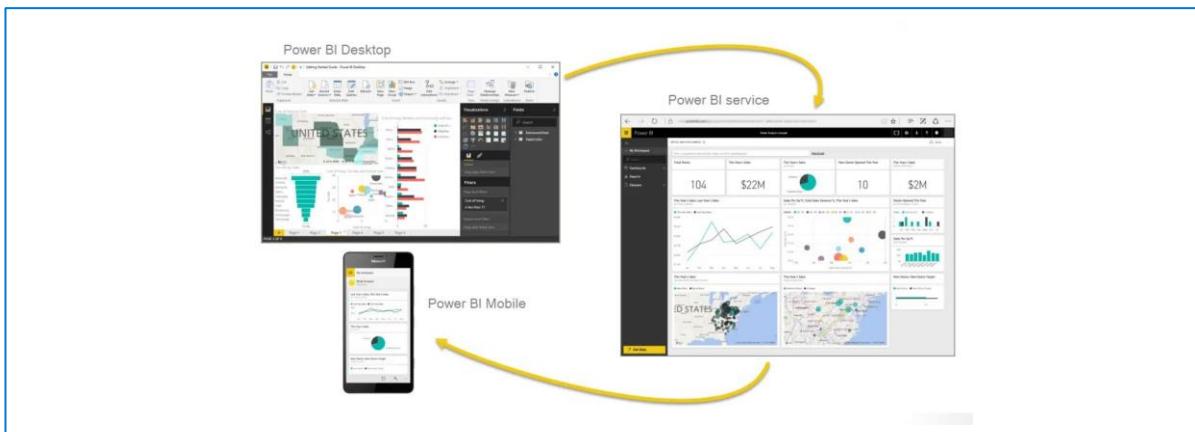
Learn how Power BI services and applications work together



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171

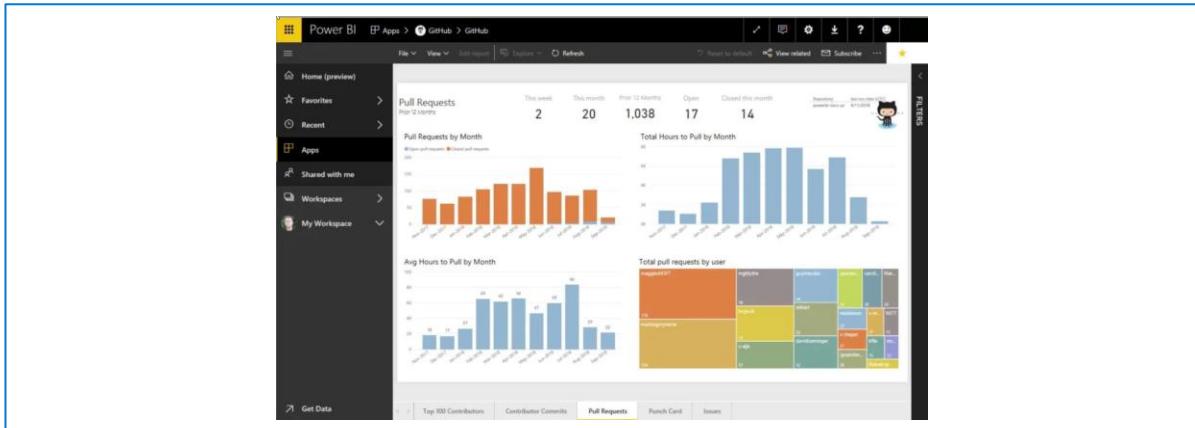
Explore how Power BI can make your business more efficient



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172

Learn how to create compelling visuals and reports



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173

Question

Which three objects can be added to a Microsoft Power BI dashboard? Each correct answer presents a complete solution. (Choose three.)
NOTE: Each correct selection is worth one point.

- A. a report page
- B. a Microsoft PowerPoint slide
- C. a visualization from a report
- D. a dataflow
- E. a text box

174

Answer

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175

Question

What should you use to build a Microsoft Power BI paginated report?

- A. Charticulator
- B. Power BI Desktop
- C. the Power BI service
- D. Power BI Report Builder



176

Answer

What should you use to build a Microsoft Power BI paginated report?

- A.** Charticulator
- B.** Power BI Desktop
- C.** the Power BI service
- D.** Power BI Report Builder

177



Question

Which two activities can be performed entirely by using the Microsoft Power BI service? Each correct answer presents a complete solution. (Choose two.)
NOTE: Each correct selection is worth one point.

- A.** report and dashboard creation
- B.** report sharing and distribution
- C.** data modeling
- D.** data acquisition and preparation

178



Answer

Which two activities can be performed entirely by using the Microsoft Power BI service? Each correct answer presents a complete solution. (Choose two.)
NOTE: Each correct selection is worth one point.

- A. report and dashboard creation
- B. report sharing and distribution
- C. data modeling
- D. data acquisition and preparation

179



Thank You and Good Luck

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