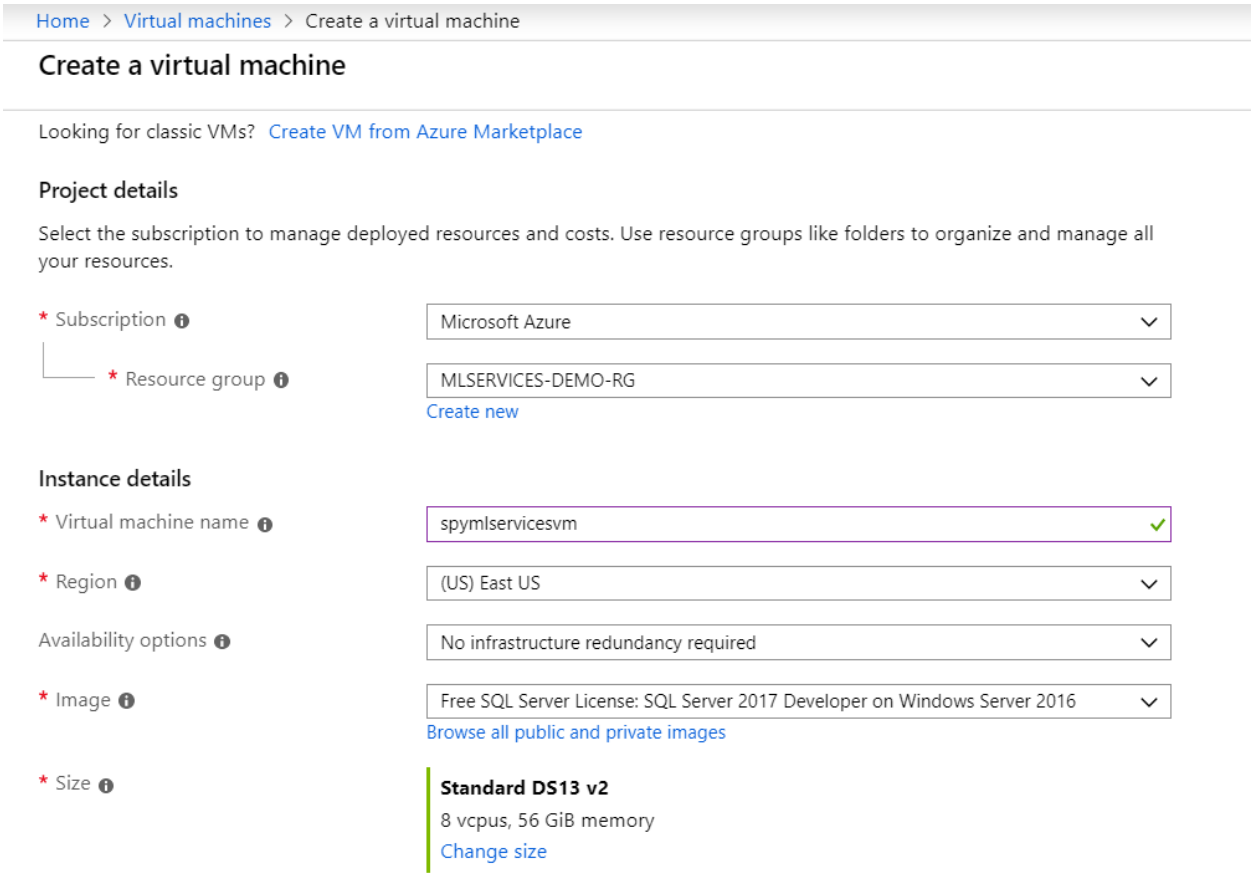
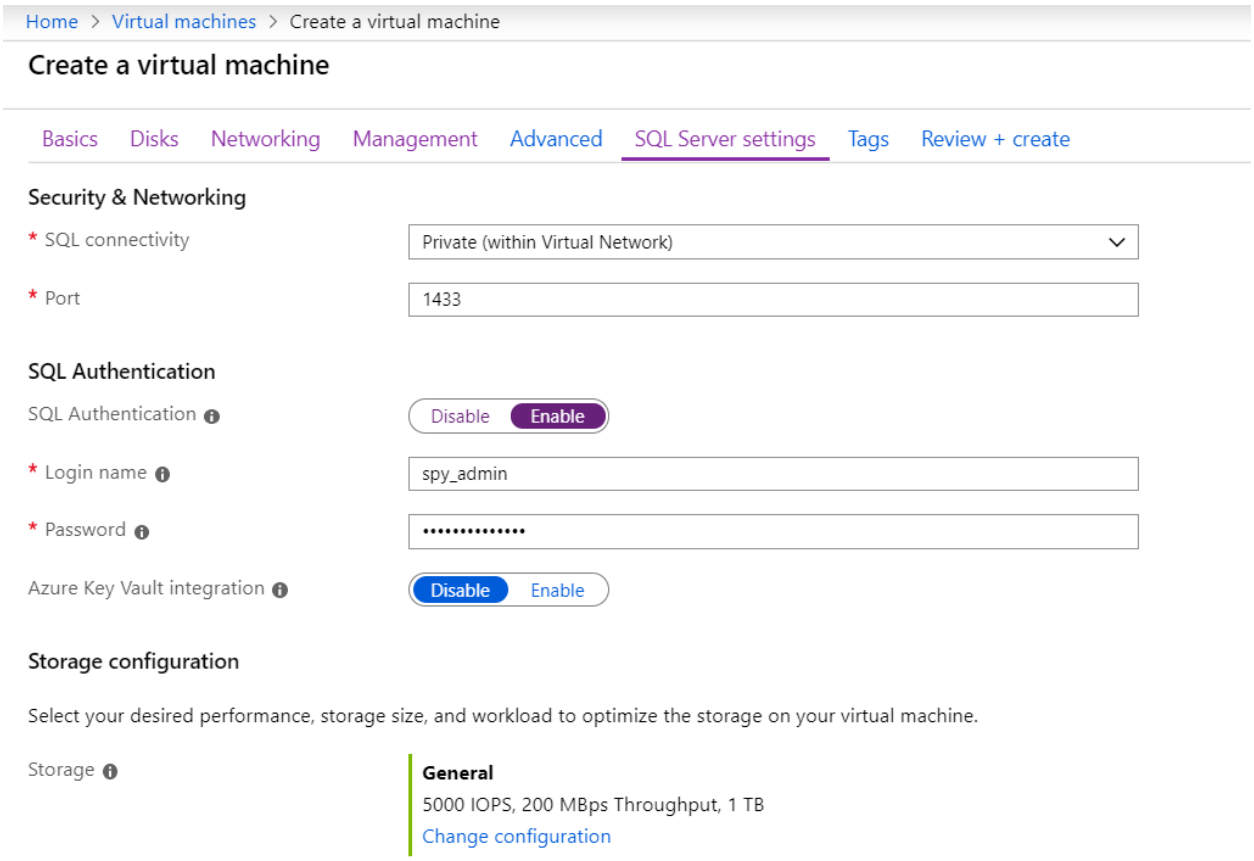
Demystifying Machine Learning & AI to Drive Business Outcomes

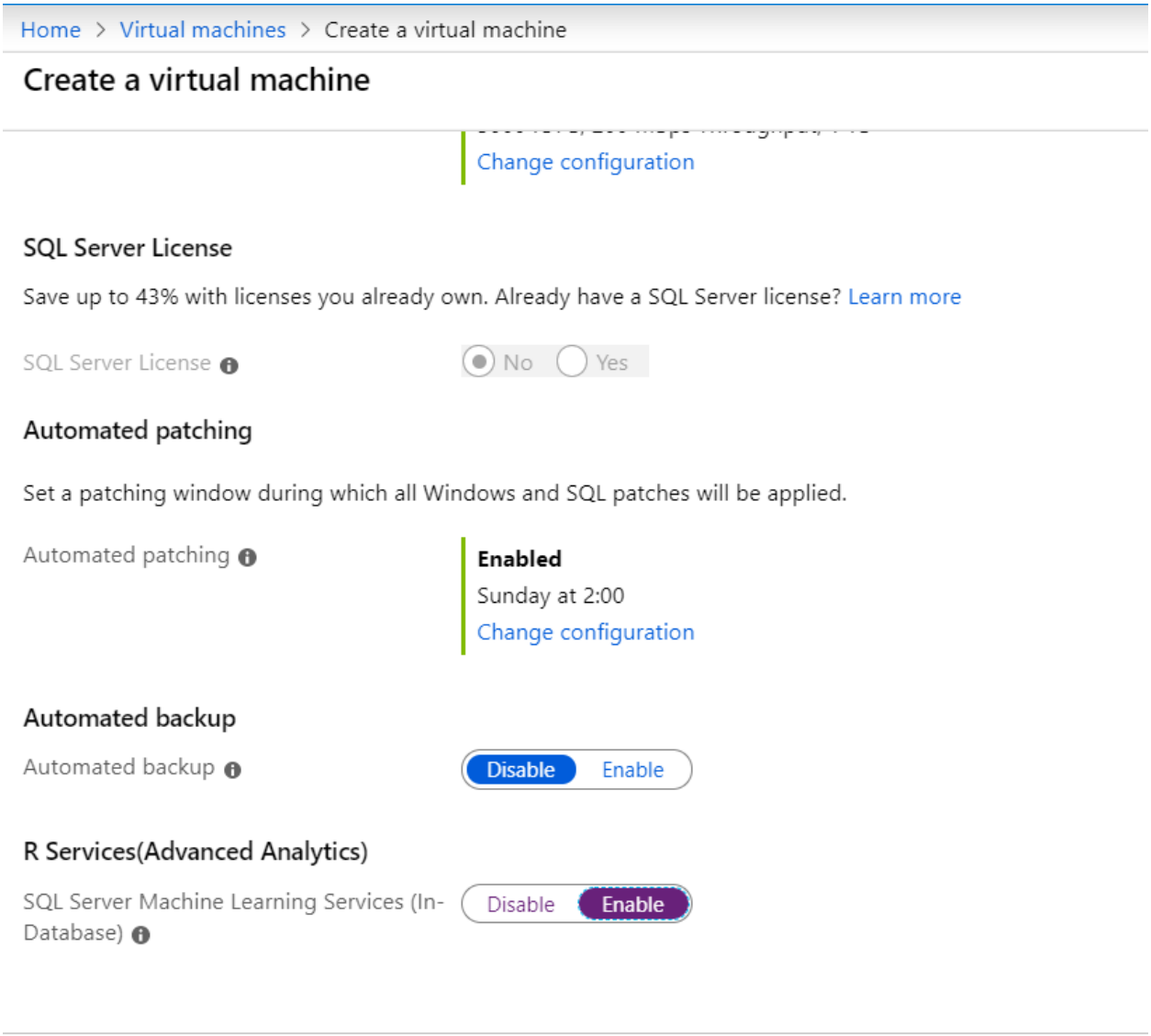
Contents

Demystifying Machine Learning & AI to Drive Business Outcomes

1. Create a SQL Virtual Machine



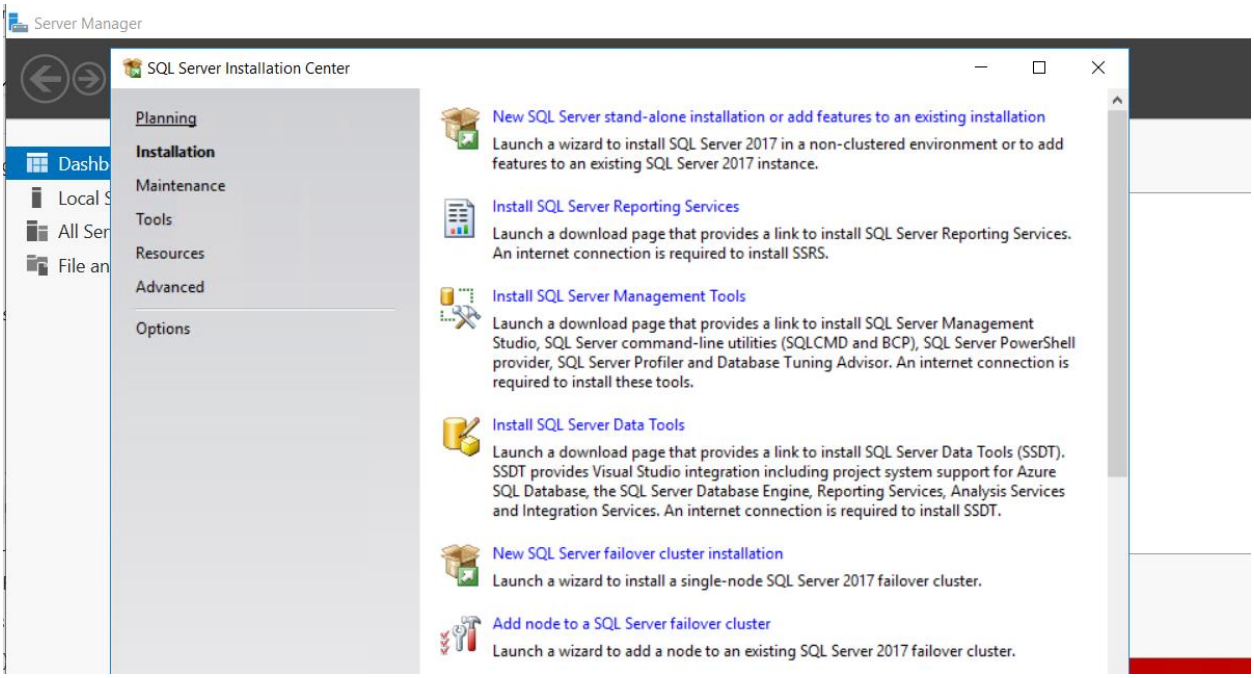

Home > Virtual machines > Create a virtual machine
Create a virtual machine
Basics Disks Networking Management Advanced SQL Server settings Tags Review + create
Security & Networking
* SQL connectivity
Private (within Virtual Network)
* Port
1433
SQL Authentication
SQL Authentication
Disable Enable
* Login name
spy_admin
* Password
Azure Key Vault integration
Disable Enable
Storage configuration
Select your desired performance, storage size, and workload to optimize the storage on your virtual machine.
Storage
General
5000 IOPS, 200 MBps Throughput, 1 TB
Change configuration

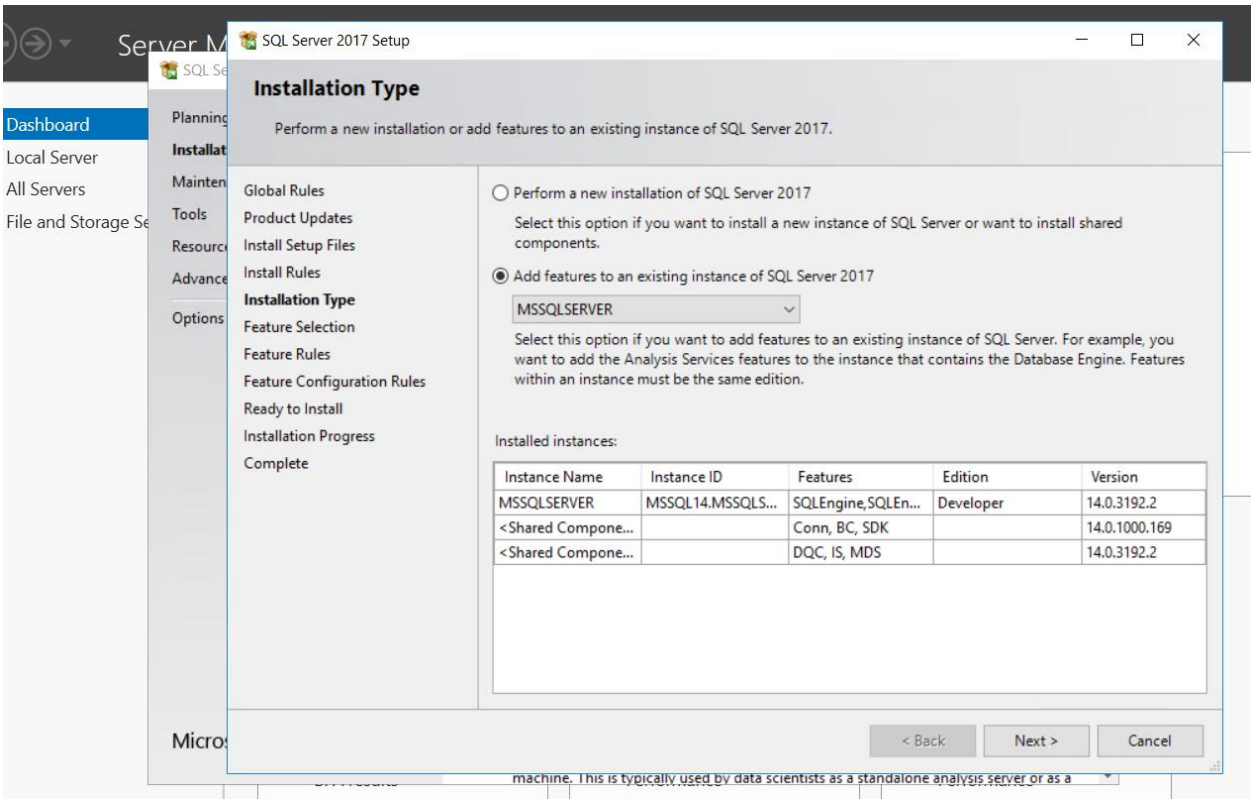

Home > Virtual machines > Create a virtual machine
Create a virtual machine
Change configuration
SQL Server License
Save up to 43% with licenses you already own. Already have a SQL Server license? Learn more
SQL Server License
No
Yes
Automated patching
Set a patching window during which all Windows and SQL patches will be applied.
Automated patching
Enabled
Sunday at 2:00
Change configuration
Automated backup
Automated backup
Disable
Enable
R Services(Advanced Analytics)
SQL Server Machine Learning Services (In-Database)
Disable
Enable

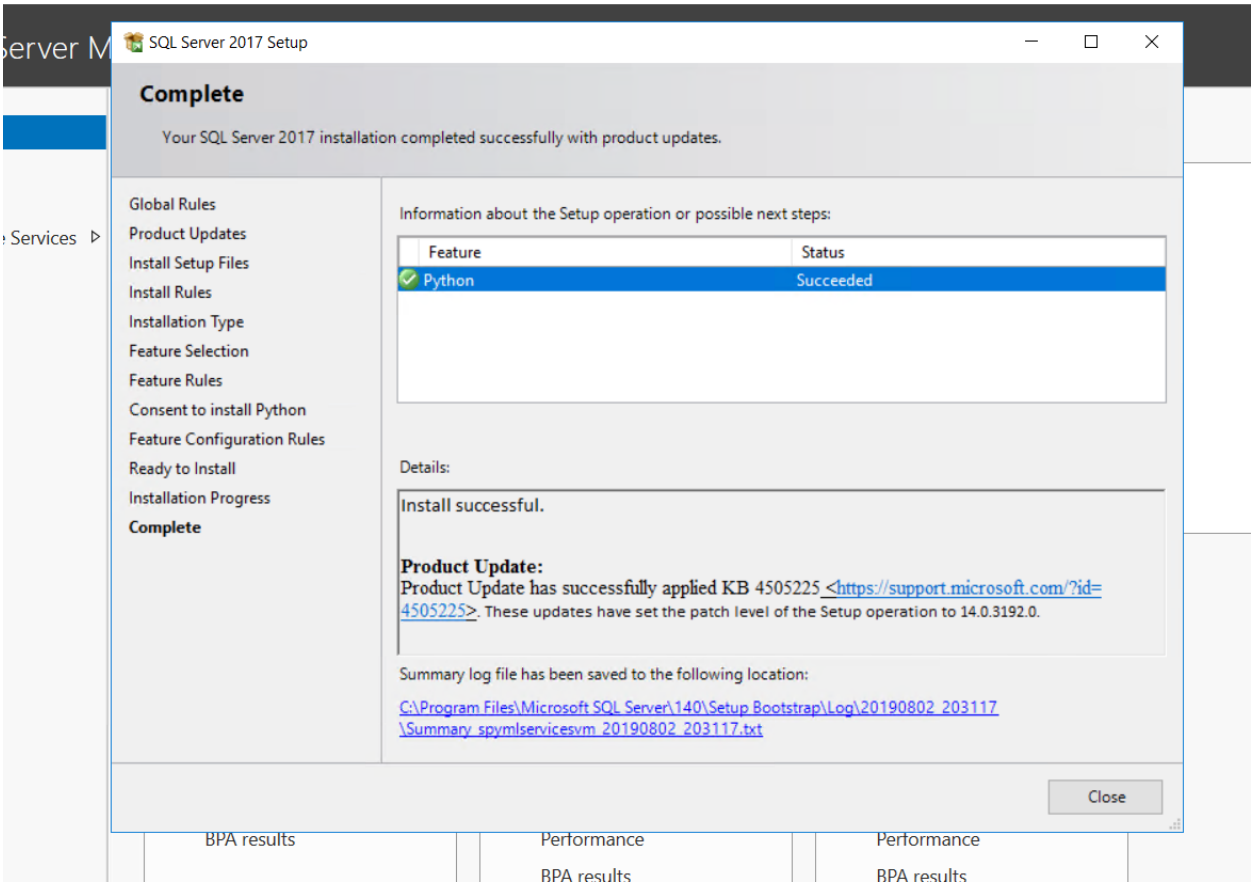
Demystifying Machine Learning & AI to Drive Business Outcomes

2. Install and Configure SQL Machine Learning Services

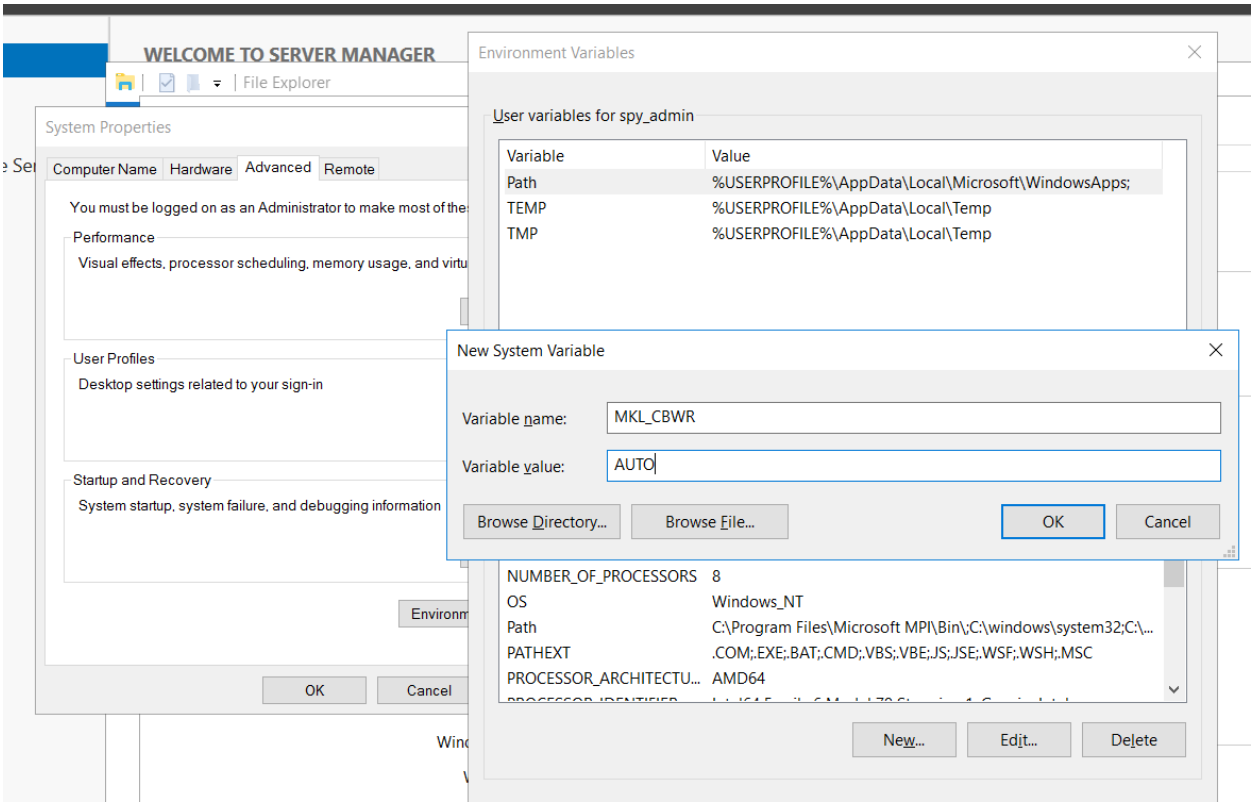
a. Add Python



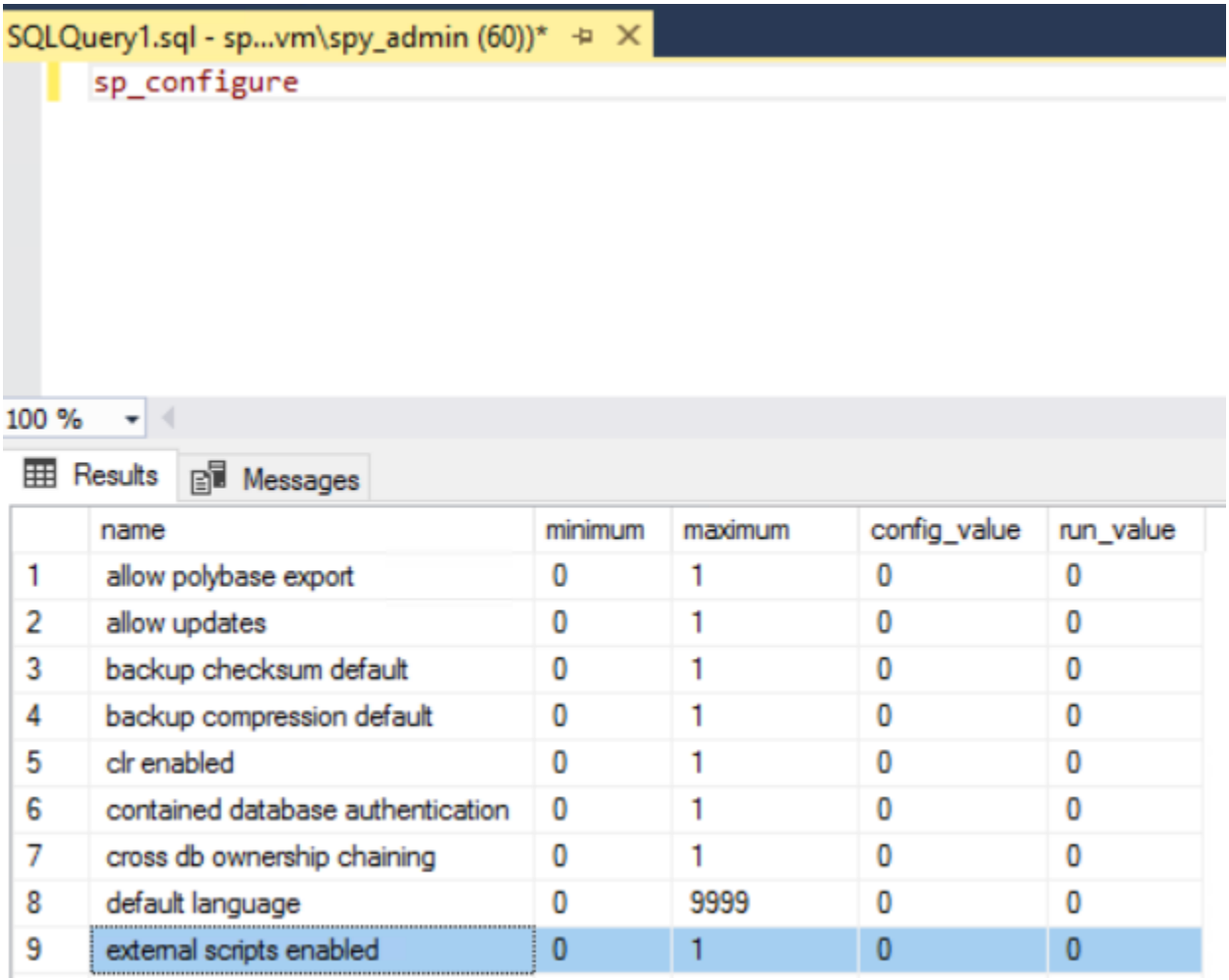



SQL Server 2017 Setup
Complete
Your SQL Server 2017 installation completed successfully with product updates.
Global Rules
Product Updates
Install Setup Files
Install Rules
Installation Type
Feature Selection
Feature Rules
Consent to install Python
Feature Configuration Rules
Ready to Install
Installation Progress
Complete
Information about the Setup operation or possible next steps:
Feature
Status
Python
Succeeded
Details:
Install successful.
Product Update:
Product Update has successfully applied KB 4505225 <https://support.microsoft.com/?id=4505225>. These updates have set the patch level of the Setup operation to 14.0.3192.0.
Summary log file has been saved to the following location:
C:\Program Files\Microsoft SQL Server\140\Setup Bootstrap\Log\20190802_203117\Summary_spyml servicesvm_20190802_203117.txt
Close
Services
BPA results
Performance
BPA results
Performance
BPA results

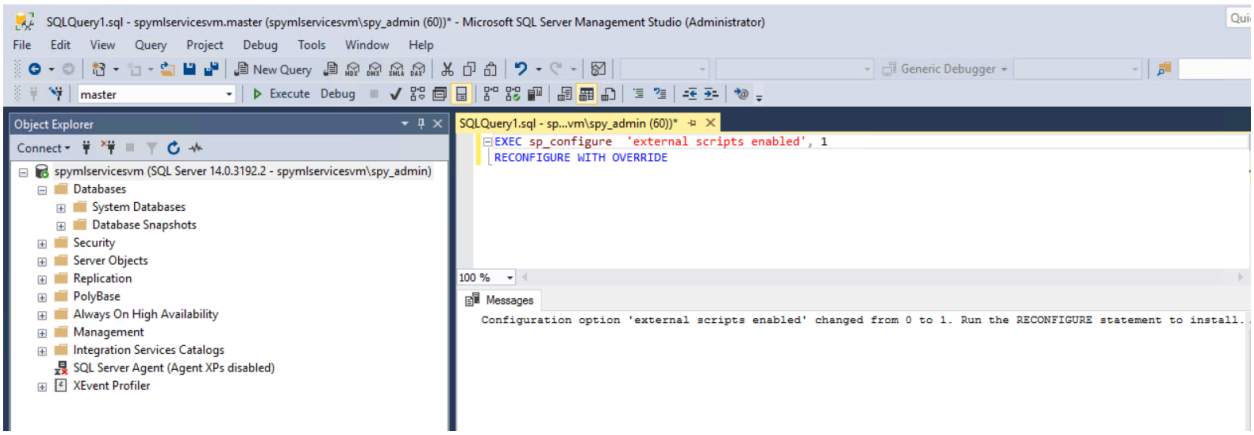
b. Configure new environment variable



c. Enable external scripts in SQL Server



	name	minimum	maximum	config_value	run_value
1	allow polybase export	0	1	0	0
2	allow updates	0	1	0	0
3	backup checksum default	0	1	0	0
4	backup compression default	0	1	0	0
5	clr enabled	0	1	0	0
6	contained database authentication	0	1	0	0
7	cross db ownership chaining	0	1	0	0
8	default language	0	9999	0	0
9	external scripts enabled	0	1	0	0

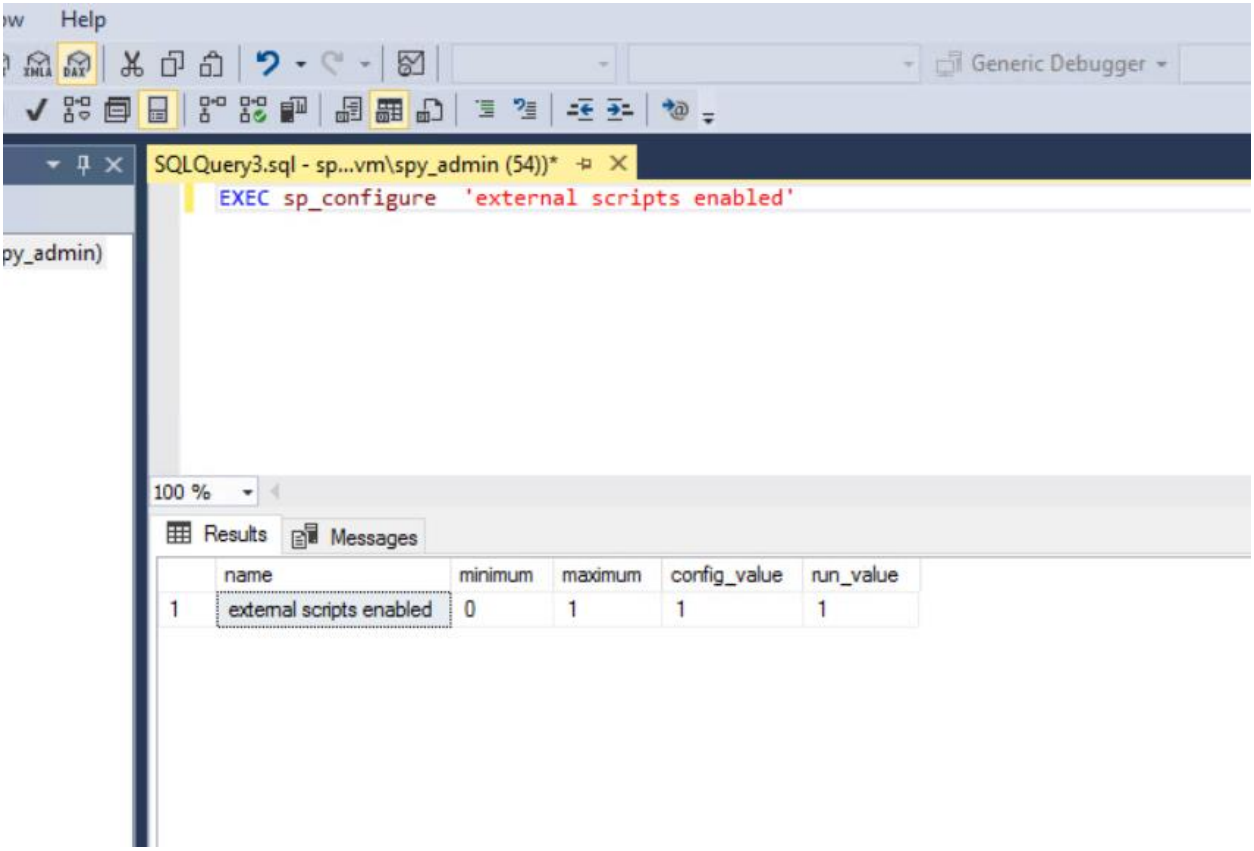


d. Restart the SQL DB service

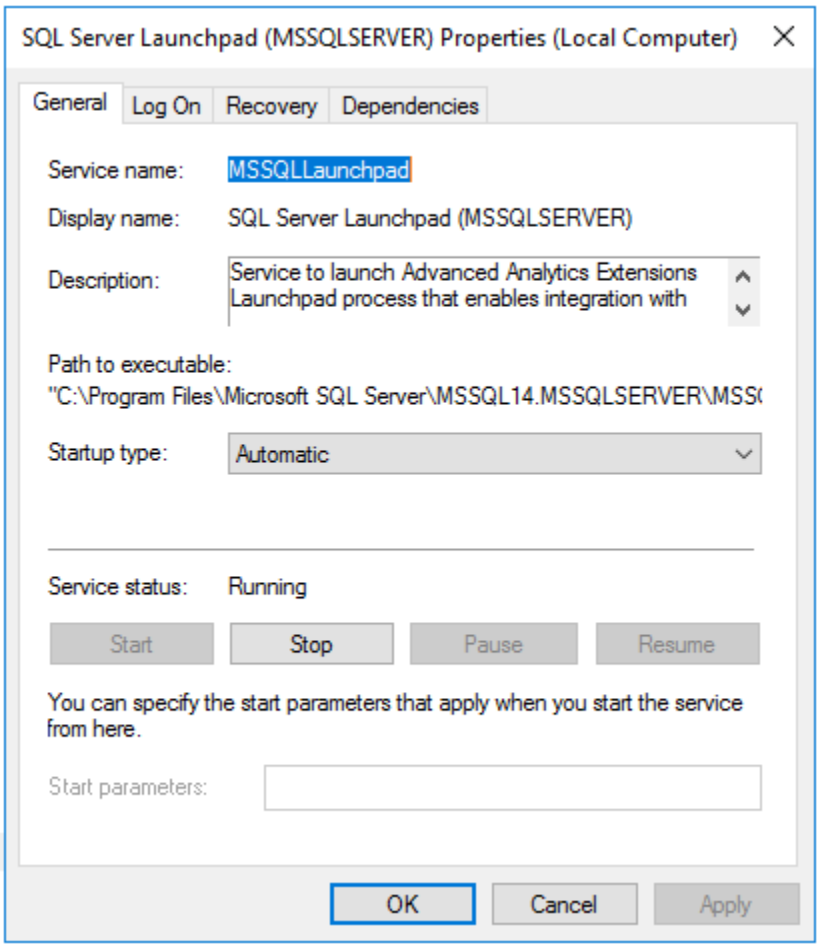
When the installation is complete, restart the database engine before continuing to the next, enabling script execution.

Restarting the service also automatically restarts the related SQL Server Launchpad service.

You can restart the service using the right-click **Restart** command for the instance in SSMS, or by using the **Services** panel in Control Panel, or by using SQL Server Configuration Manager.

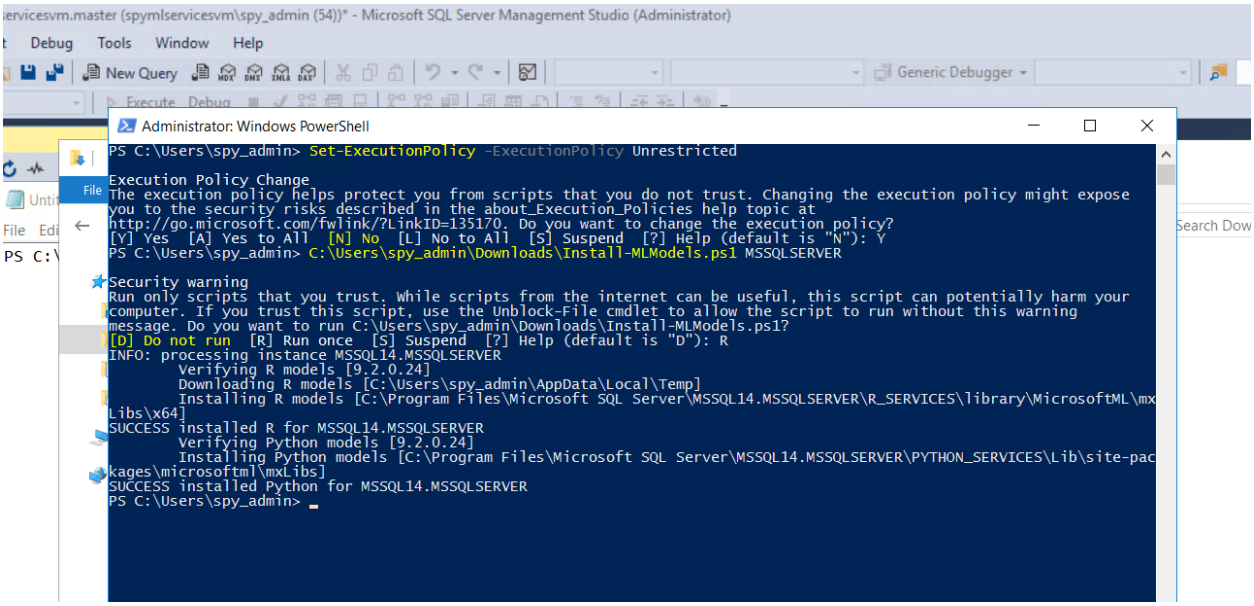


e. Set Service to Autostart:



3. Run the installation script for the pre-trained Machine Learning models

From Workshop git or Click https://aka.ms/mlm4sql to download the file **Install-MLModels.ps1**.

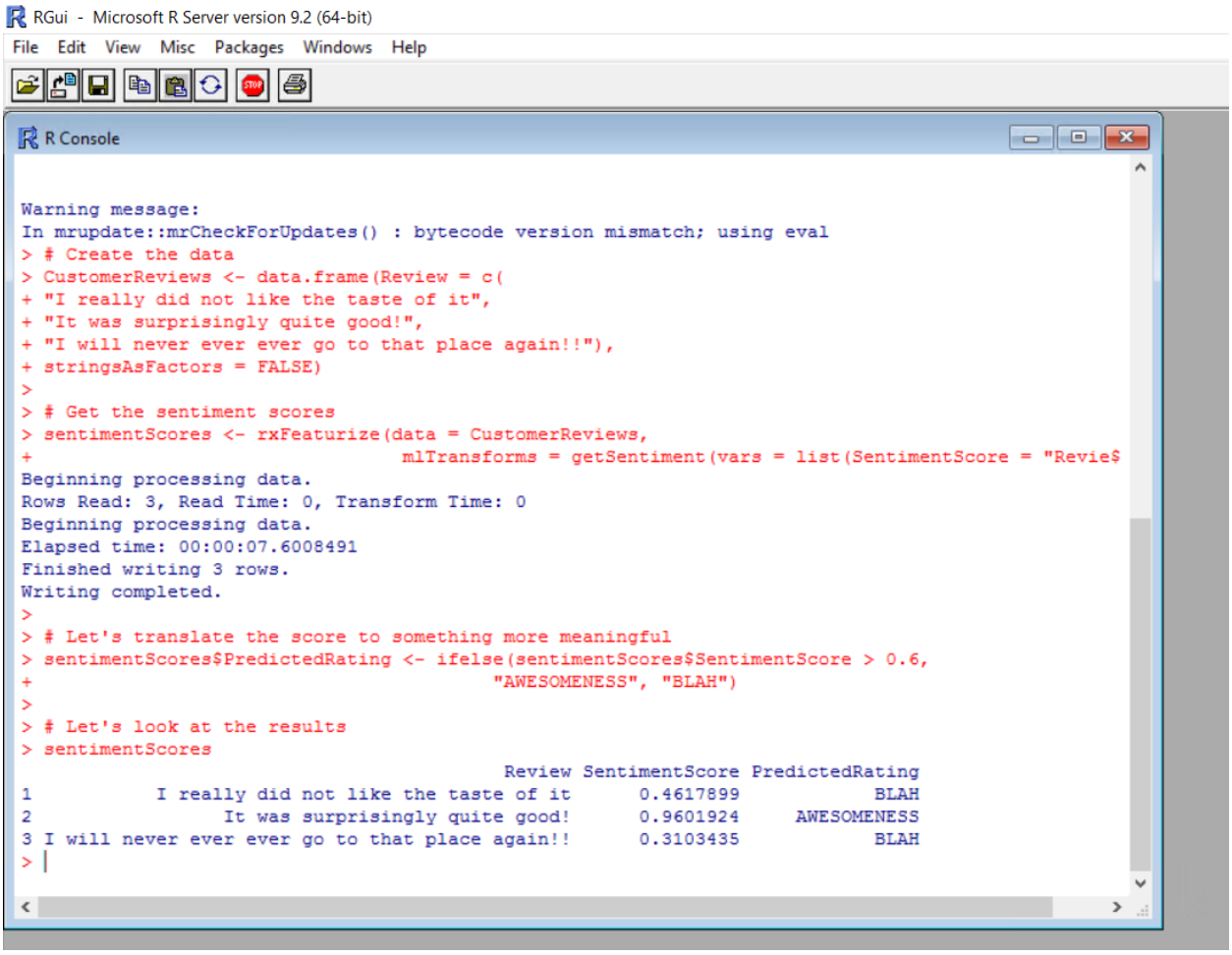


4. Perform R Verification:

Start RDUI @ C:\Program Files\Microsoft SQL Server\MSSQL14.MSSQLSERVER\R_SERVICES\bin\x64

Script:

```
# Create the data
CustomerReviews <- data.frame(Review = c(
"I really did not like the taste of it",
"It was surprisingly quite good!",
"I will never ever ever go to that place again!!"),
stringsAsFactors = FALSE)

# Get the sentiment scores
sentimentScores <- rxFeaturize(data = CustomerReviews,
                               mlTransforms = getSentiment(vars =
list(SentimentScore = "Review")))

# Let's translate the score to something more meaningful
sentimentScores$PredictedRating <- ifelse(sentimentScores$SentimentScore >
0.6,
                                          "AWESOMENESS", "BLAH")

# Let's look at the results
sentimentScores
```



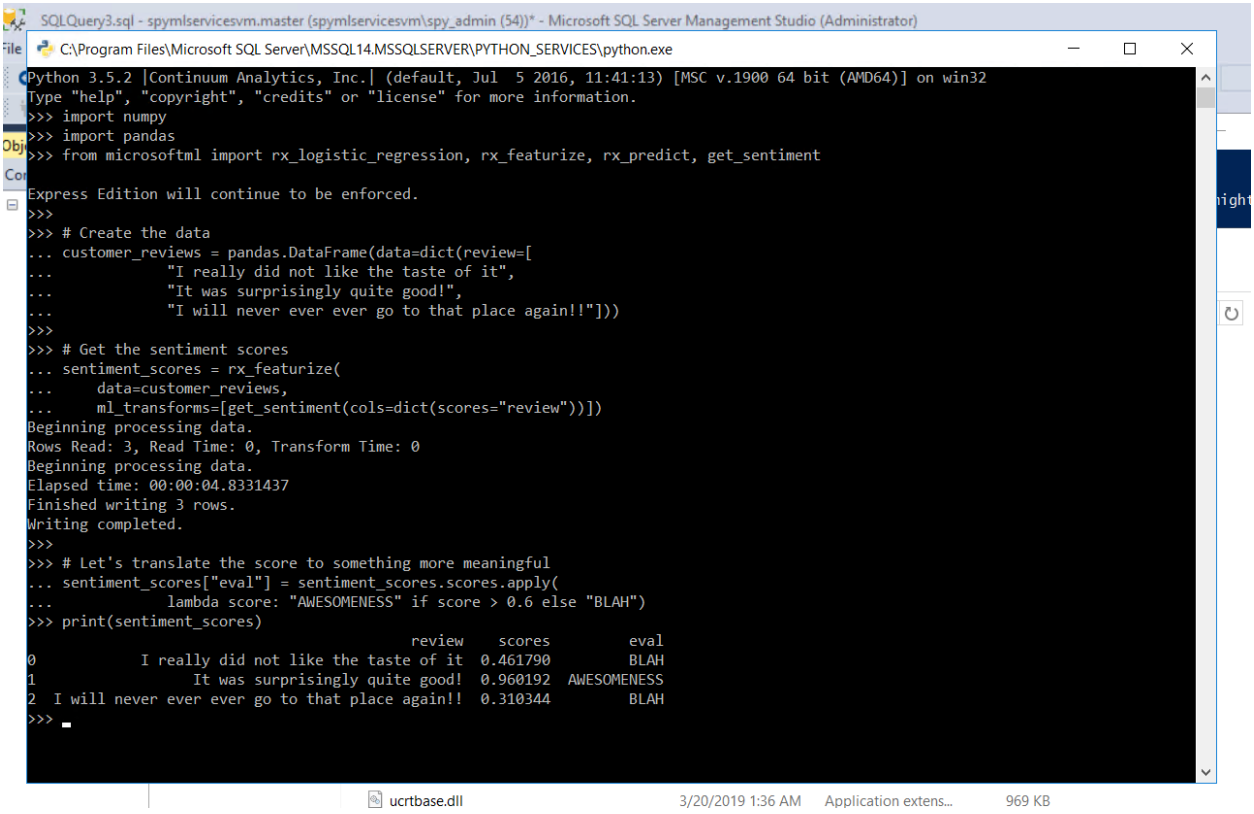
5. Perform Python Verification:

Python.exe at C:\Program Files\Microsoft SQL Server\MSSQL14.MSSQLSERVER\PYTHON_SERVICES

Script:

```
import numpy
import pandas
from microsoftml import rx_logistic_regression, rx_featurize, rx_predict,
get_sentiment

# Create the data
customer_reviews = pandas.DataFrame(data=dict(review=[
            "I really did not like the taste of it",
            "It was surprisingly quite good!",
            "I will never ever ever go to that place again!!"]))

# Get the sentiment scores
sentiment_scores = rx_featurize(
    data=customer_reviews,
    ml_transforms=[get_sentiment(cols=dict(scores="review"))])

# Let's translate the score to something more meaningful
```

```
sentiment_scores["eval"] = sentiment_scores.scores.apply(
            lambda score: "AWESOMENESS" if score > 0.6 else "BLAH")
print(sentiment_scores)
```



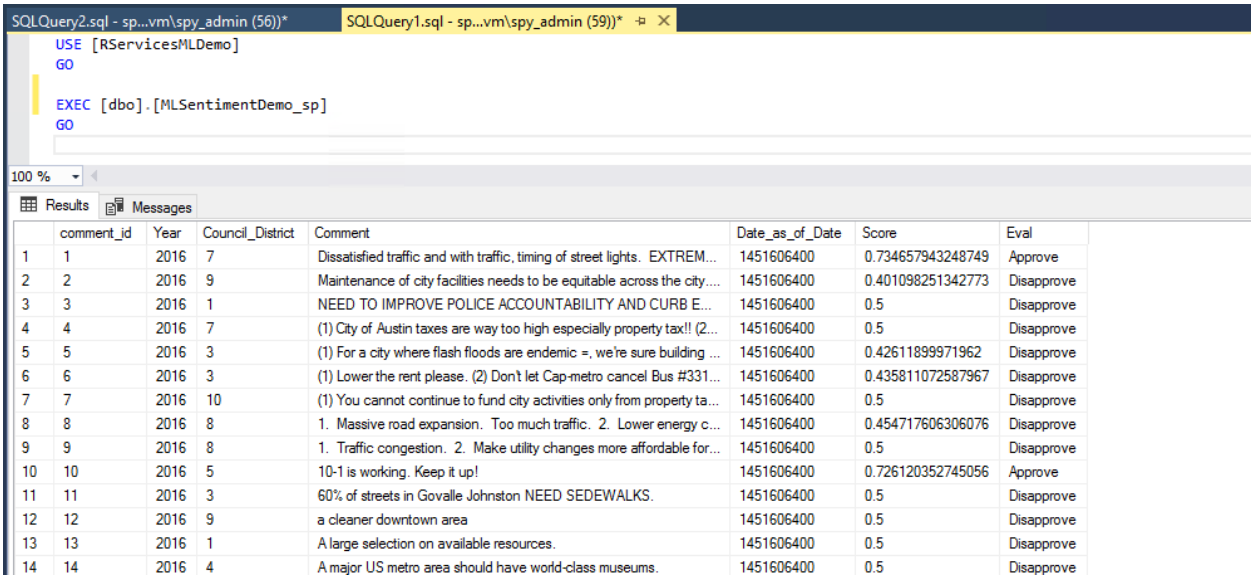
6. Restore RServicesMLDemo DB backup
7. Connect to DB and review tables

RServicesMLDemo

TableName	Comment
Budget_Simulator_Data	Several Comment fields
community_survey_comments	See "Comment Field"
community_survey_sentiment_dbr	Sentiment analysis output from Cognitive Services
community_survey_sentiment_sml	Sentiment analysis output from SparkML
community_survey_sentiment_mls	Sentiment analysis output from Pre-Trained SQL Machine Learning model
Demographic_Statistics_By_Zip_Code	Not used for this demo.
US_Comments	See "textOriginal" or "textDisplay"
MLSentimentDemo_sp	Demo stored procedure

8. Create Stored Procedure:

```
DROP PROCEDURE [dbo].[MLSentimentDemo_sp]
GO
CREATE PROCEDURE [dbo].[MLSentimentDemo_sp]
AS
BEGIN
    SET NOCOUNT ON;
    DECLARE @query nvarchar(max) =
    N'SELECT [comment_id],[Year],[Council_District],[Comment],cast(Date_as_of_Date as
date) as Date_as_of_Date FROM [RServicesMLDemo].[dbo].[community_survey_comments] where
[Comment] is not null'
    EXECUTE sp_execute_external_script
    @language = N'Python',
    @script = N'
import numpy
import pandas
from microsoftml import rx_logistic_regression, rx_featurize, rx_predict, get_sentiment

# Create the data
sentiment_reviews = InputDataSet

# Get the sentiment scores
sentiment_scores = rx_featurize(
    data=sentiment_reviews,
    ml_transforms=[get_sentiment(cols=dict(scores="Comment"))])

# Lets translate the score to something more meaningful
sentiment_scores["eval"] = sentiment_scores.scores.apply(
            lambda score: "Approve" if score >= 0.8 else ("Somewhat Approve" if score >=
0.6 and score < 0.8 else ("Disapprove" if score >= 0.4 and score < 0.6 else "Highly
Disapprove")))
#print(sentiment_scores)

OutputDataSet = sentiment_scores
',
 @input_data_1 = @query
WITH RESULT SETS ((comment_id INT, Year INT,Council_District INT,Comment
nvarchar(MAX),Date_as_of_Date float, Score float, Eval nvarchar(25)));
END
GO

Test:
EXEC [dbo].[MLSentimentDemo_sp]
GO
```



	comment_id	Year	Council_District	Comment	Date_as_of_Date	Score	Eval
1	1	2016	7	Dissatisfied traffic and with traffic, timing of street lights. EXTREM...	1451606400	0.734657943248749	Approve
2	2	2016	9	Maintenance of city facilities needs to be equitable across the city....	1451606400	0.401098251342773	Disapprove
3	3	2016	1	NEED TO IMPROVE POLICE ACCOUNTABILITY AND CURB E...	1451606400	0.5	Disapprove
4	4	2016	7	(1) City of Austin taxes are way too high especially property tax!! (2...	1451606400	0.5	Disapprove
5	5	2016	3	(1) For a city where flash floods are endemic =, we're sure building ...	1451606400	0.42611899971962	Disapprove
6	6	2016	3	(1) Lower the rent please. (2) Don't let Cap-metro cancel Bus #331...	1451606400	0.435811072587967	Disapprove
7	7	2016	10	(1) You cannot continue to fund city activities only from property ta...	1451606400	0.5	Disapprove
8	8	2016	8	1. Massive road expansion. Too much traffic. 2. Lower energy c...	1451606400	0.454717606306076	Disapprove
9	9	2016	8	1. Traffic congestion. 2. Make utility changes more affordable for...	1451606400	0.5	Disapprove
10	10	2016	5	10-1 is working. Keep it up!	1451606400	0.726120352745056	Approve
11	11	2016	3	60% of streets in Govalle Johnston NEED SEDEWALKS.	1451606400	0.5	Disapprove
12	12	2016	9	a cleaner downtown area	1451606400	0.5	Disapprove
13	13	2016	1	A large selection on available resources.	1451606400	0.5	Disapprove
14	14	2016	4	A major US metro area should have world-class museums.	1451606400	0.5	Disapprove

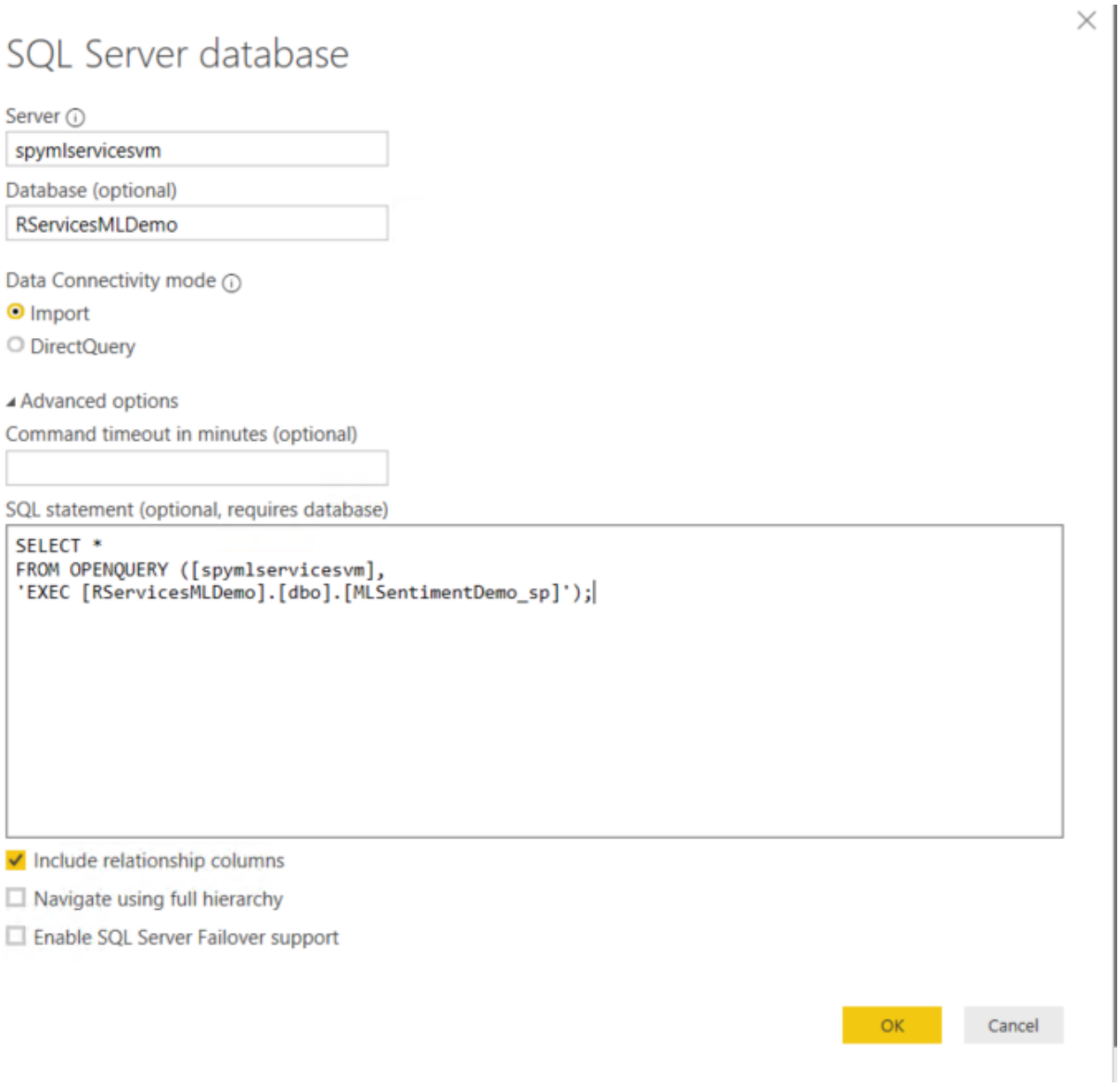
9. Connect with Power BI to Stored Procedure

   a. Enable Direct Access to stored procedures

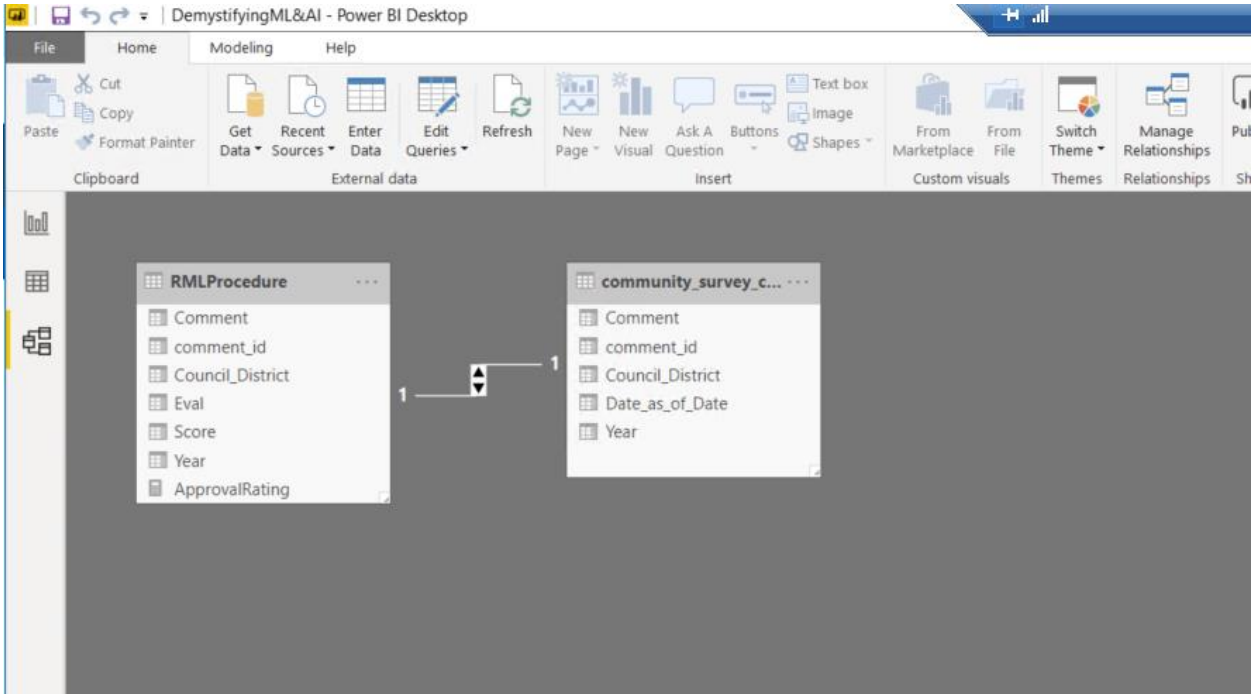
```
EXEC sp_serveroption 'spymlservicesvm', 'DATA ACCESS', TRUE
select server_id, name, is_data_access_enabled from sys.servers
```

   b. Use syntax below in Power BI get data connection

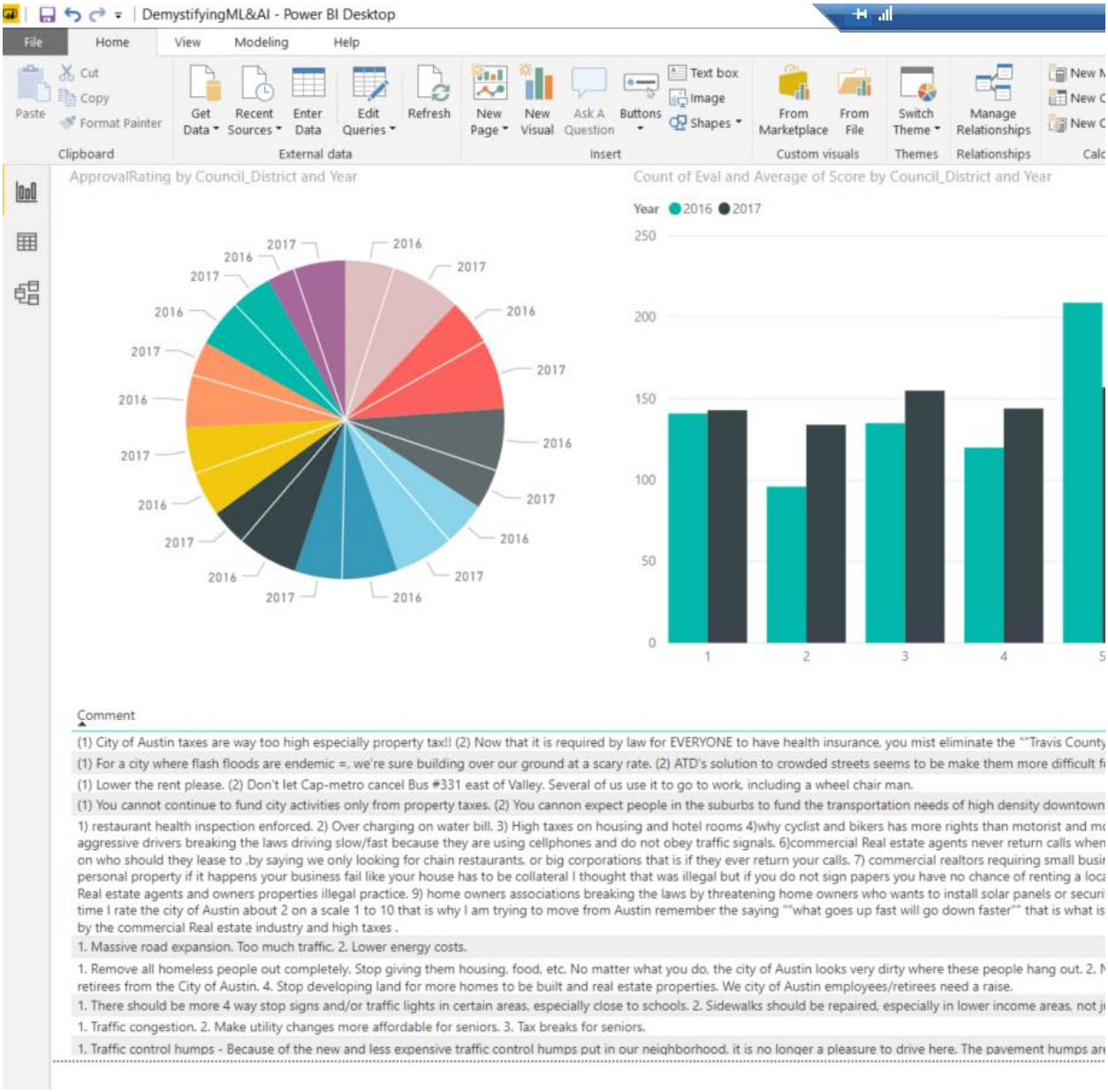
```
SELECT *
FROM OPENQUERY ([spymlservicesvm],
'EXEC [RServicesMLDemo].[dbo].[MLSentimentDemo_sp]');
```


SQL Server database
Server
spymlservicesvm
Database (optional)
RServicesMLDemo
Data Connectivity mode
Import
DirectQuery
Advanced options
Command timeout in minutes (optional)
SQL statement (optional, requires database)
SELECT *
FROM OPENQUERY ([spymlservicesvm],
'EXEC [RServicesMLDemo].[dbo].[MLSentimentDemo_sp]');
Include relationship columns
Navigate using full hierarchy
Enable SQL Server Failover support
OK
Cancel

Demystifying Machine Learning & AI to Drive Business Outcomes



c. Install gateway and publish to Power BI Service



Demystifying Machine Learning & AI to Drive Business Outcomes