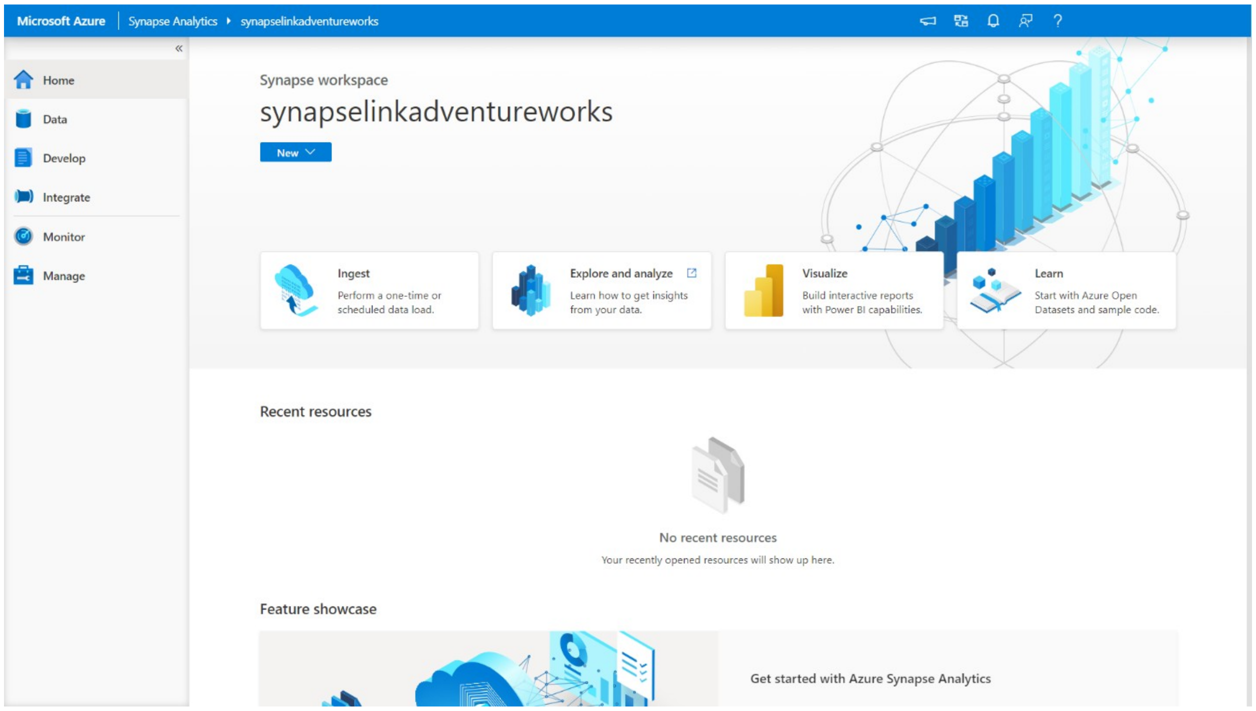
Write basic queries against a single container

Note In this reading you can see the steps involved in writing basic queries against a single container.

We are going to be working the same two new containers (Customer and SalesOrder) we did in the previous module. The Customer and SalesOrder containers each contain example Adventure Works datasets of related customer profile records and sales order records respectively. These data sets reside in different Azure Cosmos DB accounts: the customer profile data resides in an Azure Cosmos DB Core (SQL) API account and the sales order data resides in Azure Cosmos DB API for MongoDB account, given that this data comes from distinct source systems. Adventure Works wants to use their available operational data to get insight into:

- What amount of revenue is coming from customers without completed profile data (no address details provided)
- How sales order volume and revenue are distributed by city for those customers where they do have address details.

1. Connect to an Azure Synapse Workspace that has an Azure Synapse SQL Serverless instance, and an Azure Synapse Spark Pool.



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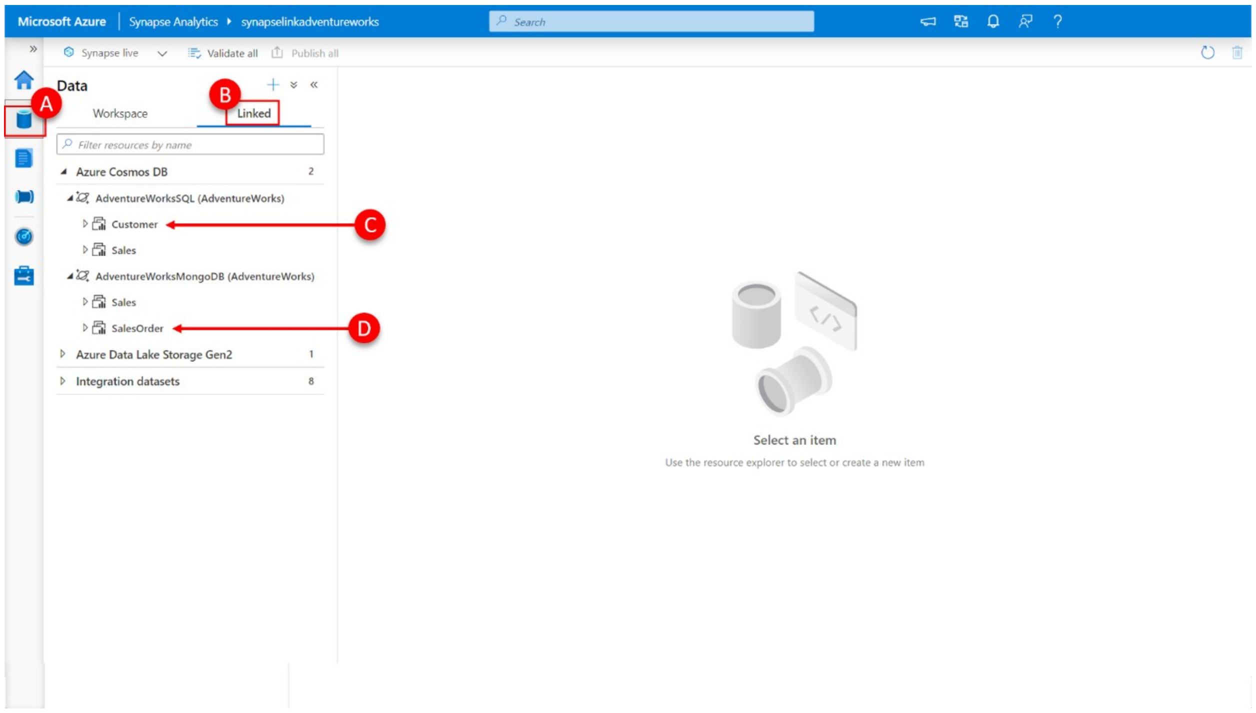
The home page of Azure Synapse Studio

2. In the left-hand menu, select **Data (A)**

3. Click on the **Linked tab** in the explorer view **(B)**

4. Expand the **AdventureWorksSQL** linked service to expose the **Customer** container

5. Expand the **AdventureWorksMongoDB** linked service to expose the **SalesOrder** container.



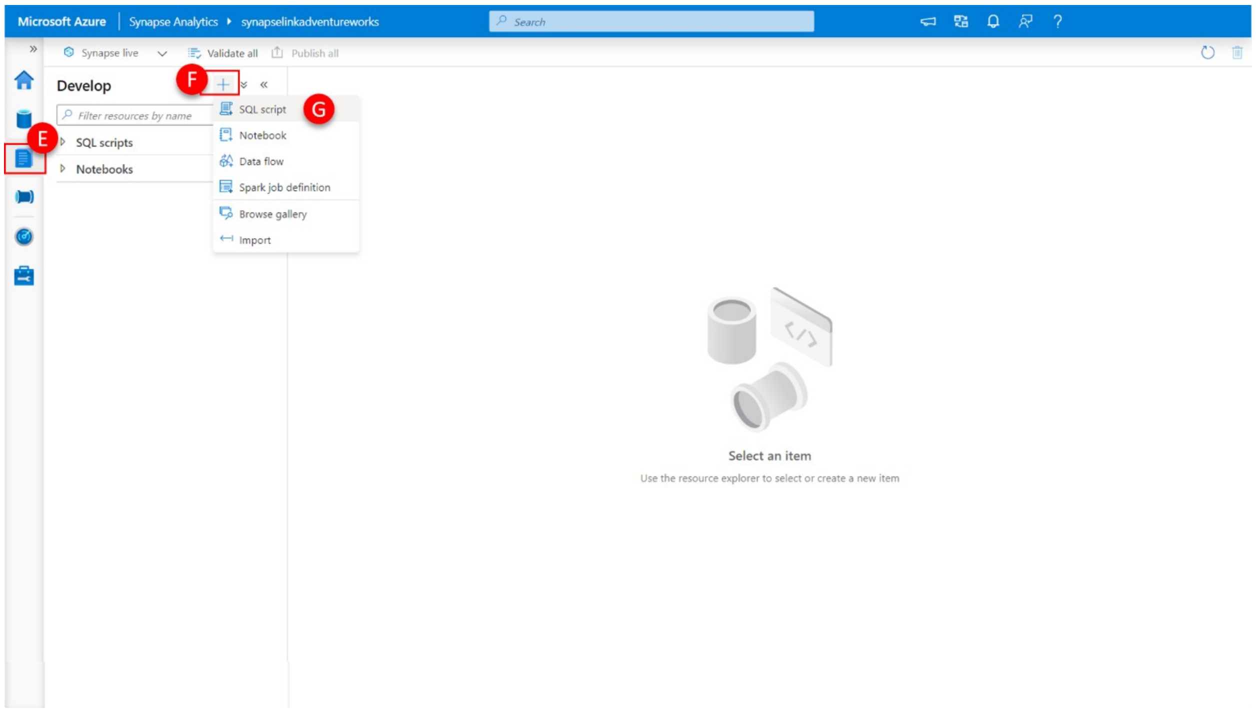
Viewing linked services in Azure Synapse Studio

Here you can see an additional two containers now visible in the data explorer view, under the previously created linked service to our Azure Cosmos DB accounts (these containers already have Adventure Works data loaded into them). The first, **Customer (C)**, has been created in the AdventureWorks database within the Azure Cosmos DB SQL API account and contains customer profile information. The second, **SalesOrder (D)**, has been created in the AdventureWorks database within the Azure Cosmos DB API for MongoDB account and contains sales order information.

Let's run some queries to explore what is in the Customer container.

For reference here is a sample of a customer profile JSON document from the Customer container:

```json
{
"id": "3E6A563E-9F01-46EA-BDE2-7C38FD02BE29",
"title": "",
"firstName": "Ruben",
"lastName": "Madan",
"emailAddress": "ruben8@adventure-works.com",
"phoneNumber": "1 (11) 500 555-0167",
"creationDate": "2013-12-20T00:00:00",
"address": {
    "addressLine1": "59, boulevard Tremblay",
    "addressLine2": "",
    "city": "Paris",
    "state": "75 ",
    "country": "FR",
    "zipCode": "75008"
},
"password": {
    "hash": "L6rgOSf0NMOhruu/t/+tzWBzO0VNcyUL9qQf3GVW+9A=",
    "salt": "76E5DBEB"
},
"_rid": "mP07AMBVkP0DAAAAAAAAAA==",
"_self": "dbs/mP07AA==/colls/mP07AMBVkP0=/docs/mP07AMBVkP0DAAAAAAAAAA==/",
"_etag": "\"c401ba71-0000-0800-0000-5fd2ff6e0000\"",
"_attachments": "attachments/",
"_ts": 1607663471
}
```



Open a SQL Script in Azure Synapse Studio

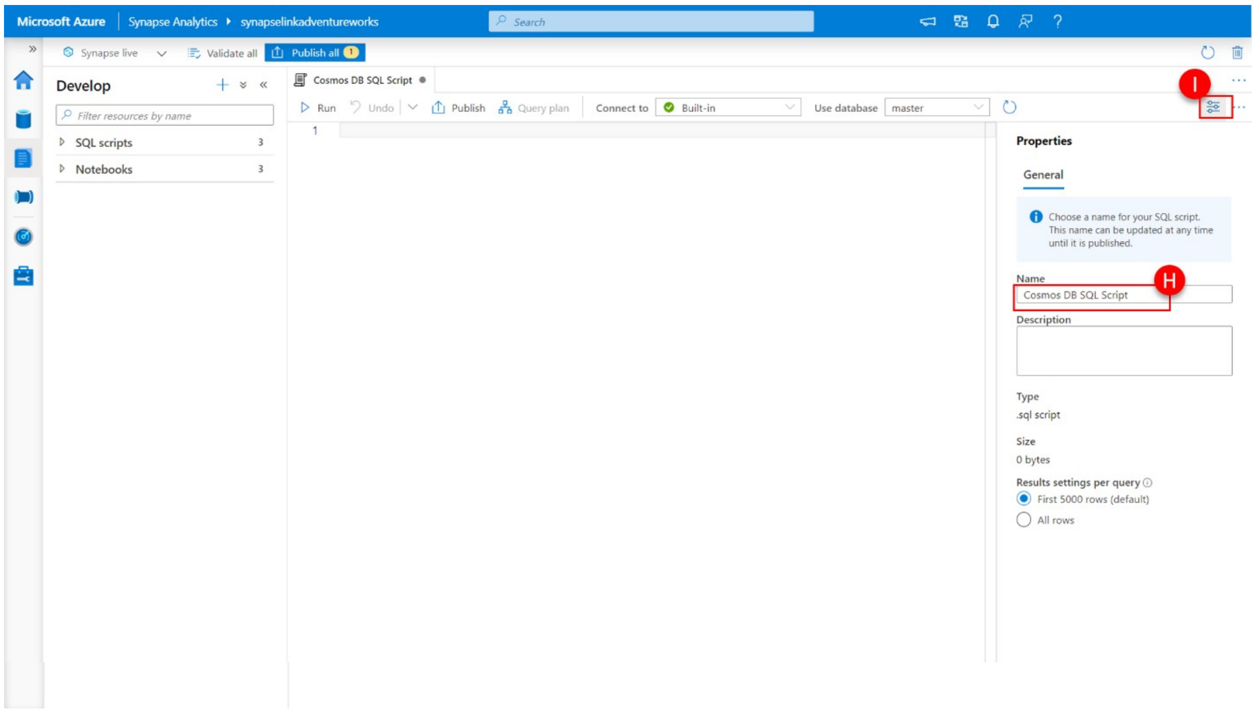
6. In the left-hand menu, select **develop (E)**

7. Then click the **"+" (F)** to add a resource.

8. And then select **SQL Script (G)** to create a new SQL script. A new SQL Script will immediately be created within the Synapse Workspace.

9. Within the SQL script properties, provide an appropriate name **Cosmos DB SQL Script (H)**

10. And then click the **properties icon (I)** to close the properties blade.



Choose a name for your SQL script. This name can be updated at any time until it is published.

Name: Cosmos DB SQL Script

Connect to: Built-in

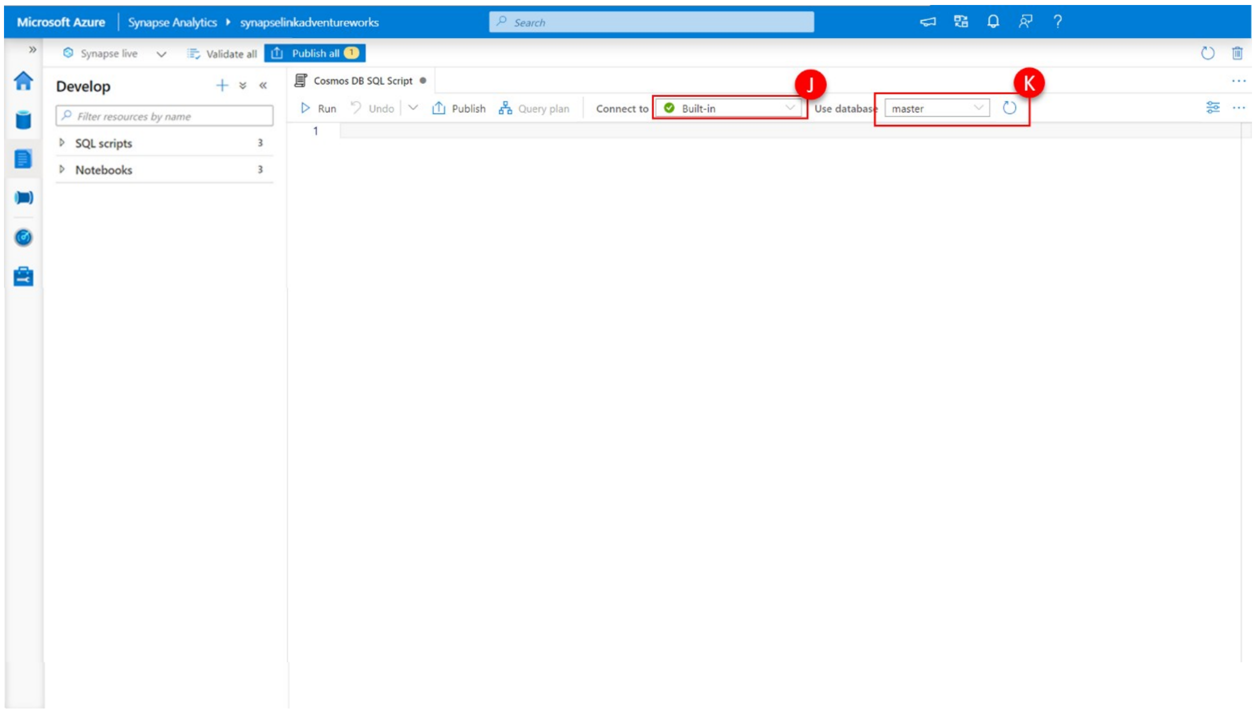
Use database: master

Type: .sql script

Size: 0 bytes

Defining a SQL script in Azure Synapse Studio

Because we are going to utilize the built-in SQL Serverless pool, you can choose **built-in** from the **connect to:** drop down at the top of the query pane (J). You will see that the default database is now **master**.



Connect to: Built-in

Use database: master

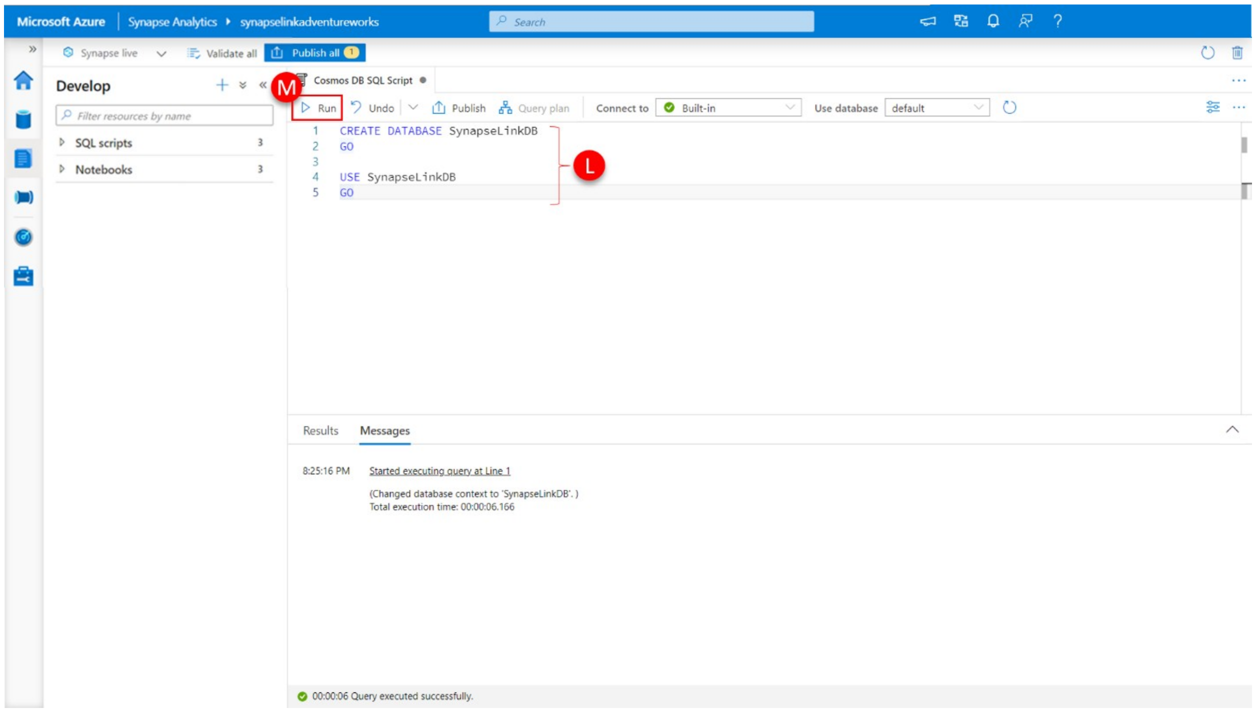
Connect to SQL Serverless in Azure Synapse Studio

Let's create a database in which we will store the objects we are going to query.

11. Paste the following Transact-SQL code into the **query pane (L)** and click the **run button at the top of the query pane (M)**.

```sql
CREATE DATABASE SynapseLinkDB
GO

USE SynapseLinkDB
GO
```



Connect to: Built-in
Use database: default

```sql
CREATE DATABASE SynapseLinkDB
GO

USE SynapseLinkDB
GO
```

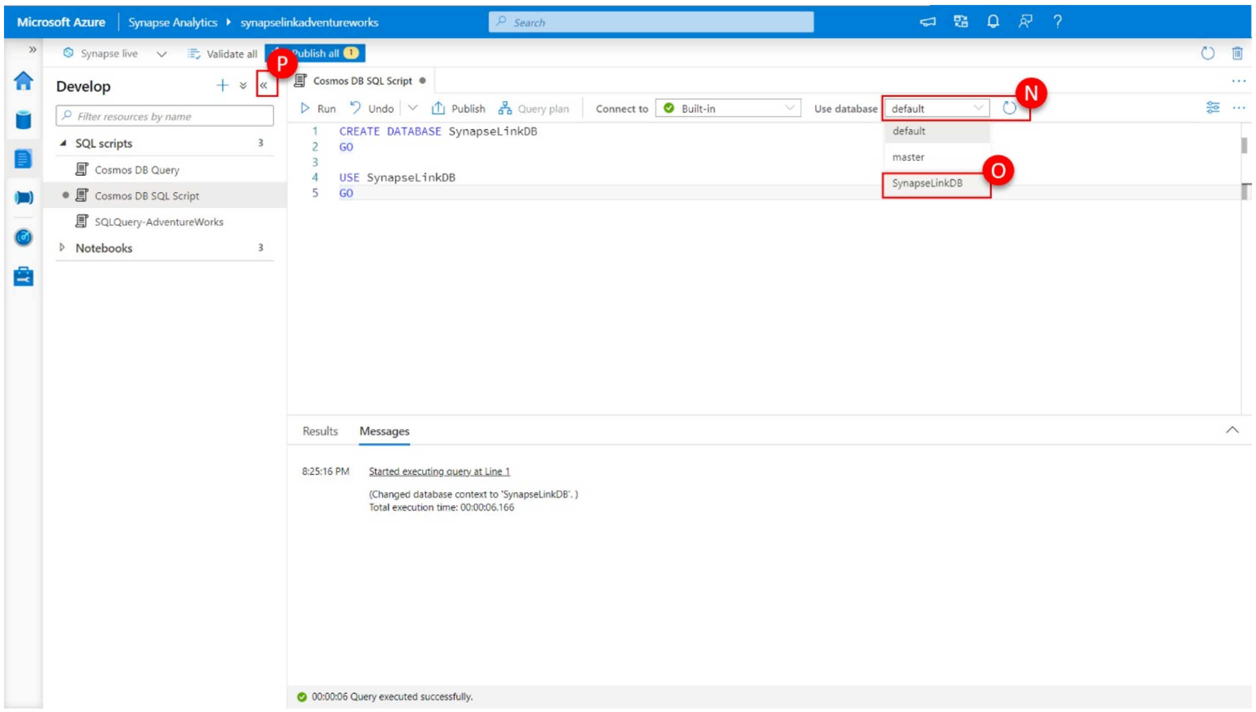
```
8:25:16 PM   Started executing query at Line 1
             (Changed database context to 'SynapseLinkDB'.)
             Total execution time: 00:00:06.166

00:00:06 Query executed successfully.
```

Execute a SQL Script in Azure Synapse Studio

This will create a database named **SynapseLinkDB** and the select it for use within the subsequent session.

An alternative method of selecting this database for use is to click on the **Use database (N)** drop-down and selecting the database you wish to use, in our case **SynapseLinkDB (O)**.



```
CREATE DATABASE SynapseLinkDB
GO

USE SynapseLinkDB
GO
```

```
8:25:16 PM   Started executing query at Line 1
             (Changed database context to 'SynapseLinkDB'.)
             Total execution time: 00:00:06.166
```

00:00:06 Query executed successfully.

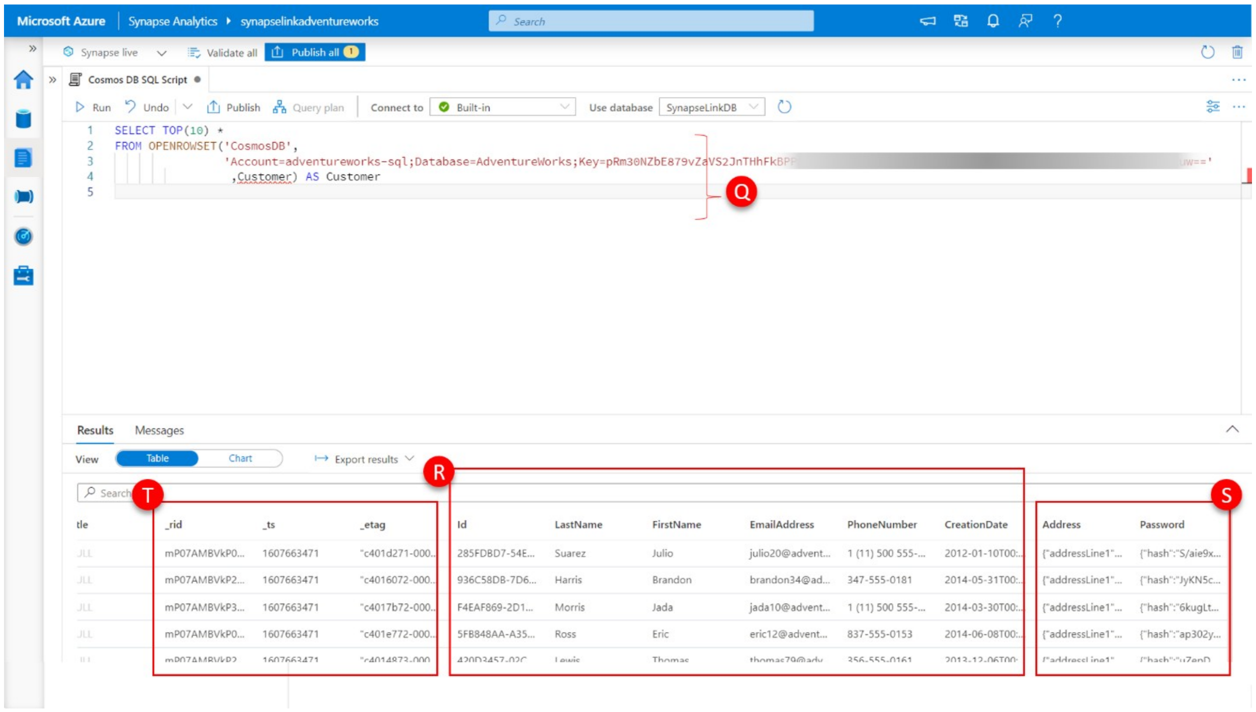
Select the database context in Azure Synapse Studio
Let's also create a little more display real-estate by minimizing the explorer blade by:

12. clicking **<<** in the top right of the **blade (P)**.

We are now going to perform a SELECT operation against the Azure Cosmos DB analytical store using the OPENROWSET() function by:

13. Paste the following SQL into the query pane, making sure to **delete the previous SQL (Q)**.

```
SELECT TOP(10) *
FROM OPENROWSET('CosmosDB',
                'Account=adventurework-sql;
Database=AdventureWorks;
Key=pRm30NZbE879vZa…Euw=='
                ,Customer) AS Customer
```



```
SELECT TOP(10) *
FROM OPENROWSET('CosmosDB',
                'Account=adventureworks-sql;Database=AdventureWorks;Key=pRm30NZbE879vZaVS2JnTHhFkBP[redacted]uw=='
                 ,Customer) AS Customer
```

tle	_rid	_ts	_etag	Id	LastName	FirstName	EmailAddress	PhoneNumber	CreationDate	Address	Password
JLL	mP07AMBVkP0...	1607663471	"c401d271-000...	285FDBD7-54E...	Suarez	Julio	julio20@advent...	1 (11) 500 555-...	2012-01-10T00:...	{"addressLine1"...	{"hash":"S/aie9x...
JLL	mP07AMBVkP2...	1607663471	"c4016072-000...	936C58DB-7D6...	Harris	Brandon	brandon34@ad...	347-555-0181	2014-05-31T00:...	{"addressLine1"...	{"hash":"JyKN5c...
JLL	mP07AMBVkP3...	1607663471	"c4017b72-000...	F4EAF869-2D1...	Morris	Jada	jada10@advent...	1 (11) 500 555-...	2014-03-30T00:...	{"addressLine1"...	{"hash":"6kugLt...
JLL	mP07AMBVkP0...	1607663471	"c401e772-000...	5FB848AA-A35...	Ross	Eric	eric12@advent...	837-555-0153	2014-06-08T00:...	{"addressLine1"...	{"hash":"ap302y...
JLL	mP07AMBVkP2	1607663471	"c4014873-000	420D3457-02C	Lewis	Thomas	thomas79@adv	356-555-0161	2013-12-06T00:	{"addressLine1"	{"hash":"u7enD

Execute a query in Azure Synapse Studio
14. And then click **run**.

This will return the top (10) rows from the connected Azure Cosmos DB analytical store via Synapse Link.

There are several parameters that need to be provided to the OPENROWSET function.

- The **provider name**: which in the case of the Cosmos DB analytical store is **CosmosDB**.
- The **provider string**: which the case of the Cosmos DB analytical store is a connection string including the Azure Cosmos DB account name, the Database specifying the Azure Cosmos DB you wish to use and the Key for the account.
- The **table name**: which in the case of the Cosmos DB analytical store is the container we wish to use.

You will now be presented with a result set of the first 10 rows of a row-based representation of the documents contained within the Customer container's analytical store. This is held within an Azure Cosmos Core (SQL) API account, so that data will be represented using the well-defined schema representation by default.

The top-level properties of the document are represented as columns with the associated property values as the value of the column. In the case that these values are primitive data types ("string", "integer", "float" etc.), the column will be apparently **typed (R)**, if these properties are embedded arrays or objects within the document, the column value will be a structure of these **embedded values (S)**.

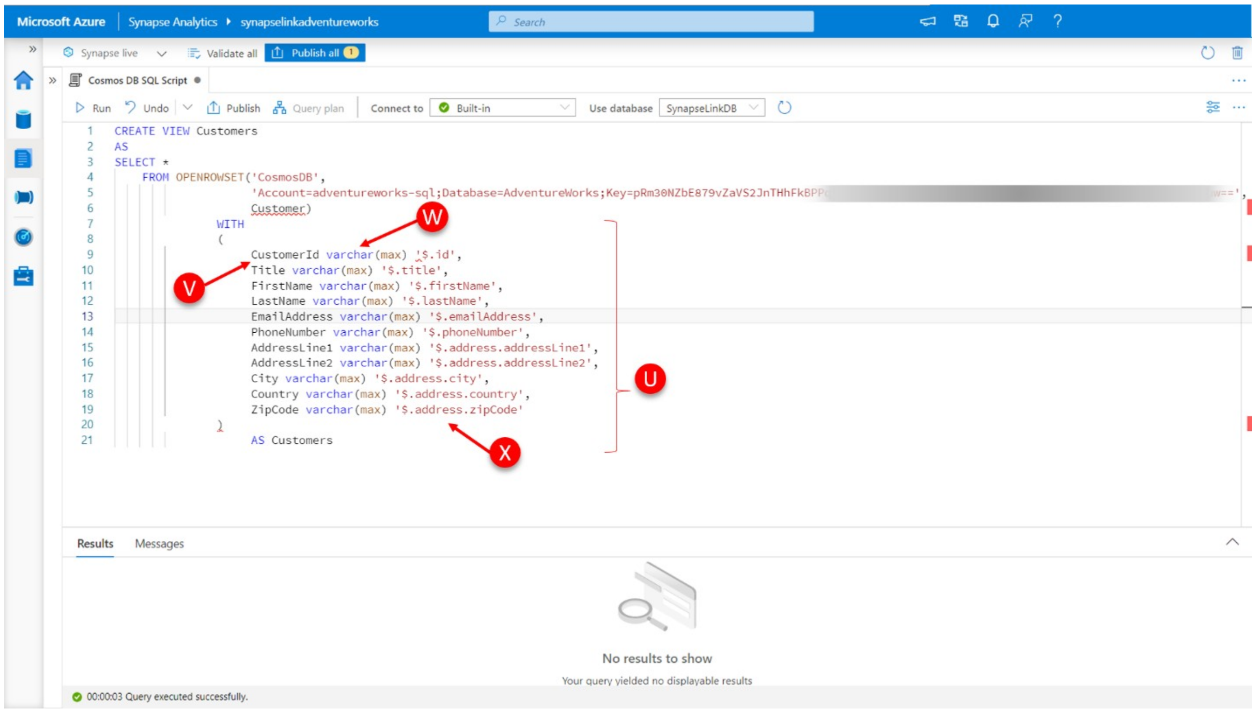
In the case of our example the title, firstName, lastName, emailAddress, and phoneNumber properties are primitive strings and **assigned to their own columns (R)**, the address and password properties are both **embedded objects (S)**.

There is also the presence of **several Azure Cosmos DB system document properties (T)**. Azure Cosmos DB automatically has system properties such as _ts, _self, _attachments, _rid, and _etag associated with every document. These system document properties are seldom useful for analytical store query purposes, and will be ignored going forward.

Let us now create a view of our customers that we can use in our SQL queries in future.

1. Paste the following SQL into the query pane, making sure to delete the previous SQL statement.

```
CREATE VIEW Customers
AS
SELECT *
    FROM OPENROWSET('CosmosDB',
                    'Account=adventureworks-sql;
Database=AdventureWorks;
Key=NZbE879vZa…Euw==',
                    Customer)
            WITH
            (
                    CustomerId varchar(max) '$.id',
                    Title varchar(max) '$.title',
                    FirstName varchar(max) '$.firstName',
                    LastName varchar(max) '$.lastName',
                    EmailAddress varchar(max) '$.emailAddress',
                    PhoneNumber varchar(max) '$.phoneNumber',
                    AddressLine1 varchar(max) '$.address.addressLine1',
                    AddressLine2 varchar(max) '$.address.addressLine2',
                    City varchar(max) '$.address.city',
                    Country varchar(max) '$.address.country',
                    ZipCode varchar(max) '$.address.zipCode'
            )
                    AS Customers
```



```
CREATE VIEW Customers
AS
SELECT *
    FROM OPENROWSET('CosmosDB',
                'Account=adventureworks-sql;Database=AdventureWorks;Key=pRm30NZbE879vZaVS2JnTHhFkBPP[redacted]w==',
                Customer)
            WITH
            (
                CustomerId varchar(max) '$.id',
                Title varchar(max) '$.title',
                FirstName varchar(max) '$.firstName',
                LastName varchar(max) '$.lastName',
                EmailAddress varchar(max) '$.emailAddress',
                PhoneNumber varchar(max) '$.phoneNumber',
                AddressLine1 varchar(max) '$.address.addressLine1',
                AddressLine2 varchar(max) '$.address.addressLine2',
                City varchar(max) '$.address.city',
                Country varchar(max) '$.address.country',
                ZipCode varchar(max) '$.address.zipCode'
            )
                AS Customers
```

No results to show

Your query yielded no displayable results

00:00:03 Query executed successfully.

Create a view in Azure Synapse Studio

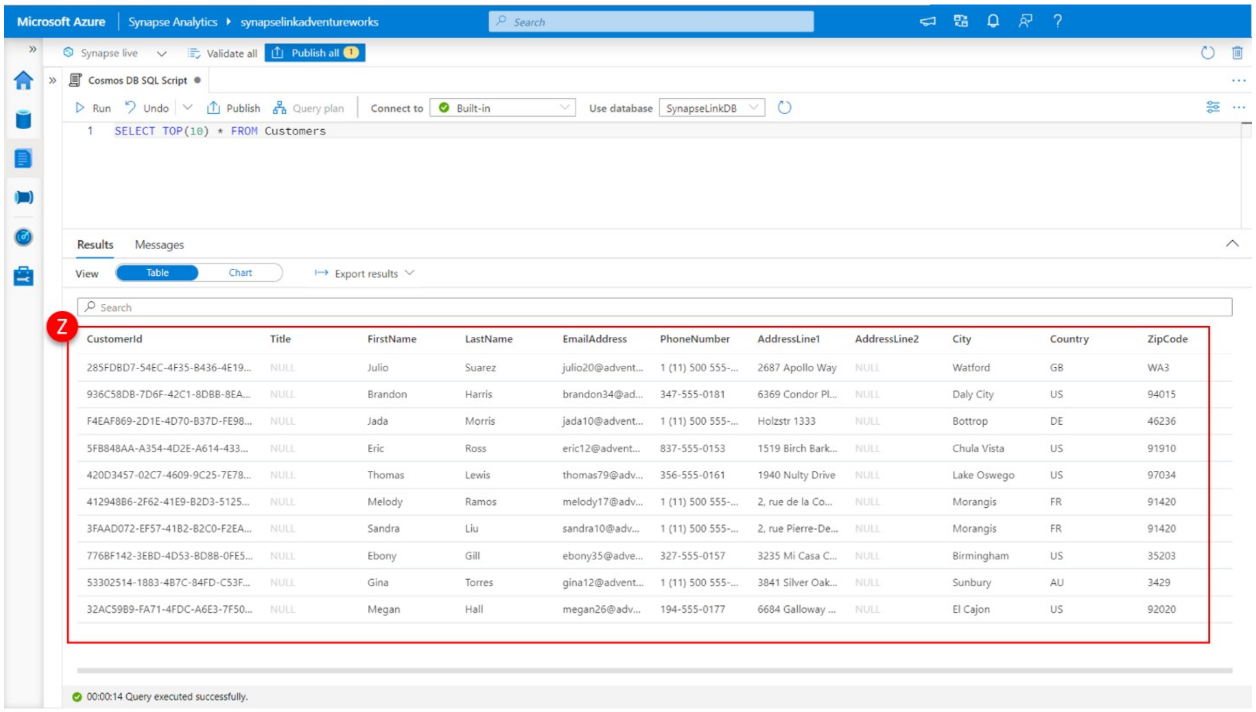
Here you will note that we have expanded the functionality of OPENROWSET function of the CREATE VIEW statement to include a **WITH clause (U)** that allows us to:

- Specify an alias for the column name (V), for example renaming the ID attribute to CustomerId in our example
- Specify the datatype of the underlying column store (W)
- Specify the JSON path of the property, the value of which to return in the specified column, this includes returning property values within embedded objects within the JSON. (X), for example “$.address.zipCode” to access the zipCode property contained within the embedded address object.

2. Now query the view that you have just created

1

```
SELECT TOP(10) * FROM Customers
```



```sql
SELECT TOP(10) * FROM Customers
```

CustomerId	Title	FirstName	LastName	EmailAddress	PhoneNumber	AddressLine1	AddressLine2	City	Country	ZipCode
285FDBD7-54EC-4F35-B436-4E19...	NULL	Julio	Suarez	julio20@advent...	1 (11) 500 555-...	2687 Apollo Way	NULL	Watford	GB	WA3
936C58DB-7D6F-42C1-8DBB-8EA...	NULL	Brandon	Harris	brandon34@ad...	347-555-0181	6369 Condor Pl...	NULL	Daly City	US	94015
F4EAF869-2D1E-4D70-B37D-FE98...	NULL	Jada	Morris	jada10@advent...	1 (11) 500 555-...	Holzstr 1333	NULL	Bottrop	DE	46236
5FB848AA-A354-4D2E-A614-433...	NULL	Eric	Ross	eric12@advent...	837-555-0153	1519 Birch Bark...	NULL	Chula Vista	US	91910
420D3457-02C7-4609-9C25-7E78...	NULL	Thomas	Lewis	thomas79@adv...	356-555-0161	1940 Nulty Drive	NULL	Lake Oswego	US	97034
412948B6-2F62-41E9-B2D3-5125...	NULL	Melody	Ramos	melody17@adv...	1 (11) 500 555-...	2, rue de la Co...	NULL	Morangis	FR	91420
3FAAD072-EF57-41B2-B2C0-F2EA...	NULL	Sandra	Liu	sandra10@adv...	1 (11) 500 555-...	2, rue Pierre-De...	NULL	Morangis	FR	91420
776BF142-3EBD-4D53-BD8B-0FE5...	NULL	Ebony	Gill	ebony35@adve...	327-555-0157	3235 Mi Casa C...	NULL	Birmingham	US	35203
53302514-1883-4B7C-84FD-C53F...	NULL	Gina	Torres	gina12@advent...	1 (11) 500 555-...	3841 Silver Oak...	NULL	Sunbury	AU	3429
32AC59B9-FA71-4FDC-A6E3-7F50...	NULL	Megan	Hall	megan26@adv...	194-555-0177	6684 Galloway ...	NULL	El Cajon	US	92020

```
00:00:14 Query executed successfully.
```

Query a view in Azure Synapse Studio

Here you can see the **results (Z)** from our Customers view, returning a flattened columnar view of the JSON documents that reside in the customer container within the Azure Cosmos DB SQL API account.