# How to Connect to the SQL Server from the Windows 10 Enclave Virtual Desktop Using RStudio

### Introduction

This document offers tips for connecting to SQL server from the Windows Enclave Virtual Desktop using RStudio, Version 4.0.4. Note that this solution has been validated using the Windows 10 Enclave Virtual Desktop connection to a MS Windows SQL Server with either ODBC, RODBC or JDBC.

### **Requirements or Prerequisites**

- 1. Access to Enclave Platform should already be granted and your workspace provisioned. If you do not have approval to access the Enclave
- Platform, complete and submit the Access Request Form.
- 2. You should be logged on to your Enclave Windows Virtual Desktop. You cannot access the Enclave Platform resources from outside the platform.

# **Step-by-Step Instructions**

Depending on how you want to run R scripts to connect to the SQL server, there are three drivers you can use. These are ODBC, RODBC or JDBC drivers.

# Step 1. Install ODBC, RODBC or JDBC Drivers

Installing ODBC, RODBC or JDBC drivers should be as easy as this:

### **ODBC** Driver

#### **Download ODBC Driver**

The Microsoft ODBC Drivers for SQL Server are stand-alone ODBC drivers which provide an application programming interface (API) implementing the standard ODBC interfaces to Microsoft SQL Server.

The Microsoft ODBC Driver for SQL Server can be used to create new applications. You can also upgrade your older applications which currently use an older ODBC driver. The ODBC Driver for SQL Server supports connections to Azure SQL Database, Azure Synapse Analytics, and SQL Server.

Version	Features Supported				
Microsoft ODBC Driver 18 for SQL	Support for TDS 8.0				
Server	Extensions to SQLGetData				
	Option to send SQL_LONG_* types as (max)-types				
Microsoft ODBC Driver 17 for SQL	Always Encrypted support for BCP API				
Server	New connection string attribute UseFMTONLY causes driver to use legacy metadata in special cases equiring temp tables				
Microsoft ODBC Driver 13.1 for SQL Server	Always Encrypted				
	Azure AD Authentication				
	Always On Availability Groups (AG)				
Microsoft ODBC Driver 13 for SQL Server	Internationalized Domain Name (IDN)				
Microsoft ODBC Driver 11 for SQL	Driver-Aware Connection Pooling				
Server	Connection Resiliency				
	Asynchronous execution (Polling Method)				

#### Summary

#### RODBC Driver

RODBC is simple to install, and binary distributions are available for Windows from CRAN. https://cran.r-project.org/web/packages/RODBC/index. html

install.packages("RODBC")

#### JDBC Driver

JDBC creates a new DBI driver that can be used to start JDBC connections. JDBC function has two purposes. One is to initialize the Java VM and load a Java JDBC driver (not to be confused with the JDBCDriver R object which is actually a DBI driver). The second purpose is to create a proxy R object which can be used to a call dbConnect which actually creates a connection. JDBC requires a JDBC driver for a database-backend to be loaded. Usually, a JDBC driver is supplied in a Java Archive (jar) file. The path to such a file can be specified in classPath. The

driver itself has a Java class name that is used to load the driver (for example the MySQL driver

uses com.mysql.jdbc.Driver), this has to be specified in driverClass.

JDBC (driverClass = "", classPath = "", identifier.quote = NA)

The RJDBC package is an implementation of R's DBI interface using JDBC as a backend. This allows R to connect to any DBMS that has a JDBC driver.

install.packages("DBI", dep=TRUE)
install.packages("rJava", dep=TRUE)
install.packages("RJDBC", dep=TRUE)

### Step 2. Specifying DSNs

The ODBC driver managers have 'User DSNs' and 'System DSNs': these differ only in where the information is stored, the first on a per-user basis and the second for all users of the system.

Windows has a GUI you can use to set up the DSNs. For example, to set up the ODBC Data Source, go to the Start menu and type "ODBC". When "Micro soft ODBC Administrator" or "Data Sources (ODBC)" appears under Programs, click on it. Alternatively, go to the Start menu and select "Administrativ e Tools". In this step, you can add, remove and edit ('configure') DSNs as illustrated in the screenshots below.

You need to repeat these steps for each database you are planning to use

In the ODBC Data Source Administrator window, select the User DSN tab, click the Add button.

Select SQL Server Native Client 11.0 from the list of drivers and then click Finish.

ODBC Data Source Administrator (64-bit)     User DSN System DSN File DSN Drivers Tracing Connection Pooling About	×		1 N		1
User Data Sources:		Create New Data Source			×
Name         Platform         Driver           An ODBC User data source stores information about how to connect to the indice           User data source is only visible to you, and can only be used on the current mach			Select a driver for which you ward Name ODBC Driver 17 for SQL Server SQL Server SQL Server Native Client 11.0	Version 2017.175.01.01 10.00.17763.01	rce. Cor Mic Mic Mic
OK Cancel	Apply Help		< Back	Finish Can	cel

Type the name you want to use for your data source, add a description of the data source, and the name of the Server you want to connect to (enclavemssql01 in this example). Click **Next** to continue.

Create a New Data Sour	ce to SQL Server	×					
SQL Server 2012	This wizard will help you create an ODBC data source that you can use to connect to SQL Server. What name do you want to use to refer to the data source? Name: COVID 19	,					
How do you want to describe the data source?							
Description: COVID 19 Data Mart							
	Which SQL Server do you want to connect to? Server: enclave-mssql01						
		<u> </u>					
	Finish Next > Cancel Help						

Verify that "With Integrated Windows authentication" option is selected. Click Next to continue.

Microsoft SQL Server D	5N Configuration	×
8	How should SQL Server verify the authenticity of the login ID?	
SQL Server 2012	With Integrated Windows authentication.	_
	SPN (Optional):	
	$\bigcirc_{\rm user.}^{\rm With \ SQL \ Server}$ authentication using a login ID and password entered by the	;
	Login ID: clw47	
	Password:	
	< Back Next > Cancel Help	

Check "Change the default database to" box and then choose the name of the database to which you want to connect from the drop-down (COVID19\_Mart in this example). Click Next to continue.

Microsoft SQL Server DSN Configuration					
SQL Server 2012	Change the default database to: COVID19_Mart Mirror server:	~			
	SPN for mirror server (Optional):				
	<ul> <li>✓ Use ANSI quoted identifiers.</li> <li>✓ Use ANSI nulls, paddings and warnings.</li> <li>Application intent:</li> </ul>				
	READONLY Multi-subnet failover.	~			
	< Back Next > Cancel H	elp			

Verify general configuration settings for the ODBC connection and click Finish.

Microsoft SQL Server DSN Configuration				
SQL Server 2012	Change the language of SQL Server system messages (Default) Use strong encryption for data	to:	~	
	Perform translation for character data           Use regional settings when outputting currency, number	rs, dates and times		
	Save long running queries to the log file:	a, dates una tintes.		
	C:\Users\LOCAL_~1\Temp\QUERY.LOG	Browse		
	Long query time (milliseconds):	30000		
	Log ODBC driver statistics to the log file:			
	C:\Users\LOCAL_~1\Temp\STATS.LOG	Browse		
	< Back Finish C	Cancel Help		

Once the summary of configuration for the new data source is created, test the data source by clicking the **Test Data Source** button.

ODBC Microsoft SQL Server Setup	×
A new ODBC data source will be created with the following configuration:	
Microsoft SQL Server Native Client Version 11.00.7462	1
Data Source Name: COVID 19 Data Source Description: COVID 19 Data Mart Server: enclave-mssql01 Use Integrated Security: Yes Database: COVID19_Mart Language: (Default) Data Encryption: No Trust Server Certificate: No Multiple Active Result Sets(MARS): No Mirror Server: Translate Character Data: Yes Log Long Running Queries: No Log Driver Statistics: No Use Regional Settings: No Use ANSI Quoted Identifiers: Yes Use ANSI Null, Paddings and Warnings: Yes Application Intent: READONLY	1
Test Data Source OK Cancel	

If everything works as expected, the confirmation screen will appear as indicated below. Click the **OK** button to close the test screen window. Click **OK** butt on again to close the creation window.

SQL Server ODBC Data Source Test	Х
Test Results	
Microsoft SQL Server Native Client Version 11.00.7462	~
Running connectivity tests	
Attempting connection Connection established Verifying option settings Disconnecting from server	
TESTS COMPLETED SUCCESSFULLY!	
I	
OK	

Once the ODBC data source has been successfully created, click the  $~\mathbf{OK}$  button.

S ODBC [	Data Source A	dministrate	or <mark>(64-bit</mark>	t)						×
User DSN	System DSN	File DSN	Drivers	Tracing	Connection	Pooling	About			
User Data	Sources:									
Name	Platform	Driver						Add		
COVID	19 32/64-bit	SQL Server	Native C	lient 11.0				Remo	ve	
								Configu	ure	
					n about how to an only be use			indicated data p er.	rovider. A	
					OK	Can	cel	Apply	Help	

## Step 3. Making a MS SQL Server Connection

ODBC works by setting up a connection or channel from the client (here RODBC) to the

DBMSs as specified in the DSN. Such connections are normally used throughout a session,

but should be closed explicitly at the end of the session-however RODBC will clear up

after you if you forget (with a warning that might not be seen in a GUI environment).

There can be many simultaneous connections.

The simplest way to make a connection is

library(RODBC)

cn <- odbcConnect("some dsn")</pre>

#### and when you are done with it,

close(cn)

or if you prefer

odbcClose(cn)

Here three sample codes. These codes provides a template for connecting to an existing database. In this example the database is i2b2.

The first example is a very simple R program: "odbc connect to SQL Server using DSN Covid 19.R"

```
library(RODBC)
cn <- odbcConnect("COVID 19")
dataSQLQuery <- sqlQuery(cn, "SELECT * FROM i2b2.dbo.ACT_COVID")
View(dataSQLQuery)</pre>
```

#### It uses the DSN created by following Step 2 above or the PDF files that is attached.

#### The second R program: "RODBC Connect to SQL Server i2b2 database from R"

```
libPaths()
local({r <- list("cran" = "http://repo.analyticsenclave.org:8082/artifactory/cran")})
getOption("repos")
install.packages('RODBC')
library('RODBC')
cn <- odbcDriverConnect(connection="Driver={SQL Server Native Client 11.0};server=mssql01-t.analyticsenclave.
org;database=i2b2;trusted_connection=yes;")
dataSQLQuery <- sqlQuery(cn, "SELECT * FROM i2b2.dbo.ACT_COVID")
View(dataSQLQuery)</pre>
```

It uses odbcDriver Connection function with the connection strings.

#### The third R program: "RJDBC\_enclave - RJDBC to querry i2b2 COVID table.R"

```
install.packages("DBI",dep=TRUE)
install.packages("rJava",dep=TRUE)
install.packages("RJDBC",dep=TRUE)
library('DBI')
library('DBI')
library('rJava')
library('RJDBC')
drv <- JDBC("com.microsoft.sqlserver.jdbc.SQLServerDriver", "c:/Program Files/sqljdbc_8.2/enu/mssql-jdbc-8.2.2.
jre8.jar", identifier.quote = "'")
cn <- dbConnect(drv, "jdbc:sqlserver://mssql01.analyticsenclave.org:1433; databaseName=COVID19_Mart;
domain=analyticsenclave.org;IntegratedSecurity=true")
dataSQLQuery <- dbGetQuery(cn, "SELECT * FROM i2b2.dbo.ACT_COVID")
View(dataSQLQuery)</pre>
```

### Limitations

Please Note: The above code was tested to run successfully under R 4.0.4

### **Related References**

- 1. Connect to an ODBC Data Source (SQL Server Import and Export Wizard) SQL Server Integration Services (SSIS) | Microsoft Docs
- 2. Setting up R to connect to SQL Server RStudio Support
- 3. Working with a JDBC connection JDBC Driver for SQL Server | Microsoft Docs

### **Additional Resources**

#### How to connect to Oracle using ODBC

- 1. Start the database connection wizard.
- 2. Select Oracle (ODBC / JDBC), and then click Next.
- 3. Select ODBC.
- Click Edit Drivers.

- 5. Select the Oracle drivers you wish to use (in this example, Oracle in OraClient11g\_home1). ...
- 6. Click Back.
- Select Create a new data source name (DSN) with the driver, and then select the Oracle driver chosen in step 4. ...
   Click Connect.

#### **Related documents**

Connect R (RStudio) with RJDBC to Microsoft SQL Server Express 2008 R2 – Incentergy – Effizienzsteigerndes Projektmanagement