

Install R packages with SQLMLUTILS

Last updated by | Vitor Tomaz | Feb 24, 2023 at 3:31 AM PST

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Issue

Issue when trying to run the `sp_execute_external_script` command to add R packages to Azure SQL Managed Instance, for specific scenario the `readr` package. But issue can be to install any package.

Command used

```
execute sys.sp_execute_external_script @language =N'r',@script=N'install.packages("readr")'
```

Error Message

Msg 39004, Level 16, State 20, Line 0 A 'R' script error occurred during execution of 'sp_execute_external_script' with HRESULT 0x80004004. External script request id is 18C93558-86F6-4741-A639-81B286B793BA. Msg 39019, Level 16, State 2, Line 0 An external script error occurred: Warning in install.packages("readr") : 'lib = "C:/WFRoot/Ext/R.9.4.7.1185/library"' is not writable Error in install.packages("readr") : unable to install packages Calls: source -> withVisible -> eval -> eval -> install.packages


Error in execution. Check the output for more information. Error in eval(ei, envir) : Error in execution. Check the output for more information. Calls: runScriptFile -> source -> withVisible -> eval -> eval -> .Call Execution halted

Impacted Regions

ALL


Investigation Analysis

Based on public documentation <https://learn.microsoft.com/en-us/sql/machine-learning/install/sql-machine-learning-services-windows-install?view=sql-server-ver15&viewFallbackFrom=sql-server-ver16> and <https://learn.microsoft.com/en-us/sql/machine-learning/package-management/install-additional-r-packages->

[on-sql-server?view=sql-server-ver16](#)  **sqlmlutils** should be used to install R packages on Azure SQL Managed Instance.

Mitigation

To install **sqlmlutils** required to install packages, the machine learning feature should be enabled, below are the details steps to Install the readr package on SQL MI:

1. Machine learning should be enabled as described here <https://learn.microsoft.com/en-us/azure/azure-sql/managed-instance/machine-learning-services-overview?view=azuresql> 

To enable Machine Learning run the T-SQL Command:

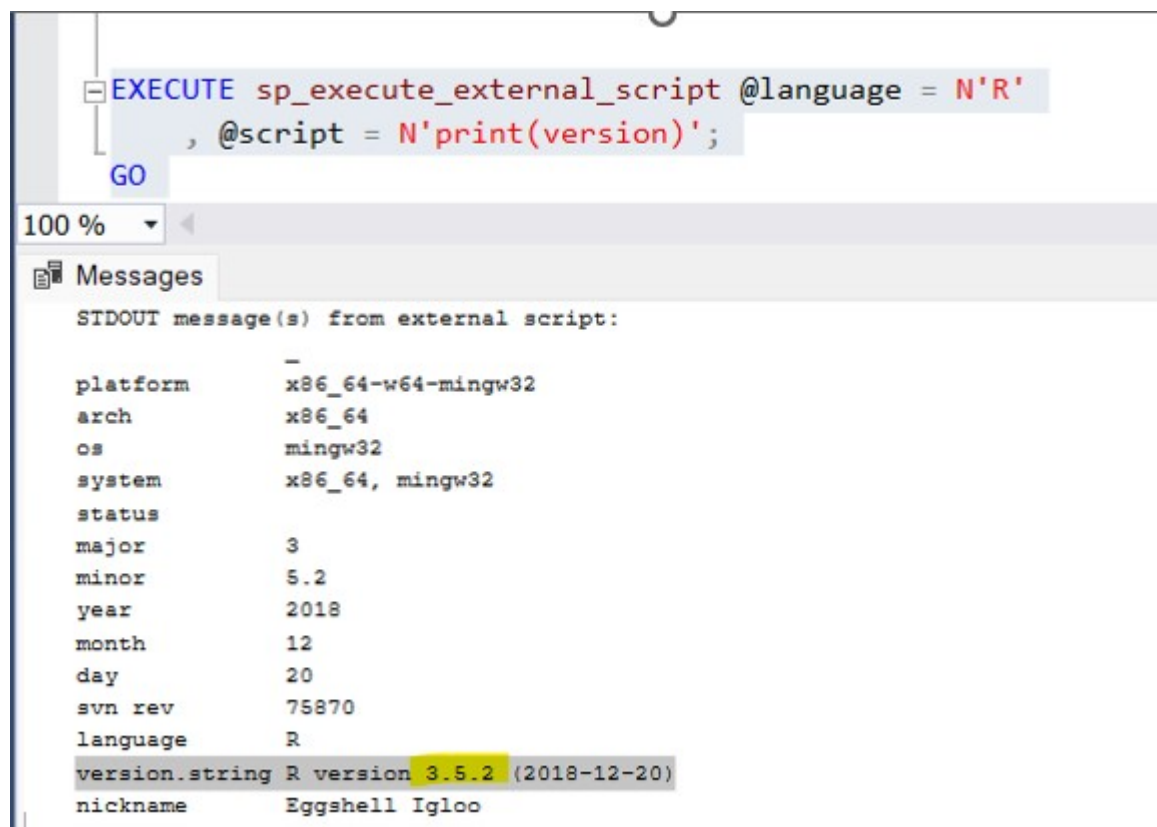
```
exec sp_configure 'external scripts enabled' , 1  
reconfigure with override
```

This will cause a restart for the SQL MI so disconnections are expected.

2. When Machine learning is enabled R is installed with default packages, to review the R version for the Azure SQL Managed Instance the following T-SQL command should be run preferable on the desired database to install the package.

```
EXECUTE sp_execute_external_script @language = N'R'  
    , @script = N'print(version)';  
GO
```

For this example the R version for SQL MI founded was: "version.string R version 3.5.2 (2018-12-20)"



The screenshot shows a SQL Server query window with the following command entered:

```
EXECUTE sp_execute_external_script @language = N'R'  
    , @script = N'print(version)';  
GO
```

Below the query window, the 'Messages' pane displays the output of the external script:

```
STDOUT message(s) from external script:  
  
platform      x86_64-w64-mingw32  
arch          x86_64  
os            mingw32  
system        x86_64, mingw32  
status  
major         3  
minor         5.2  
year          2018  
month         12  
day           20  
svn rev       75870  
language      R  
version.string R version 3.5.2 (2018-12-20)  
nickname      Eggshell Igloo
```

3. You can validate the R packages installed by running the follow command:

```
EXECUTE sp_execute_external_script
@language=N'R',
@script = N'str(OutputDataSet);
packagematrix <- installed.packages();
Name <- packagematrix[,1];
Version <- packagematrix[,3];
OutputDataSet <- data.frame(Name, Version);',
@input_data_1 = N'
.

WITH RESULT SETS ((PackageName nvarchar(250), PackageVersion nvarchar(max) ))
GO
```

Here is a result example for the above query, by now the readr package is not installed.




```
EXECUTE sp_execute_external_script
@language=N'R',
@script = N'str(OutputDataSet);
packagematrix <- installed.packages();
Name <- packagematrix[,1];
Version <- packagematrix[,3];
OutputDataSet <- data.frame(Name, Version);',
@input_data_1 = N'
.

WITH RESULT SETS ((PackageName nvarchar(250), PackageVersion nvarchar(max) ))
GO
```


100 %

Results Messages

	PackageName	PackageVersion
25	MicrosoftML	9.4.7
26	MicrosoftR	3.5.2
27	nlme	3.1-137
28	nnet	7.3-12
29	parallel	3.5.2
30	png	0.1-7
31	R6	2.3.0
32	RevoMods	11.0.1
33	RevoPemaR	10.0.0
34	RevoScaleR	9.4.7
35	RevoUtils	11.0.2
36	RevoUtilsMath	11.0.0
37	RODBC	1.3-15
38	rpart	4.1-13
39	RUnit	0.4.26
40	spatial	7.3-11
41	splines	3.5.2
42	stats	3.5.2
43	stats4	3.5.2
44	survival	2.43-3
45	tcltk	3.5.2
46	tools	3.5.2

4. Download and install R based on the SQL MI R version, I downloaded the 3.5.2 R version R: <https://www.r-project.org/> 
5. Download and Install Rstudio <https://posit.co/download/rstudio-desktop/> 
6. Download and install Azure Data Studio <https://learn.microsoft.com/en-us/sql/azure-data-studio/what-is-azure-data-studio?view=sql-server-ver16> 
7. Install SQLMLUTILS, for this exercise I installed online, but also an offline option is available:

To install sqlmlutils first ODBC packages should be installed as described here

<https://learn.microsoft.com/en-us/sql/machine-learning/package-management/install-additional-r-packages-on-sql-server?view=sql-server-ver16#add-the-package-online>  To install ODBC packages cmd should be used, based on review with PG team the right command should be:

```
R.exe -e "install.packages('odbc', type='binary', repos='https://cran.us.r-project.org')
```

The above command is not well documented on the public link. To run the above command you need to make sure to be on R path by default should be "C:\Program Files\R\R-3.5.2\bin" here is the example

```
C:\Program Files\R\R-3.5.2\bin>R.exe -e "install.packages('odbc', type='binary', repos='https://cran.us.r-project.org')
```

This is the output generated.

```
> install.packages('odbc', type='binary', repos='https://cran.us.r-project.org')
Installing package into 'C:/Users/glorior/Documents/R/win-library/3.5'
(as 'lib' is unspecified)

There is a binary version available (and will be installed) but the
source version is later:
  binary source
odbc 1.2.2 1.3.3


also installing the dependency 'BH'

probando la URL 'https://cran.us.r-project.org/bin/windows/contrib/3.5/BH_1.72.0-3.zip'
Content type 'application/zip' length 18270616 bytes (17.4 MB)
=====
downloaded 17.4 MB

probando la URL 'https://cran.us.r-project.org/bin/windows/contrib/3.5/odbc_1.2.2.zip'
Content type 'application/zip' length 1079260 bytes (1.0 MB)
=====
downloaded 1.0 MB

package 'BH' successfully unpacked and MD5 sums checked
package 'odbc' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
  C:\Users\glorior\AppData\Local\Temp\Rtmp08hoo1\downloaded_packages
>
>
```


After ODBC packages are installed, the next step is to install sqlmlutils by download the sqlmlutils_1.2.1_R3.5.2.tar.gz file found here <https://github.com/microsoft/sqlmlutils/releases>  The command also is not well documented and you need to make sure to be on R path and specify the path for the file downloaded.

R.exe CMD INSTALL "C:\Users\glomor\Downloads\sqlmlutils_1.2.1_R3.5.2.tar.gz"

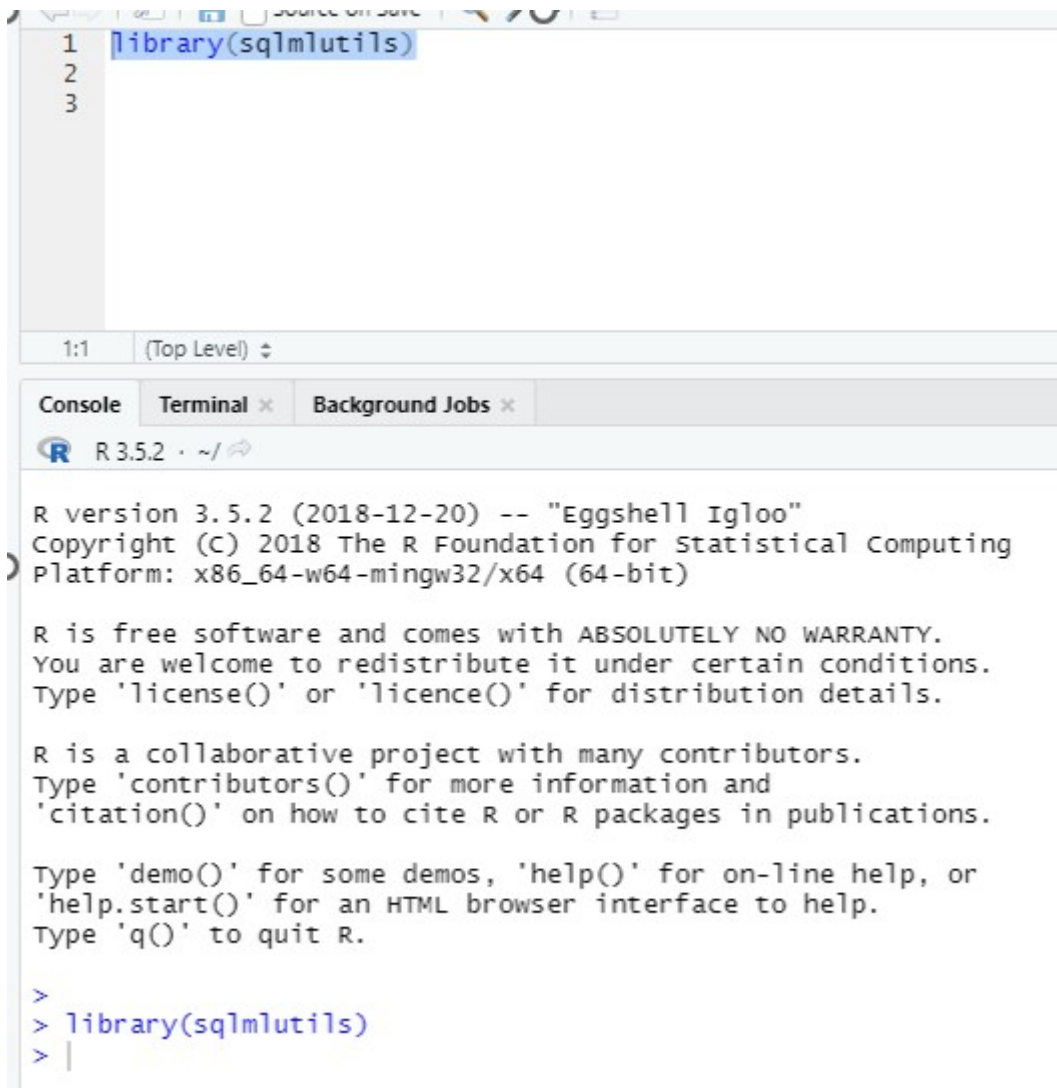
Here is the example:

```
C:\Program Files\R\R-3.5.2\bin>R.exe CMD INSTALL "C:\Users\glomor\Downloads\sqlmlutils_1.2.1_R3.5.2.tar.gz"
In R CMD INSTALL
* installing to library 'C:/Users/glomor/Documents/R/win-library/3.5'
* installing *source* package 'sqlmlutils' ...
** R
** byte-compile and prepare package for lazy loading
** help
*** installing help indices
converting help for package 'sqlmlutils'
finding HTML links ... done
checkSproc                                html
connectionInfo                            html
createSprocFromFunction                   html
dropSproc                                 html
executeFunctionInSQL                      html
executeSQLQuery                           html
executeScriptInSQL                       html
executeSproc                             html
sql_install.packages                     html
sql_installed.packages                   html
sql_remove.packages                      html
sqlmlutils-package                       html
** building package indices
** testing if installed package can be loaded
*** arch - i386
*** arch - x64
* DONE (sqlmlutils)

C:\Program Files\R\R-3.5.2\bin>
```

8. If the sqlmlutils were successfully installed the R packages can be installed by following the described here <https://learn.microsoft.com/en-us/sql/machine-learning/package-management/install-additional-r-packages-on-sql-server?view=sql-server-ver16#add-the-package-online> 

A way to validate if sqlmlutils were successfully installed is trying to upload to R Studio by running library(sqlmlutils) command.



```

1 library(sqlmlutils)
2
3
1:1 (Top Level)
Console Terminal x Background Jobs x
R 3.5.2 · ~/
R version 3.5.2 (2018-12-20) -- "Eggshell Igloo"
Copyright (C) 2018 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (64-bit)

R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.

R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

>
> library(sqlmlutils)
> |


```

If the sqlmlutils were not successfully installed an error like follow will be shown:

```

> library(sqlmlutils)
Error in library(sqlmlutils) : there is no package called 'sqlmlutils'
> library(sqlmlutils)
Error in library(sqlmlutils) : there is no package called 'sqlmlutils'
> library(sqlmlutils)
Error in library(sqlmlutils) : there is no package called 'sqlmlutils'
> |

```

To install the required R package on this example the readr package, the Rstudio tool should be used, this is the example of the command used, I connected to SQL MI using public endpoint there is also a useful youtube video <https://www.youtube.com/watch?v=JOeVh0HCxgQ&t=57s> 

```
library(sqlmlutils)
```

```

connection <- connectionInfo(
  server = "sqlmiserver.public.a92ad62f61b7.database.windows.net,3342", -- replace with your SQLMI
  database = "dbname", --Replace with your database name
  uid = "user", --Replace with your SQL user
  pwd = "Password") --Replace with your SQL password

```

```
sql_install.packages(connectionString = connection, pkgs = "readr", verbose = TRUE, scope = "PUBLIC")
```

This is the output for the command executed

```

1 library(sqlmlutils)
2 connection <- connectionInfo(
3   server = "sqlmlutils.public.a92ad62f63b7.database.windows.net,3342",
4   database = "dbname",
5   uid = "user",
6   pwd = "password")
7
8 sql_install_packages(connectionstring = connection, pkgs = "readr", verbose = TRUE, scope = "public")
9
10
11 Console Terminal Background Jobs
12
13 > sql_install_packages(connectionstring = connection, pkgs = "readr", verbose = TRUE, scope = "PUBLIC")
2022-10-24 18:57:03.29 Starting package install on SQL server (Driver=SQL Server;Server=sqlmlutils.public.a92ad62f63b7.database.windows.net,3342;Database=
2022-10-24 18:57:03.29 Verifying permissions to install packages on SQL server...
2022-10-24 18:57:07.08 Resolving package dependencies for (readr)...
2022-10-24 18:57:32.84 Downloading package [1/18] Rcpp (1.0.4.6)...
2022-10-24 18:57:32.49 Downloading package [2/18] tibble (3.0.1)...
2022-10-24 18:57:32.63 Downloading package [3/18] hms (0.5.3)...
2022-10-24 18:57:32.76 Downloading package [4/18] clipr (0.7.0)...
2022-10-24 18:57:32.97 Downloading package [5/18] crayon (1.3.4)...
2022-10-24 18:57:33.19 Downloading package [6/18] pkgconfig (2.0.3)...
2022-10-24 18:57:33.29 Downloading package [7/18] rlang (0.4.5)...
2022-10-24 18:57:33.50 Downloading package [8/18] vctrs (0.2.4)...
2022-10-24 18:57:33.82 Downloading package [9/18] cli (2.0.2)...
2022-10-24 18:57:33.95 Downloading package [10/18] ellipsis (0.1.0)...
2022-10-24 18:57:34.14 Downloading package [11/18] fansi (0.4.1)...
2022-10-24 18:57:34.26 Downloading package [12/18] lifecycle (0.2.0)...
2022-10-24 18:57:34.36 Downloading package [13/18] magrittr (1.1)...
2022-10-24 18:57:34.47 Downloading package [14/18] pillar (1.4.1)...
2022-10-24 18:57:34.62 Downloading package [15/18] assertthat (0.2.1)...
2022-10-24 18:57:34.72 Downloading package [16/18] utf8 (1.1.4)...
2022-10-24 18:57:34.83 Downloading package [17/18] digest (0.6.25)...
2022-10-24 18:57:34.94 Downloading package [18/18] readr (2.1.3)...
2022-10-24 18:57:35.70 Copying package to SQL server [1/18] Rcpp...
2022-10-24 18:57:39.53 Copying package to SQL server [2/18] tibble...
2022-10-24 18:57:40.10 Copying package to SQL server [3/18] hms...
2022-10-24 18:57:40.34 Copying package to SQL server [4/18] clipr...
2022-10-24 18:57:40.54 Copying package to SQL server [5/18] crayon...
2022-10-24 18:57:43.48 Copying package to SQL server [6/18] pkgconfig...
2022-10-24 18:57:42.64 Copying package to SQL server [7/18] rlang...
2022-10-24 18:57:42.91 Copying package to SQL server [8/18] vctrs...
2022-10-24 18:57:44.22 Copying package to SQL server [9/18] cli...
2022-10-24 18:57:44.71 Copying package to SQL server [10/18] ellipsis...
2022-10-24 18:57:44.92 Copying package to SQL server [11/18] fansi...
2022-10-24 18:57:45.27 Copying package to SQL server [12/18] lifecycle...
2022-10-24 18:57:45.50 Copying package to SQL server [13/18] magrittr...
2022-10-24 18:57:45.79 Copying package to SQL server [14/18] pillar...
2022-10-24 18:57:46.09 Copying package to SQL server [15/18] assertthat...
2022-10-24 18:57:46.26 Copying package to SQL server [16/18] utf8...
2022-10-24 18:57:46.59 Copying package to SQL server [17/18] digest...
2022-10-24 18:57:46.87 Copying package to SQL server [18/18] readr...
2022-10-24 18:57:48.55 Installing packages to library path, this may take some time...
2022-10-24 18:57:58.39 Successfully installed packages on SQL server (Rcpp, tibble, hms, clipr, crayon, pkgconfig, rlang, vctrs, cli, ellipsis, fansi, lifecycle, magrittr, pillar, assertthat, utf8, digest, readr).
warning message:
package is already installed but version is older than available in repos:
package="R6", scope="SYSTEM", currently installed version="2.3.0", new version="2.4.1"

```

9. You can go to the SSMS studio and validate if the readr package is installed by running the command on the step 3 on SSMS

```

EXECUTE sp_execute_external_script
    @language=N'R',
    @script = N'str(OutputDataSet);
    packagematrix <- installed.packages();
    Name <- packagematrix[,1];
    Version <- packagematrix[,3];
    OutputDataSet <- data.frame(Name, Version);',
    @input_data_1 = N'
    ',
    WITH RESULT SETS ((PackageName nvarchar(250), PackageVersion nvarchar(max)))
GO


```

	PackageName	PackageVersion
1	assertthat	0.2.1
2	cli	2.0.2
3	clipr	0.7.0
4	crayon	1.3.4
5	digest	0.6.25
6	ellipsis	0.3.0
7	fansi	0.4.1
8	glue	1.4.0
9	hms	0.5.3
10	lifecycle	0.2.0
11	magrittr	1.5
12	pillar	1.4.3
13	pkgconfig	2.0.3
14	Rcpp	1.0.4.6
15	readr	1.3.1
16	rlang	0.4.5
17	tibble	3.0.1
18	utf8	1.1.4
19	vctrs	0.2.4
20	base	3.5.2
21	boot	1.3-20
22	checkpoint	0.4.4
23	class	7.3-14

More Information

There is also a useful youtube video <https://www.youtube.com/watch?v=JOeVh0HCxgQ&t=57s> 


Public Doc Reference

<https://learn.microsoft.com/en-us/azure/azure-sql/managed-instance/machine-learning-services-overview?view=azuresql> 

<https://www.r-project.org/> 

<https://posit.co/download/rstudio-desktop/> 

<https://learn.microsoft.com/en-us/sql/azure-data-studio/what-is-azure-data-studio?view=sql-server-ver16> 

<https://learn.microsoft.com/en-us/sql/machine-learning/package-management/install-additional-r-packages-on-sql-server?view=sql-server-ver16#add-the-package-online> 

<https://github.com/microsoft/sqlmlutils/releases> 

<https://learn.microsoft.com/en-us/sql/machine-learning/package-management/install-additional-r-packages-on-sql-server?view=sql-server-ver16#add-the-package-online> 

Internal Reference

There is an ICM with detailed about this

<https://portal.microsofticm.com/imp/v3/incidents/details/343225001/home> 

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