**How to install the ROracle package on Windows 10 to create a seamless R programming environment**

By Joseph DeArce

This document describes the necessary steps for the installation of **ROracle** driver/package on Windows 10 using several additional software packages to create a seamless R data processing environment. These four other software packages are necessary for the creation of a complete programming environment from a R client to a database server. You might ask why I should go through the trouble of installing these complicated software products, my answer is simple **SPEED** this connection is faster than **ODBC**, **JDBC** and anything else because it’s a native connection. If you’re interested in processing large amounts of data and they reside in **RDBM** databases, and you use R then **ROracle** is for you.

In benchmark comparisons, **ROracle** performed up to 79 times faster than **RJDBC** and 2.5 times faster than **RODBC** for reading data across a range of 1000 to 1 million rows, and 10 to 1000 columns. **ROracle** shows scalability across **NUMBER**, **VARCHAR2**, **TIMESTAMP**, and **BINARY\_DOUBLE** data types.

**Hardware**

Before we begin our installation process lets describe our test system; it has the following configuration:

* An Acer Laptop running Windows 10 with a Core7i quad processor,
* 16GB of memory.
* 1TB hard drive (not SSD).
* Installed is an Oracle 12c Enterprise database with an SGA of 4GB
* This database has a custom configuration.
* There are five PDB’s on the Oracle 12c R1 instance.

**Prerequisites**

There are a number of prerequisites for the installation of ROracle, see the list below:

1. The first step is to install the R language software (CRANS) from the main R software website, see the URL below. This site also has tutorials documentation, books, FAQs, and other resources.

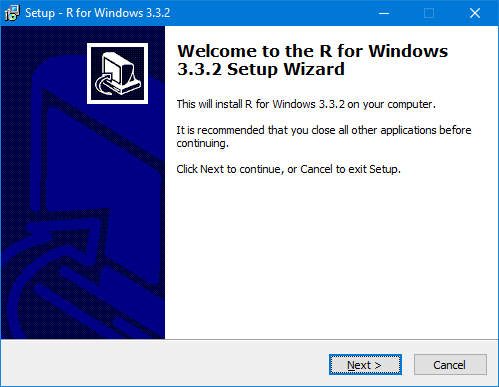
<https://www.r-project.org/>

Download page

<https://cran.r-project.org/bin/windows/base/>

On the main download page there are many resources for novices, FAQs, installation instructions, a compatibility list, instructions on how to update packages and New Features. On other pages there are manuals and tutorials. The current version is 3.2.2 when you have downloaded the file double-click on the file.

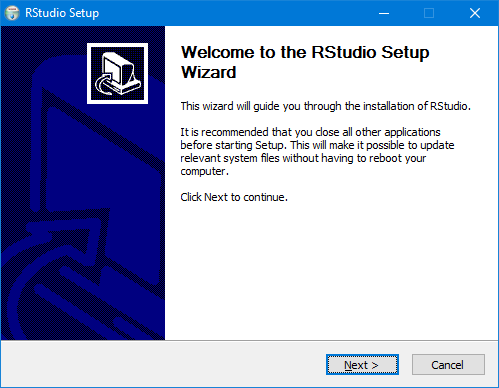
Follow the installation instructions.



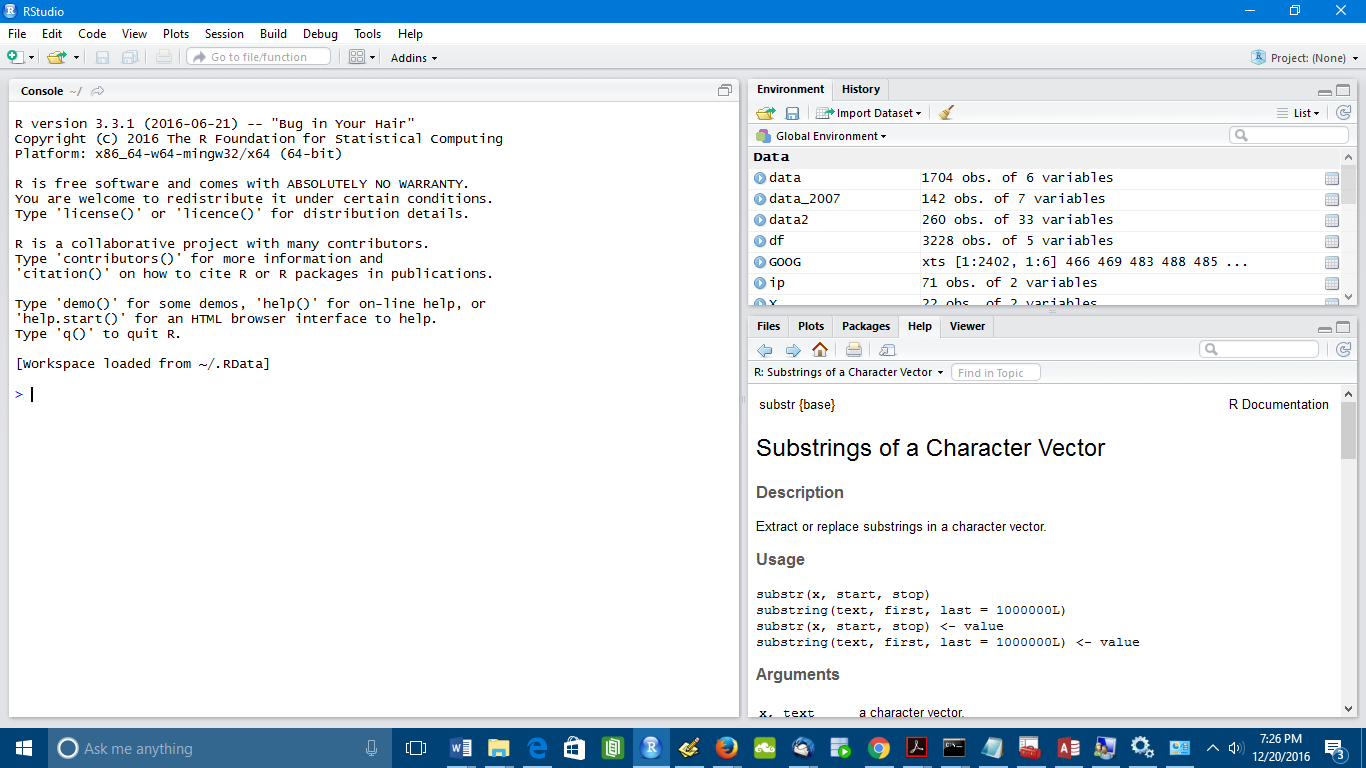
1. We will have to install an IDE for R we will do this to make programing in R easier and more intuitive. There are several IDEs to choose from, and a simple Google search will locate them for you. I picked RStudio which is one of the better known ones. RStudio can be installed from the URL below.

<https://www.rstudio.com/products/rstudio/download3/>

Click on the download link and wait until the file is downloaded to your machine then double-click on it, you will see the screen below then follow the instructions of the installer. The most current version I found was “**RStudio 1.0.44 - Windows Vista/7/8/10**”.



When the installer has finished and RStudio is installed, select it and bring it up. When RStudio comes up you will see the main screen for the program, see below for an example.



The programming environment is divided into three panels; the main programming panel takes up half the window, the two additional panels show the environment and history. The others have several tabs but open up to the documentation page, plots and files will also be displayed here.

1. **Installing Oracle Client 12c**

You will need to install the Oracle client to get access to the OCI libraries which the ROracle depends on and create several environmental variables and add several configuration files to the install directory. You can get the client software from the main Oracle database page. Here you will be asked to agree to the Oracle OTN license which you must agree to, to be able to download the software.

You should also sign up for an OTN account since it is free. The Oracle site can be very helpful for getting timely information on Oracle developments for all of their products. Also Oracle has a large number of blogs by their development teams there. These blogs have a great deal of information and insights on development trends.

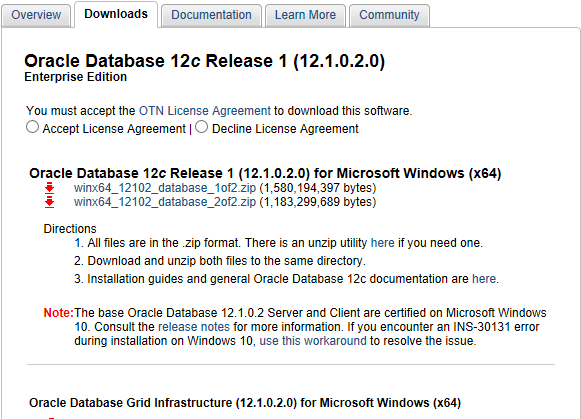
First step is to download the Oracle client from the main database website, use the URL below.

<http://www.oracle.com/technetwork/database/enterprise-edition/overview/index.html>

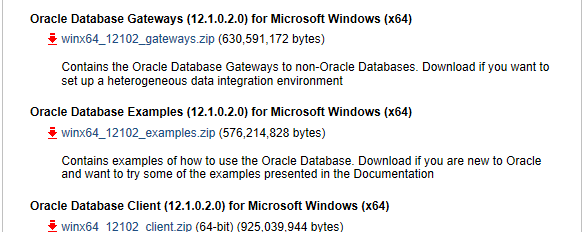


Click on the downloads tab and agree to the OTN license, then select the file you wish to download, in our case it’s the 64 bit Oracle client for 12c.

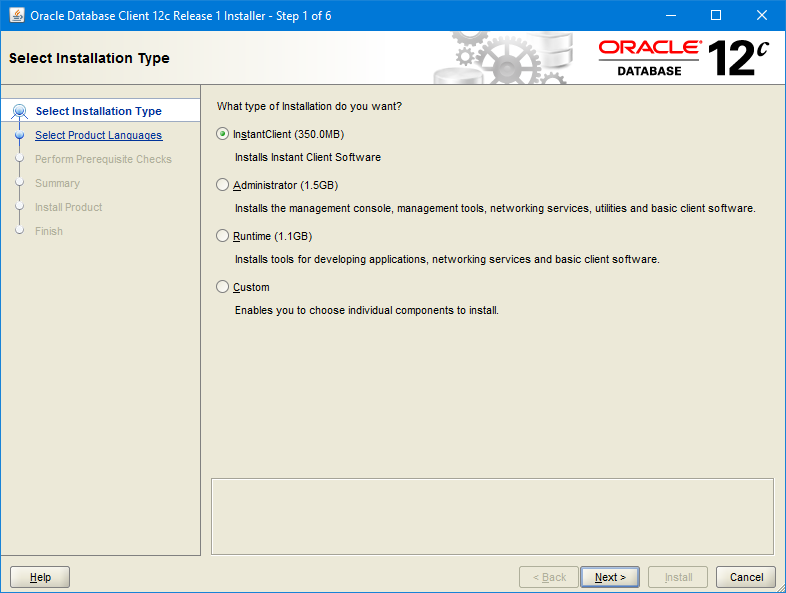
Select the’**Oracle Database 12c Release 1 (12.1.0.2)**‘ and then click the ‘**See All**’ hyperlink.



Click on the ‘**Oracle Database Client (12.1.0.2) for Windows (64x)**’ and wait until the file is downloaded.

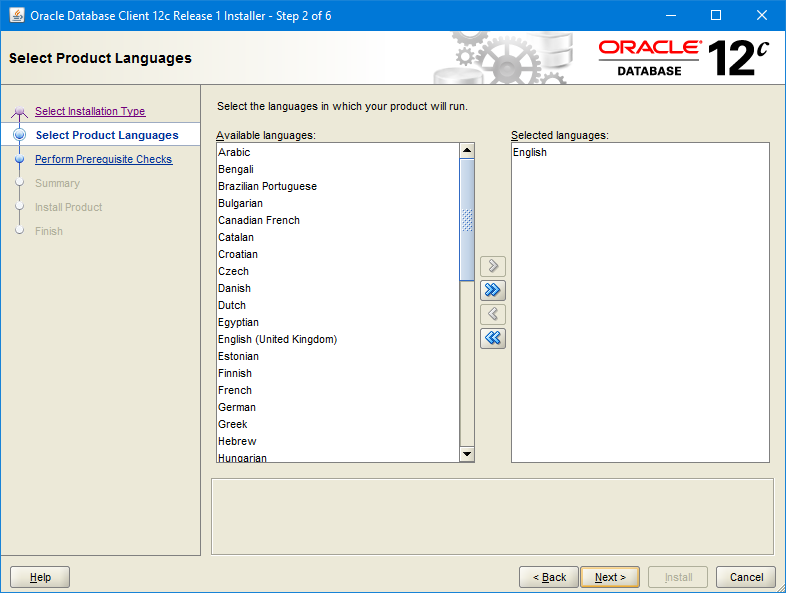


Move the file to your temporary working directory and unzip the software. Double-click on the setup.exe file to begin the install.

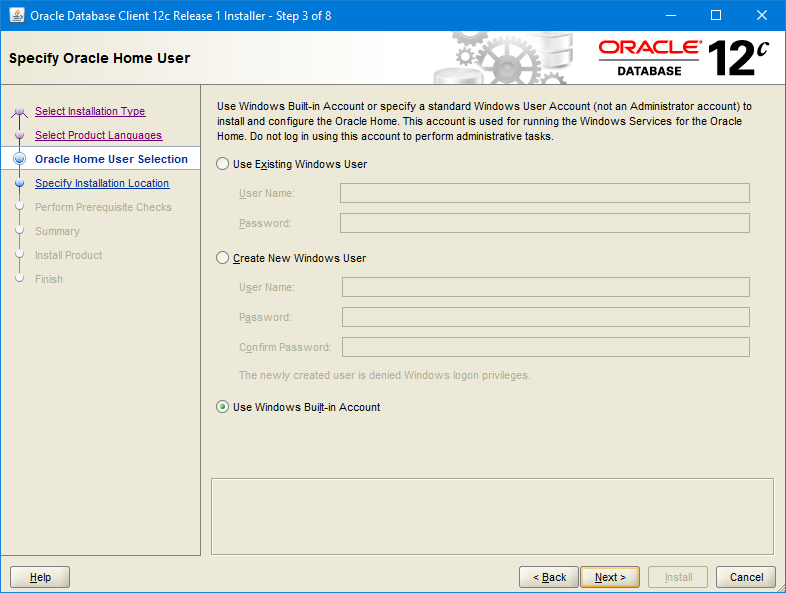


Select your install option, I choose the ‘**Administrator**‘ option, this option will lead to less steps being done than using the ‘**InstantClient**’ option to install and configure the **ROracle** software. The instant Client option requires more steps and a more extensive configuration.

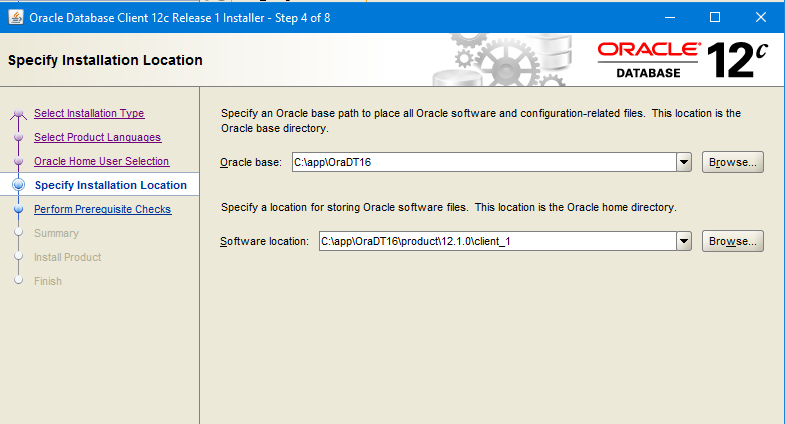
Chose a language and click ‘**Next**’**.**



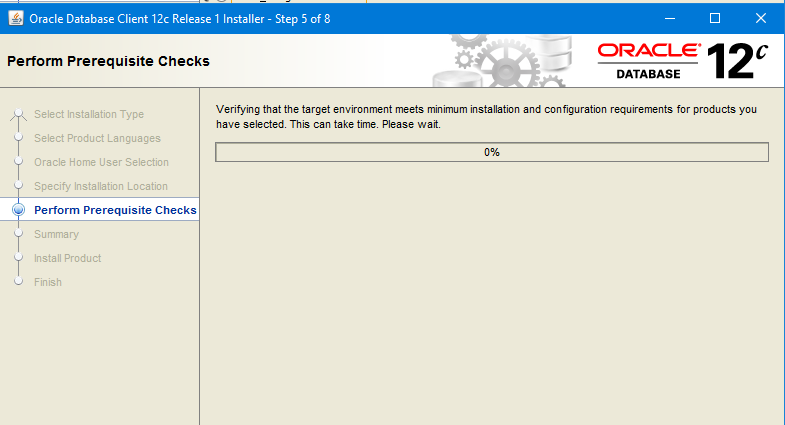
Here you will have to create a new user that does not have Admin rights to the server or the install directory. This will have to be a regular Windows user. You will have the option to choose an existing user or create a new one and when you’re ready enter ‘**USER NAME**’ and ‘**PASSWORD**’ then click the ‘**Next**’ button.



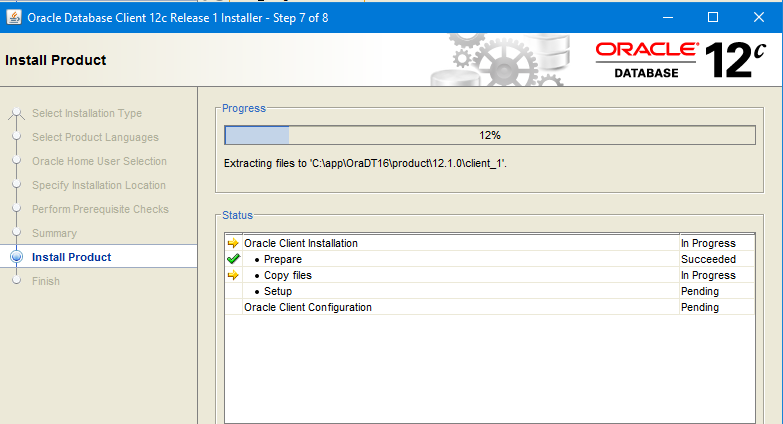
Here you can change the installation default locations .

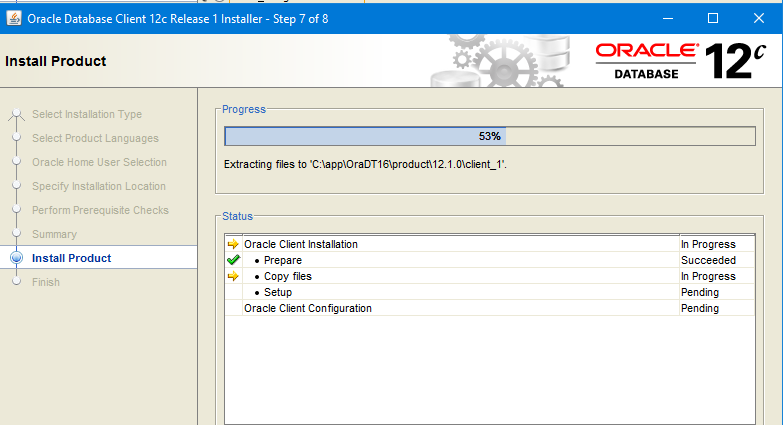


Click ‘**Next**’and you have now begun the install.

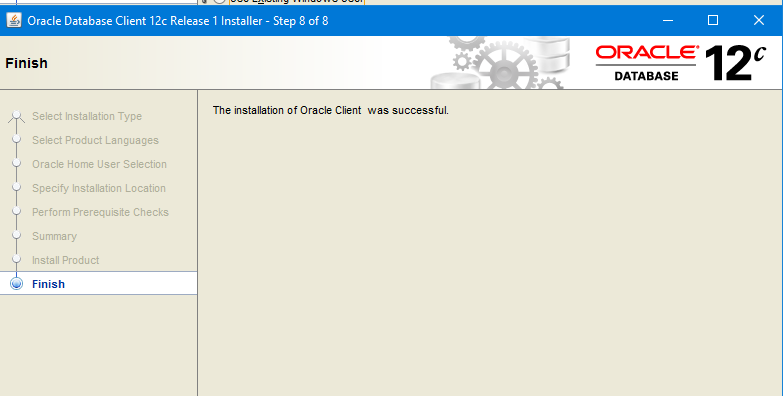


The install progress can be seen in the progress bar located at the top of the window. Towards the middle is the status panel which shows what part of the install has been **completed**, is **Pending**, **Succeeded**, or **In Progress**.





The install has now finished.

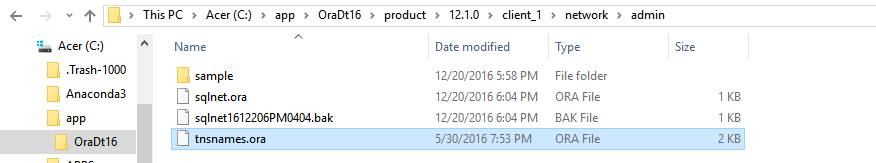


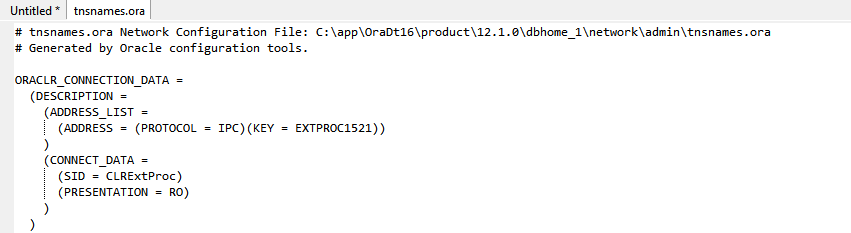
Oracle Client is now installed and you can now click the ‘**Exit**’ button.

**Oracle Post Installation and configuration**

The Oracle 12c Client has now been installed, but we must now configure it to connect to an Oracle 12c database. In order to configure it you will need to follow these steps:

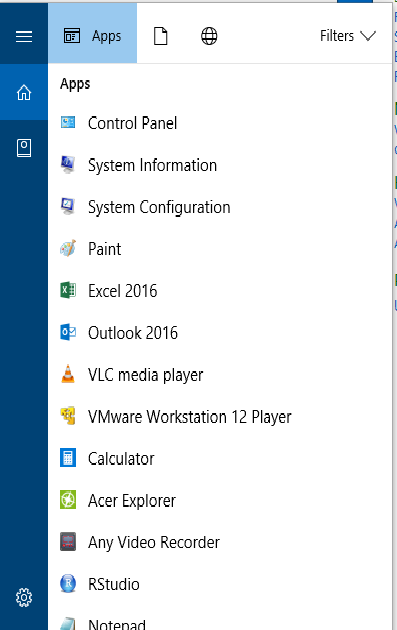
* The first step is to copy the **tnsnames.ora** file to the **NETWORK** directory in your client installation. This text file holds all your connection aliases to your various databases.



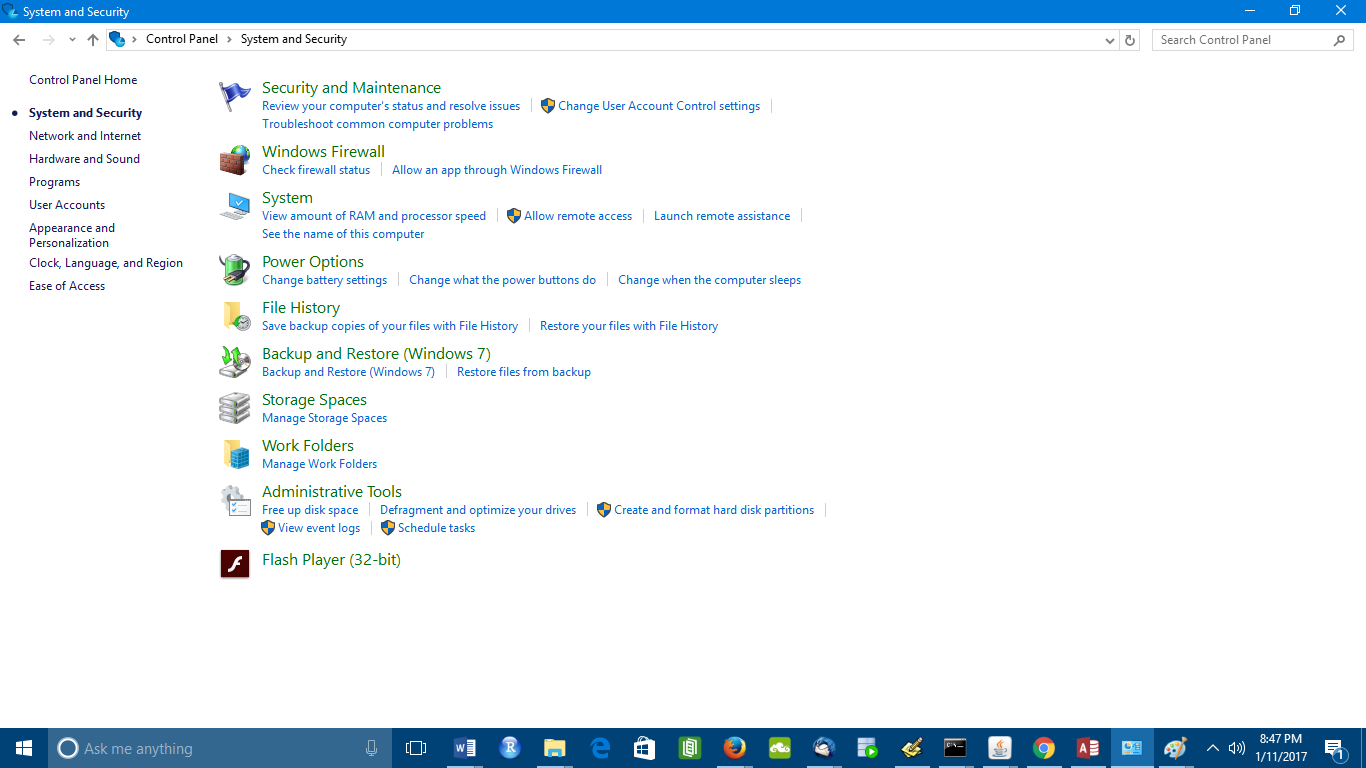


* The second step is to setup your **SQL\*Plus** environment by creating a SQL login script which will be executed every time your login.

Fortunately, **SQL\*Plus** allows you to setup a **login.sql** file, a script that is executed each and every time we start **SQL\*Plus**. You can also set an environment variable, **SQLPATH**, so that it can find the **login.sql** script, no matter what directory it is in.

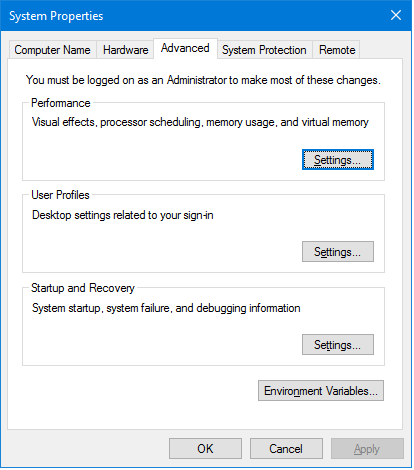


Here we will create a **SQLPATH** environmental variable, first bring up the Windows 10 search box and type ‘**Control Panel**’ and hit enter.

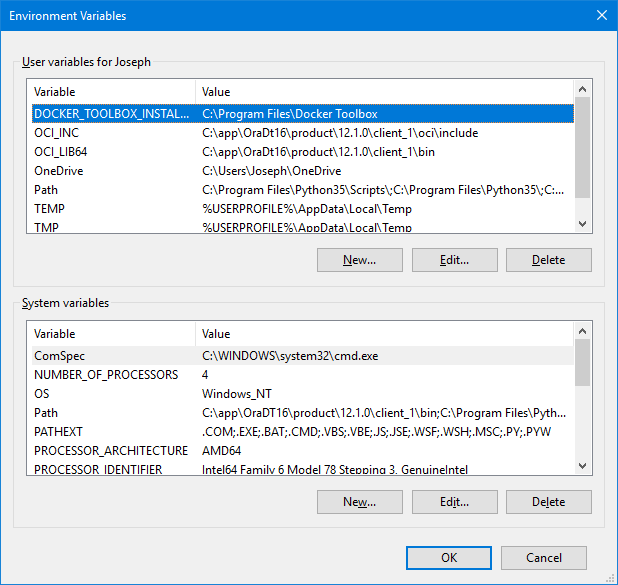


At the Control Panel select ‘**System and Security**’ and then select ‘**System**’.

Then select ‘**Advanced System Settings**’ and then you will see the ‘**System Properties**’

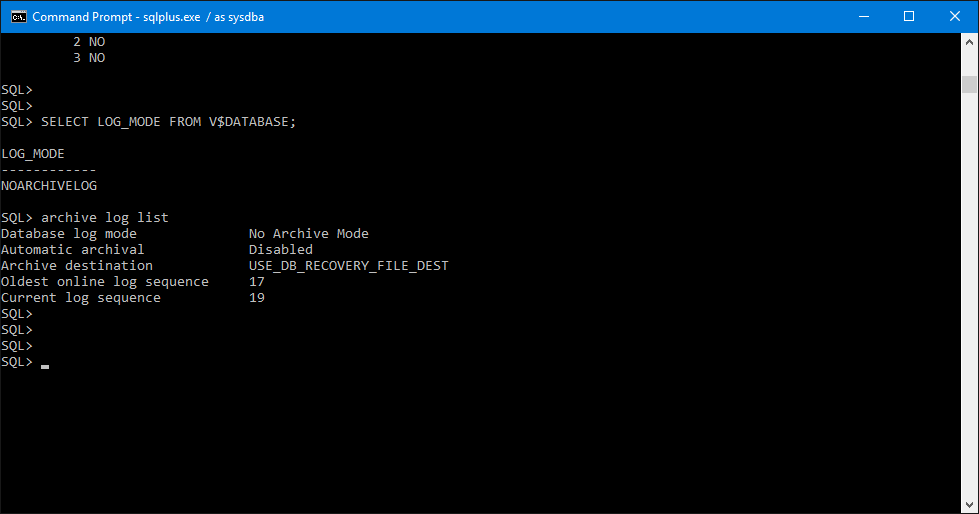


At the Windows ‘**System Properties**’ window, select “**Environmental Variables**” button

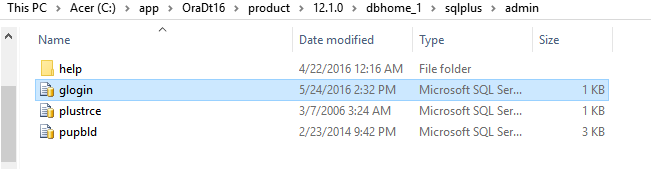


‘Here we will create a new variable by clicking on the ‘**New**’ button in the panel ‘**User variables for Joseph**’. Here we will add the **SQLPATH** to the system using the path ‘**C:\app\OraDt16\product\12.1.0\dbhome\_1\sqlplus\admin**’. Now click the ‘**OK**’ button and you’re done.

The Windows **SQL\*Plus** command prompt looks like the screen below before the **login.sql** script is executed



Add to the **login.sql** script the bold text below: If this is being done on a server then the script name is **glogin.sql** and this will give everyone who logs in to the database the same **SQL\*Plus** environment.



**define \_editor=notepad**

**set serveroutput on size 1000000**

**set trimspool on**

**set long 5000**

**set linesize 100**

**set pagesize 9999**

**column plan\_plus\_exp format a80**

**column global\_name new\_value gname**

**set termout off**

**define gname=idle**

**column global\_name new\_value gname**

**select lower(user) || '@' || substr( global\_name, 1, decode( dot, 0, length(global\_name), dot-1) ) global\_name**

**from (select global\_name, instr(global\_name,'.') dot from global\_name );**

**set sqlprompt '&gname> '**

**set termout on**

Below are the definitions of the setup options included in the script file is as follows:

* **define \_editor=vi/notepad** - Set up the default editor for **SQL\*Plus** that it would use. You can set that to be your favorite text editor (not a word processor) such as Notepad, vi or emacs.
* **set serveroutput on size unlimited** – This enables **DBMS\_OUTPUT** to be on by **default**. This also sets the default buffer size to be as large as possible.
* **set trimspool on** - When spooling text, lines will be blank-trimmed and not fixed width. If this is set off (**the default**), spooled lines will be as wide as your linesize setting
* **set long 5000** - Sets the default number of bytes displayed when selecting CLOB columns.
* **set linesize 100** - Sets the width of the lines displayed by **SQL\*Plus** to be 100 characters.
* **set pagesize 9999** - Set the pagesize, which controls how frequently SQL\*Plus prints out headings, to a big number, so we get only one heading per output.
* **column plan\_plus\_exp format a80** - This sets the default width of the explain plan output we receive with **AUTOTRACE**. To 80 columns which is good enough to hold the full plan.

The next part of the **login.sql** script sets up my **SQL\*Plus** prompt for me:

**define gname=idle**

**column global\_name new\_value gname**

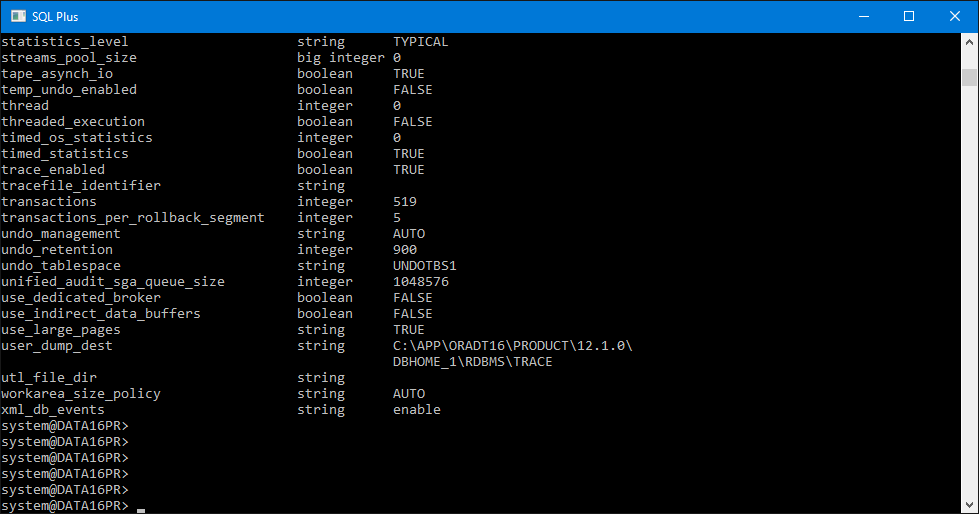
**select lower(user) || '@' || substr( global\_name, 1, decode( dot, 0, length(global\_name),**

**dot-1) ) global\_name from (select global\_name, instr(global\_name,'.') dot from global\_name );**

**set sqlprompt '&gname> '**

The directive column **global\_name** **new\_value** **gname** tells **SQL\*Plus** to take the last value it retrieves for any column named **global\_name**, and place it into the substitution variable **gname**. Then select the **global\_name** out of the database, and concatenate this with the username I am logged in with.

That makes my prompt look like what you see below.



Your prompt is made up of two parts one your login ID the other the database name so you will know who you are logged in as, as well as what database you are logged into. An example of this is ‘**sys@DATA16PR>**’ were I am logged in as SYS and I am on database DATA16PR, so you always know where you are.

**Setting Up AUTOTRACE in SQL\*Plus**

**AUTOTRACE** is a facility within **SQL\*Plus** that allows you to see the explain plan of the queries you’ve executed and the resources they used. If you wish to run efficient SQL queries then this facility is for you.

There is more than one way to get **AUTOTRACE** configured. This is what I like to do to get **AUTOTRACE** working on a server:

**C:\app\OraDt16\product\12.1.0\dbhome\_1\sqlplus\admin**

**C:\app\OraDt16\product\12.1.0\dbhome\_1\rdbms\admin**

**1. cd [ORACLE\_HOME]/rdbms/admin**

**2.** log into **SQL\*Plus as SYSTEM**

**3.** Run **@utlxplan**

**4.** Run **CREATE PUBLIC SYNONYM PLAN\_TABLE FOR PLAN\_TABLE;**

**5.** Run **GRANT ALL ON PLAN\_TABLE TO PUBLIC**;

You can replace the **GRANT TO PUBLIC** with some user if you want. By making the **PLAN\_TABLE** public, you let everyone use trace using **SQL\*Plus** that way you don’t have to run **utlplan** on very ID that needs it.

**C:\app\OraDt16\product\12.1.0\dbhome\_1\sqlplus\admin**

The next step is creating and granting the **PLUSTRACE** role:

**1. cd [ORACLE\_HOME]/sqlplus/admin**

**2.** Log in **to SQL\*Plus as SYS or as SYSDBA**

**3.** Run **@plustrce**

**4.** Run **GRANT PLUSTRACE TO PUBLIC;**

**About AUTOTRACE**

You can automatically get a report on the execution path used by the SQL optimizer and the statement execution statistics. The report is generated after a successful **SQL DML** (i.e., **SELECT**, **DELETE**, **UPDATE**, **MERGE**, and **INSERT**) statements. It is useful for monitoring and tuning the performance of these statements.

**Controlling the Report**

You can control what type of report by setting the **AUTOTRACE** system variable:

• **SET AUTOTRACE OFF**: No **AUTOTRACE** report is generated. This is the **default**.

• **SET AUTOTRACE ON EXPLAIN**: The **AUTOTRACE** report shows only the optimizer execution path.

• **SET AUTOTRACE ON STATISTICS**: The **AUTOTRACE** report shows only the SQL statement execution statistics.

• **SET AUTOTRACE ON**: The **AUTOTRACE** report includes both the optimizer execution path and the SQL statement execution statistics.

• **SET AUTOTRACE TRACEONLY**: This is like **SET AUTOTRACE** **ON**, but it suppresses the printing of the user’s query output, if any.

In Oracle 12c database we will be running the **SQL\*Plus** client for several of our SQL queries/scripts, see below.

Microsoft Windows [Version 10.0.14393]

(c) 2016 Microsoft Corporation. All rights reserved.

C:\Users\Joseph>sqlplus sys/PASSWORD@//localhost:1521/data16pr as sysdba

SQL\*Plus: Release 12.1.0.2.0 Production on Fri Jan 6 21:11:10 2017

Copyright (c) 1982, 2014, Oracle. All rights reserved.

Connected to:

Oracle Database 12c Enterprise Edition Release 12.1.0.2.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

SQL> SHO PDBS

CON\_ID CON\_NAME OPEN MODE RESTRICTED

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2 PDB$SEED READ ONLY NO

3 PHGSDATA MOUNTED

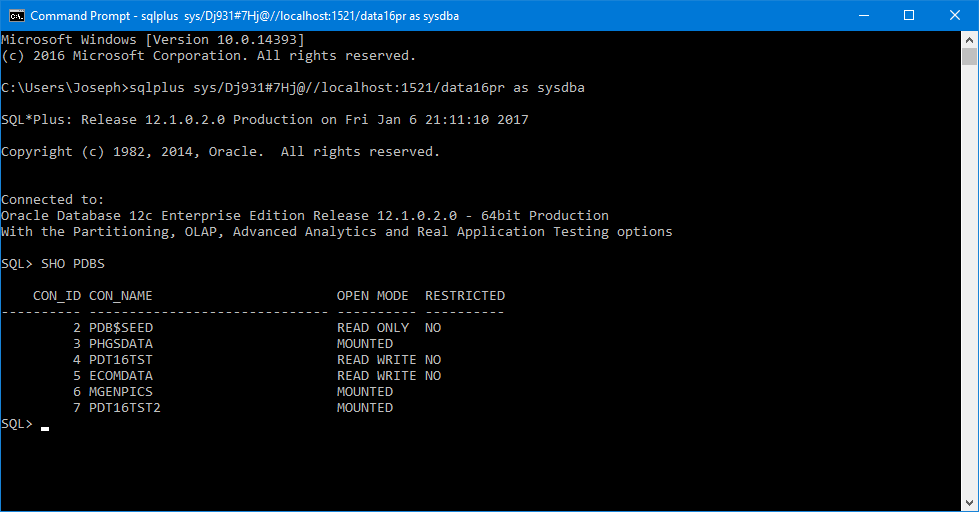
4 PDT16TST READ WRITE NO

5 ECOMDATA READ WRITE NO

6 MGENPICS MOUNTED

7 PDT16TST2 MOUNTED

SQL>



**This ends the Software Installation prerequisites**

**Installation of ROracle**

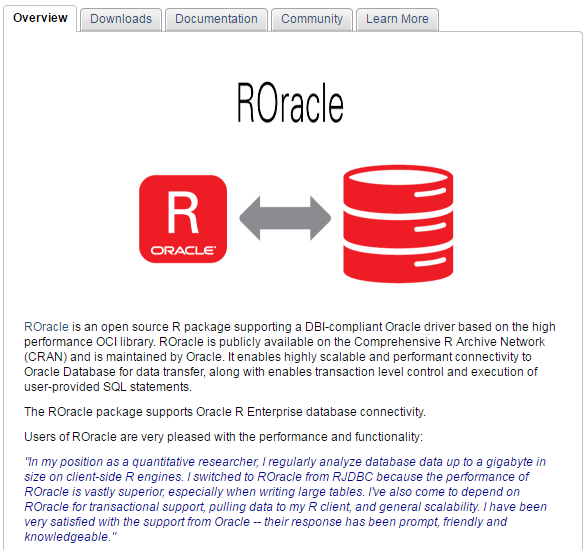
The main web page for **ROracle** on the **OTN** web site is the page below, besides downloads there is also other useful information, see the URL below.

In benchmark comparisons, **ROracle** performed up to 79 times faster than **RJDBC** and 2.5 times faster than **RODBC** for reading data across a range of 1000 to 1 million rows, and 10 to 1000 columns. **ROracle** shows scalability across **NUMBER**, **VARCHAR2**, **TIMESTAMP**, and **BINARY\_DOUBLE** data types.

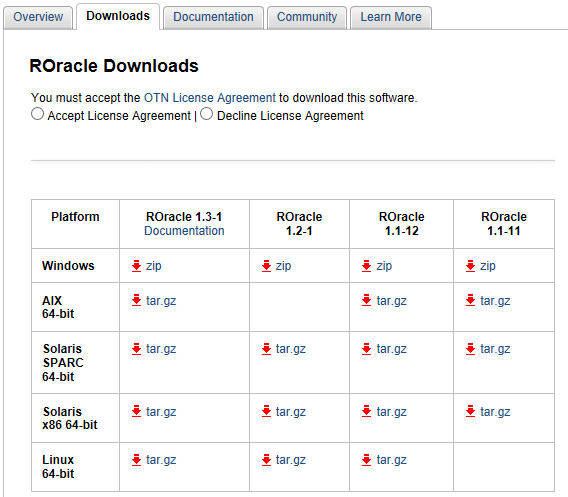
Similarly, for writing data to Oracle Database, **ROracle** was 61 times faster for 10 columns at 10 thousand rows than **RODBC**, and 630 times faster for the same data than **RJDBC**.

Here the **ROracle** page is divided into five tabs we want the downloads tab.

<http://www.oracle.com/technetwork/database/database-technologies/r/roracle/downloads/index.html>



Download the most current version of the **ROracle** package by clicking the download tab using the zip hyperlink for **ROarcle 1.3-1** see page below.



Here we will choose the Windows version and we will get the most current version which is the file **ROracle\_1.3-1.zip**. Here we will have to accept the license agreement and then click the zip hyper link below the **ROracle\_1.3-1** heading and the download will proceed if it doesn’t, just do it again.

The documentation tab is for downloading the documentation for this package, click the documentation tab, see the URL below to go to that page.

<http://www.oracle.com/technetwork/database/database-technologies/r/roracle/documentation/index.html>

There is only one file there and that is **ROracle.pdf** click the hyper link to begin downloading. Create a work directory on your PC call it **ROracle** move the files into it. In order to install this package bring up **RStudio** and we will run the command below.

The ‘**install.packages**’ command/function will need three pieces of information the **path**, the **file name** and the other parameter will tell the function **not to use a repository** see below.

**Directory Parameter**

This is the directory where you downloaded the **ROracle** to and where the other files you downloaded are.

**C:\DATATREE\_NEW\_HOME\R\_ENTERPRISE\ROracle**

Since one of the parameters is a directory path it will use escape characters, these will have to be suppressed. The function will deal with a single escape character by giving you an error, see below, except for the path which will be different.

> install.packages("C:\DATATREE\_NEW\_HOME\R\_ENTERPRISE\ROracle\ROracle\_1.3-1.zip", repos=NULL)

Error: '\D' is an unrecognized escape in character string starting ""C:\D"

So the escape character ‘\’ will need to be doubled to ‘\\’ so that the ‘**install.packages**’ command/function will not give us an error. You will need to type a command like what you see below, but your **PATH** will be different.

**install.packages("C:\\DATATREE\_NEW\_HOME\\R\_ENTERPRISE\\ROracle\\ROracle\_1.3-1.zip", repos=NULL)**

We will run these commands in **RStudio**, the log below shows the results you will get.

R version 3.3.1 (2016-06-21) -- "Bug in Your Hair"

Copyright (C) 2016 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 'license()' 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.

[Workspace loaded from ~/.RData]

>

> install.packages("C:\\DATATREE\_NEW\_HOME\\R\_ENTERPRISE\\ROracle\\ROracle\_1.3-1.zip", repos=NULL)

Installing package into ‘C:/Users/Joseph/Documents/R/win-library/3.3’

(as ‘lib’ is unspecified)

The **ROracle** package has been successfully unpacked and MD5 sums checked

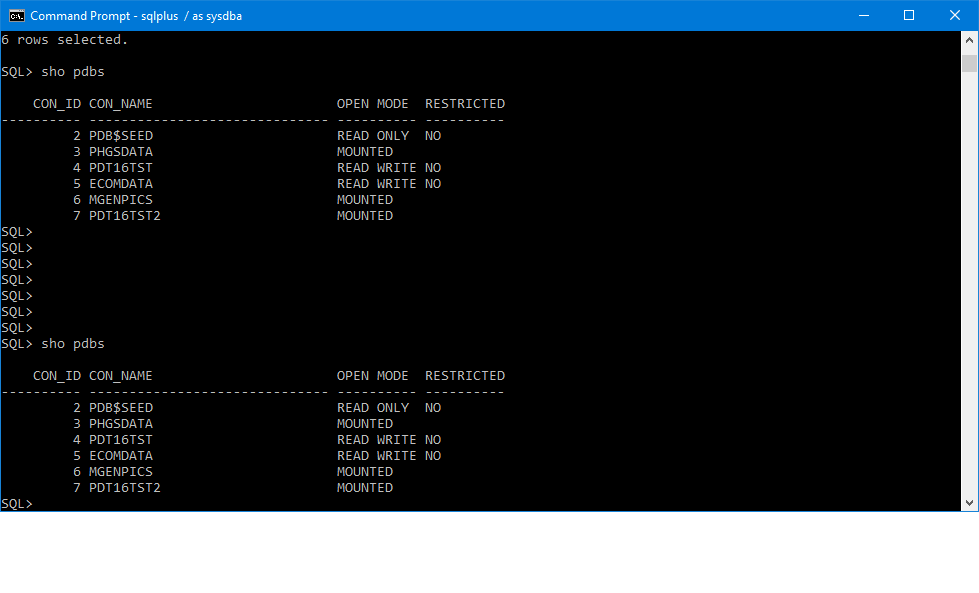
We have now installed the following software products:

* **R version 3.2.2**.
* **RStudio 1.0.44**.
* **Oracle 12c Client (12.1.0.2)** and configured it.
* **ROracle 1.3-**1 is installed as a package under the R language

You have now installed all the prerequisites and the **Roracle** package itself. Now we will need to test it, for this you will need an Oracle database to connect to.

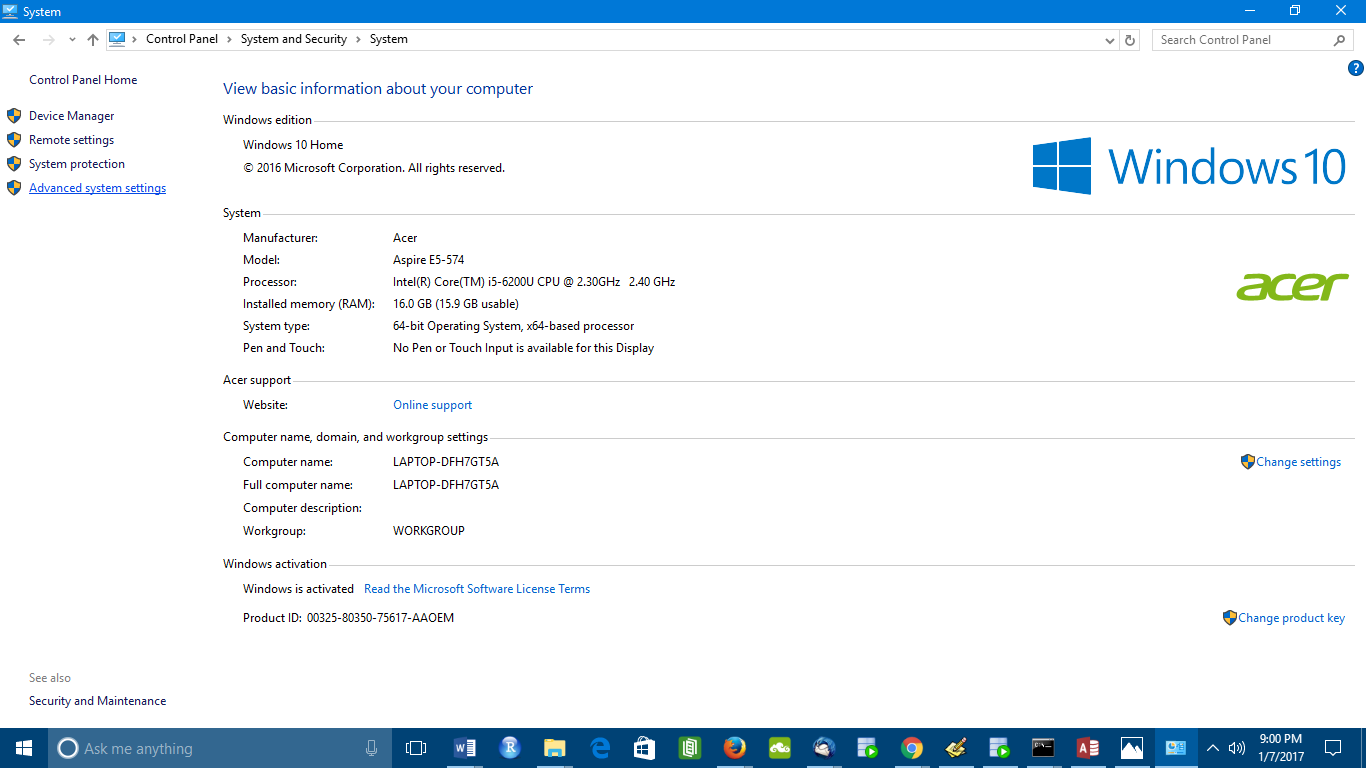
I will be using an **Oracle 12c (12.1.0.2)** database for this test. It has six pluggable databases on it with various datasets we will try to connect to **DATA16PR** ( **CDB$ROOT**) and **PDT16TST** which has many data sets.

The image below is of a **SQL\*Plus** windows prompt with the **show pdbs** command‘s output showing this is where we will execute many of our SQL scripts.

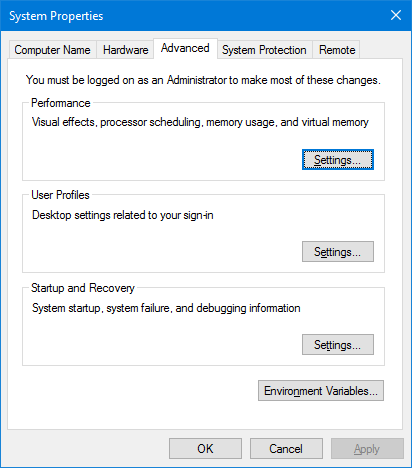


The **PATH** should be set to include the path to the Oracle Client libraries. Oracle Universal Installer should have set the **PATH** and **ORACLE\_HOME** environment variables in the registry database.

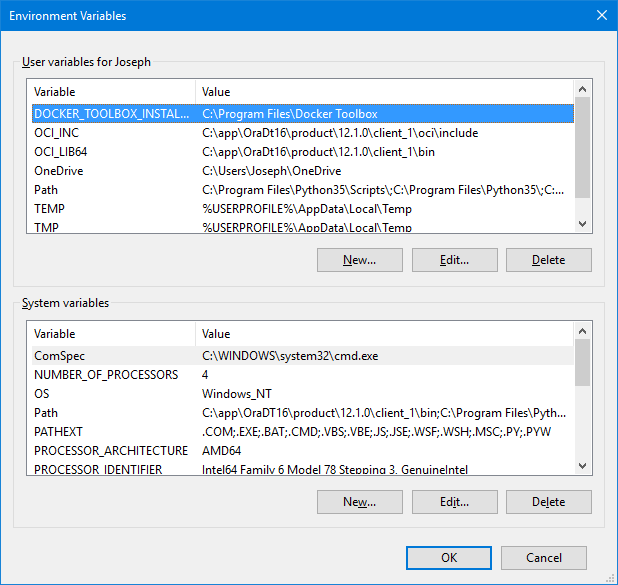
Search for ‘**Control Panel**’ and you will see the screen listed below. Then select the ‘**Advance System Settings**’ will get you to the Environmental Variables.

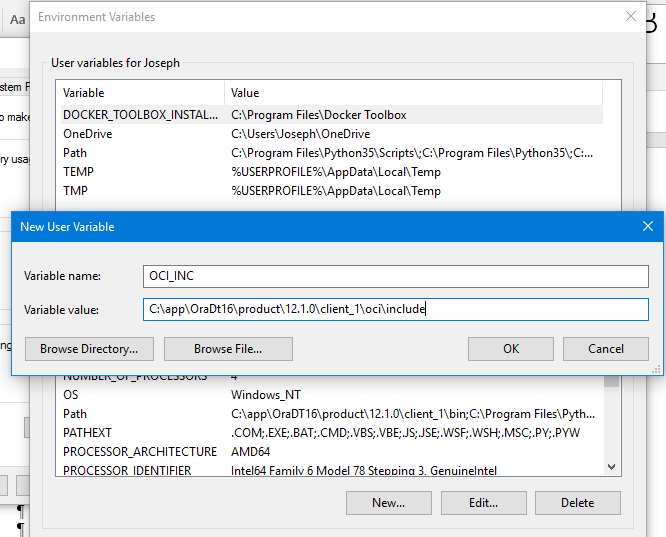


Select ‘**Environment Variables**’ and here we must create two new ones to locate the Oracle OCI libraries under the Oracle 12c Client install directories.



Click the **New** button for ‘**User variables for Joseph**’ Joseph is the current user’s name.



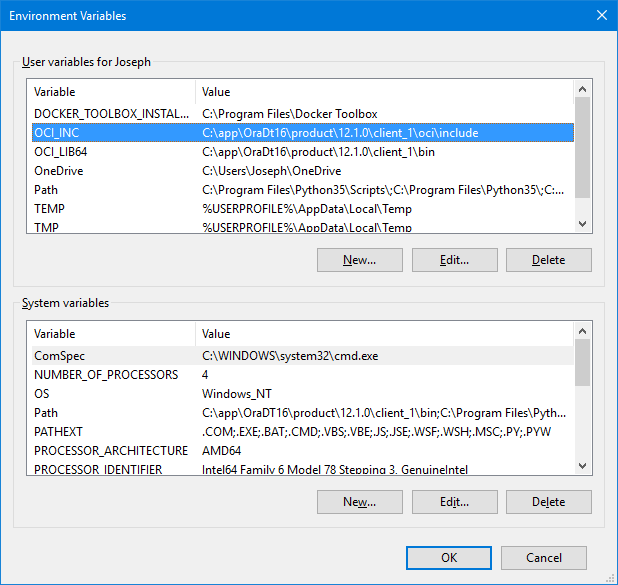


Here we will create two variables they are **OCI\_INC** and **OCI\_LIB64**. When the ‘**New User Variable**’ dialog comes up enter both the ‘**Variable Name**’ and ‘**Variable Value**’ then click the OK button. The two values are listed below.

**set OCI\_INC=C:\app\OraDt16\product\12.1.0\client\_1\oci\include**

**set OCI\_LIB64= C:\app\OraDt16\product\12.1.0\client\_1\bin**

The two variables are listed below, when finished click OK.



Load the library and use the package; you will have to change **DBNAME** to one of aliases listed in your **tnsnames.ora** file, as in the following example I am using the database container **CDB$ROOT** for my dbname of **data16pr**:

**Workspaces and the .RData file**

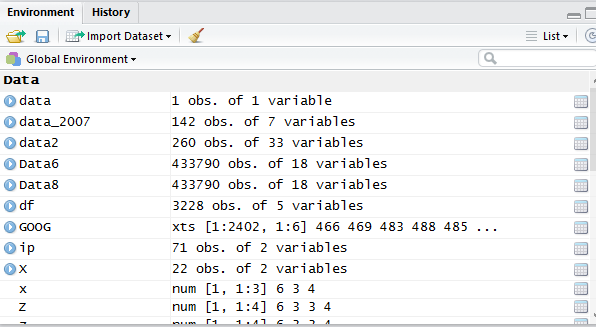
The **.RData** binary file what is it and how does it work in a R environment? This file holds all the R objects that you create while you’re working in your R environment. The workspace is your current R working environment and includes any user-defined objects (vectors, matrices, data frames, lists, functions) that you have created. At the end of a R session, the user can either save an image or not of the current workspace when prompted. This image is automatically reloaded the next time R is started

The **mvbutils** package has tools like **cd ()** function which allows you to set up and move through a **hierarchically-organized** set of R **workspaces**, each corresponding to a **directory**. While working at any level of the hierarchy, all higher levels are attached on the **search path**. You can easily switch between workspaces in the same session, you can move objects around in the hierarchy, and you can do several hierarchy-wide things such as searching, even on parts of the hierarchy that aren't currently attached.

R workspaces can become cluttered, so that it becomes very difficult to keep track of what's in them. If you work on several different projects, it can be difficult to work out where to put things or to remember where things are. If you just want to test out a bit of code without leaving permanent clutter, but while still being able to "see" your important objects, how do you do it? **cd** helps with all such problems, by letting you organize all your projects into a **single tree structure**, regardless of where they are stored on disk. Each workspace is referred to (for historical reasons) as a "**task**".

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Size | Rows | Read Time | Filename | Compression |
| Unzip’d | 2.3976 GB | 12332379 |  | yellow\_taxi\_trip\_june\_bk.csv | 0 |
| Zip’d | 338.798 MB | 12332379 | 16.51 sec | yellow\_taxi\_trip\_june\_bk.7z | 85.869% |
| .RData | 417.4381 MB | 12332379 |  | yellow\_taxi\_trip\_june\_bk | 82.589% |
| Oracle | 3649MB | 12332379 | 30.222 sec | yellow\_taxi\_trip\_june\_bk |  |

Unzipd 2574417045 zipd 355256010 98.62 compression



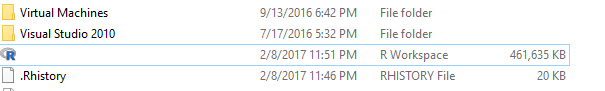
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Size | Rows | Read Time | Filename | Compression |
| Unzip’d | 163,841,355 Bytes | 433790 |  | RESTAURANT\_V7.csv | 0 |
| Zip’d | 7,856,080 Bytes | 433790 | 16.51 sec | RESTAURANT\_V7.7z | 95.205% |
| .RData | 417.4381 MB | 433790 |  | RESTAURANT | 82.589% |
| Oracle | 192MB | 433790 | 30.222 sec | RESTAURANT |  |

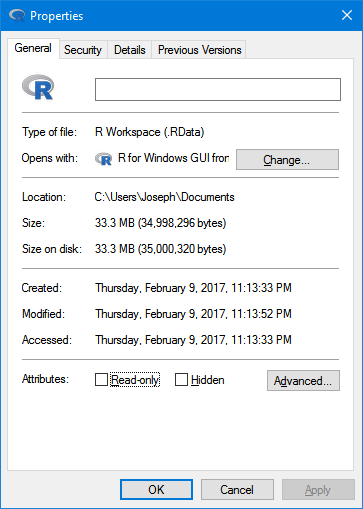
Unzipd 2574417045 zipd 355256010 98.62 compression

Note that there is a basic choice when working with R: do you keep everything you write in a text file which you source every time you start; or do you store all the objects in a workspace as a binary image in a "**.RData**" file, and rely on save and load? [Hybrids are possible, too.] Some people prefer the text-based approach, but others including me prefer the binary image approach; my reasons are that binary images let me organize my work across tasks more systematically, and that repeated text-sourcing is much too slow when lengthy analyses or data extractions are involved. The cd system is really geared to the binary image model and, before cd moves to a new task, either up or down the hierarchy, the current workspace is automatically saved to a binary image. Nevertheless, I don't think cd is incompatible with other ways of working, as long as the ".RData" file (actually the tasks object) is not destroyed from session to session. At any rate, some people who work by sourceing large code files still seem to find cd useful; it's even possible to use the .First.task feature to auto-load a task's source files into a text editor when you cd to that task. With the ".RData"-only approach, it is highly advisable to have some way of keeping separate text backups, at least of function code. The [fixr](http://finzi.psych.upenn.edu/R/library/mvbutils/html/fixr.html) editing system is geared up to this, and I presume other systems such as ESS are too.

To use the cd system, you will need to start R in the **same** workspace every time. This will become your ROOT or home task, from which all other tasks stem. There need not be much in this workspace except for an object called tasks (see below), though you can use it for shared functions that you don't want to organize into a package. From the ROOT task, your first action in a new R session will normally be to use cd to switch to a real task. The cd command is used both to switch between existing tasks, and to create new ones.

To set yourself up for working with cd, it's probably a good idea to make the ROOT task a completely new blank workspace, so the first step is to (outside R) create an empty folder with some name like "Rstart". [In MS-Windows, you should think about **where** to put this, to save yourself inordinate typing later on. If you are planning to create a completely new set of folders for your R projects, you might want to put this ROOT folder near the top of the disk directory structure, rather than in the insane default that Windows proffers, which usually looks something like "c:\document...\local...\long...\ridiculous...". However, if you are planning instead to link existing folders into the task hierarchy, then it's better to create the ROOT folder just above, or parallel to, the location of these folders.] Start R in this folder, type library( mvbutils), and then start linking your existing projects into the task hierarchy. [Of course, this assumes that you do have existing projects. If you don't, then just start creating new tasks.] To link in a project, just type cd() and a menu will appear. The first time, there will be only one option: "CREATE NEW TASK". Select it (or type 0 to quit if you are feeling nervous), and you will be prompted for a "task name", by which R will always subsequently refer to the task. Keep the name short; it doesn't have to be related to the location of the disk directory where the .RData lives. Avoid spaces and weird characters– use periods as separators. Task names are case-sensitive. Next, you'll be asked which disk directory this task refers to. By default, cd expects that you are creating a new task, and therefore suggests putting the directory immediately below the current task directory. However, if you are linking in an existing project, you'll need to supply the directory name. You can save huge amounts of typing by using "." to refer to the current directory, and on \*nix systems you can use "~" too. Next, you'll be returned to the R command prompt– but the prompt will have changed, so that the ">" is preceded by the task name. If you type search(), you'll see your ROOT task in position 2, below .GlobalEnv as usual. Despite the name, though, the new .GlobalEnv contains the project you've just linked, and if you type ls(), you should see some familiar objects. Now type cd(0) to move back to the ROOT task (note the changed prompt), type search() and ls() again to orient yourself, and proceed as before to link the rest of your pre-existing tasks into the hierarchy. When you now type cd(), the menu will have more choices. If you select an existing task rather than creating a new one, you will switch straightaway to that workspace; watch the prompt.

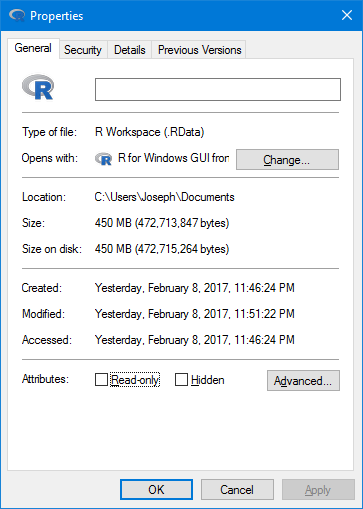


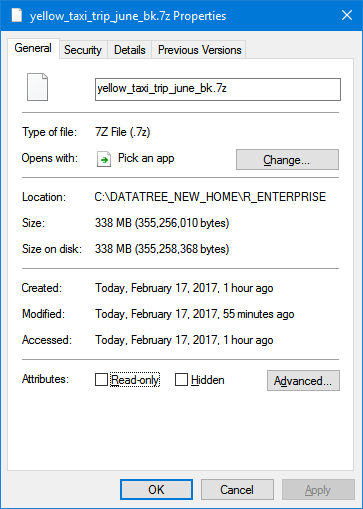


C:\Users\Joseph\Documents

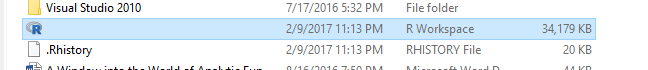
437715551bytes

417.43807888 MB





|  |
| --- |
| >  > ALL <- 1  > ALL <- 1  > allrecs <- 1  > allrecs <- 1  > ls ()  > ls ()  [1] "ALL" "allrecs" "colors" "con" "data" "data\_2007"  [7] "data2" "Data6" "Data8" "df" "drv" "g"  [13] "GOOG" "ip" "n" "p" "ptm" "rs"  [19] "server" "slope" "ui" "url2" "x" "X"  [25] "xz" "z" "Z" "zz"  [1] "ALL" "allrecs" "colors" "con" "data" "data\_2007"  [7] "data2" "Data6" "Data8" "df" "drv" "g"  [13] "GOOG" "ip" "n" "p" "ptm" "rs"  [19] "server" "slope" "ui" "url2" "x" "X"  [25] "xz" "z" "Z" "zz"  > allrecs  > allrecs  [1] 1  [1] 1  > help(ls)  > help(ls) |
|  |



**Performance Test of Database connection to the server.**

Now we will be exploring the **DBI** and **ROracle** interface by issuing a series of **ROracle** commands which will submit **SQL** commands to the Oracle database. We will be benchmarking the connection between **RStudio** and the **Oracle 12c** database by submitting the same query from **RStudio** using **ROracle** commands and submitting the same **SQL** commands using **SQL Developer** and **SQL\*Plus**. On the **SQL Developer** and **SQL\*Plus** we will use the following commands:

1. **set echo on;**
2. **set timing on;**

On **RStudio** I will issue similar commands issuing the **proc.time()** function call before and after my code block to get elapsed time to execute the statements.

**Our test Data Sets**

We will be using several data sets **Restaurant inspection**, **Companies doing business in NYC**, and the **Yellow Taxi trip data** which are part of the **NYC Open Data initiative** see the URL’s and descriptions below:

1. **Yellow Taxi trip data 2015**

We will be using **Yellow Taxi trip data** which is a GIS data set for the year 2015. This data set has data for 2015 for NYC from January through June of that year. The table has over 147 million records and is 11 GB in size before it was up loaded into Oracle. This took 2 hours and 24 minutes.

**URL:** <https://data.cityofnewyork.us/Transportation/2015-Yellow-Taxi-Trip-Data/ba8s-jw6u>

This dataset includes trip records from all trips completed by yellow taxis from in NYC from January to June in 2015. Records include fields capturing pick-up and drop-off dates/times, pick-up and drop-off locations, trip distances, itemized fares, rate types, payment types, and driver-reported passenger counts. The data used in the attached datasets were collected and provided to the **NYC Taxi and Limousine Commission** (TLC) by technology providers authorized under the Taxicab Passenger Enhancement Program (TPEP). The trip data was not created by the TLC, and TLC makes no representations as to the accuracy of these data.

1. **Legally Operating Businesses**

This data set features businesses/individuals holding a DCA license so that they may legally operate in New York City. Note: Sightseeing guides and temporary street fair vendors are not included in this data set. Data set size is

**URL:** https://data.cityofnewyork.us/Business/Legally-Operating-Businesses/w7w3-xahh

1. **DOHMH New York City Restaurant Inspection Results Health**

This dataset provides restaurant inspections, violations, grades and adjudication information

**URL:** <https://data.cityofnewyork.us/browse?category=Health>

The dataset contains every sustained or not yet adjudicated violation citation from every full or special program inspection conducted up to three years prior to the most recent inspection for restaurants and college cafeterias in an active status on the **RECORD DATE** (date of the data pull). When an inspection results in more than one violation, values for associated fields are repeated for each additional violation record. Establishments are uniquely identified by their **CAMIS** (record ID) number. Keep in mind that restaurants go in and out of business; only restaurants in an active status are included in the dataset.

Records are also included for each restaurant that has applied for a permit but has not yet been inspected and for inspections resulting in no violations. Establishments with inspection date of **1/1/1900** are new establishments that have not yet received a full inspection. Restaurants that received no violations are represented by a single row and coded as having no violations using the **ACTION** field.

**Programming Logic**

We will be benchmarking both R and SQL programs which will be performing the same queries on the data set tables which we have loaded into Oracle from the **NYC Open Data initiative**. I will be timing each programs and checking the run times for comparison. In addition, we will be testing joins and rollups of the data from other tables. Also we will use analytic functions and all queries will be run with and without indexes.

With no indexes:

1. Our first test is to select one months’ worth of data from the **YELLOW\_TAXI\_TRIP** table and fetch it into the **RStudio** side as a **data.frame** and then create an Oracle table were you can write it back into a table using only R. We also do the same using SQL and **SQL\*Plus** and benchmark both experiments.
2. Next we will perform several joins

With indexes.

1. Our first test is to select one months’ worth of data from the **YELLOW\_TAXI\_TRIP** table and fetch it into the **RStudio** side as a **data.frame** and then create an Oracle table were you can write it back into a table using only R. We also do the same using SQL and **SQL\*Plus** and benchmark both experiments.
2. Next we will perform several joins

This database test is for the purpose of testing the database connection for tables with **no indexes**. For the first two tests we are connecting to the container database so there is no change in the connect string from how you would connect to a Oracle 11g database, see connect string below.

**library('ROracle')**

**drv <- dbDriver("Oracle")**

**#sample connect command**

**## con <- dbConnect(drv, "USERNAME", "PASSWORD**"**, dbname='DBNAME')**

**# real connect commad**

**con <- dbConnect(drv, "system ", "PASSWORD**"**, dbname='data16pr')**

The dbConnect function call has spaces in both the ID and the password which gives you an error

> con <- dbConnect(drv, " system ", **" PASSWORD**", dbname=' data16pr')

**Error in .oci.Connect(.oci.drv(), username = username, password = password, :**

**ORA-01017: invalid username/password; logon denied**

>

>

> library('ROracle')

> drv <- dbDriver("Oracle")

>

> con <- dbConnect(drv, "system ", " PASSWORD", dbname='data16pr')

>

Test the connection to the Oracle 12c database by reading a Oracle table:

The **dbReadTable()** function can be used to read whatever is in the table **DUAL**.

**dbReadTable(con, 'DUAL')**

>

> library('ROracle')

> drv <- dbDriver("Oracle")

>

> con <- dbConnect(drv, "system", " PASSWORD", dbname='data16pr')

>

> dbReadTable(con, 'DUAL')

DUMMY

1 X

>

>

Lets use the **dbReadTable()** function to read what is in the view **V$PDBS** which is a more interesting output.

**dbReadTable(con, 'V$PDBS')**

|  |
| --- |
| dbReadTable(con, 'V$PDBS')  CON\_ID DBID CON\_UID  1 2 369848507 369848507  2 3 1769860667 1769860667  3 4 2647541362 2052914599  4 5 1132693728 1132693728  5 6 2975992775 2975992775  6 7 2938944833 2938944833  GUID NAME  1 4f, 24, fe, dc, 9e, 82, 4f, 44, 95, 1d, 1e, a4, 9c, 42, ff, 4e PDB$SEED  2 72, 19, 85, 7a, 52, ab, 4c, 13, ac, 78, ad, 59, bc, 58, f3, 6e PHGSDATA  3 ca, d5, c4, e6, 39, a5, 49, 1f, 83, b0, 4b, a6, 67, 11, 40, 38 PDT16TST  4 7d, eb, c2, 1e, ce, 15, 45, 49, bb, 39, 31, 3d, 18, 0c, 96, 7f ECOMDATA  5 0f, a5, f4, b5, e4, 24, 45, c9, 9c, 86, c1, f6, b6, 7a, a4, e2 MGENPICS  6 fe, 04, 38, b2, f7, f0, 49, 14, a2, 7a, cc, 10, 7d, 51, 2b, dd PDT16TST2  OPEN\_MODE RESTRICTED OPEN\_TIME CREATE\_SCN TOTAL\_SIZE BLOCK\_SIZE  1 READ ONLY NO 2016-12-25 21:24:49 2233966 796917760 8192  2 MOUNTED <NA> <NA> 3434346 0 8192  3 READ WRITE NO 2016-12-27 21:43:26 3443508 8113487872 8192  4 READ WRITE NO 2016-12-27 21:44:33 3460730 1390411776 8192  5 MOUNTED <NA> <NA> 3538655 0 8192  6 MOUNTED <NA> <NA> 5891656 0 8192  RECOVERY\_STATUS SNAPSHOT\_PARENT\_CON\_ID  1 ENABLED 0  2 ENABLED 0  3 ENABLED 0  4 ENABLED 0  5 ENABLED 0  6 ENABLED 0 |

**Connecting to a Pluggable database**

Connecting to a pluggable database is different than connecting to an Oracle 12c container or to an Oracle 11g database for one the **dbname** connect string is different see below. For one the host name the port and the **pluggable database name** must be provided, in our case it’s ‘**pdt16tst**’. The host is ‘**localhost’** since the database is on the same PC as the **RStudio** and port is the default port ‘**1521**’. We also have some other parameters **bulk\_read** the default is 1000, the **bulk\_write** has a default value 1000, **stmt\_cache** is set to 0 so no statements will be kept in memory. In addition, **externa\_credentials** if your logging in from a remote database and **sysdba** is if you are logging in with the **SYSDBA** role.

library('ROracle')

drv <- dbDriver("Oracle")

#### This is the full connect for PDB 'pdt16tst' as you can see it's different

ptm <- proc.time()

con <- dbConnect(drv, "searstgi\_admin", "5933tgi", dbname='//localhost:1521/pdt16tst', prefetch = FALSE, bulk\_read = 1000L, bulk\_write = 1000L, stmt\_cache = 0L,external\_credentials = FALSE, sysdba = FALSE)

proc.time() - ptm

We will also be using **proc.time()** function this function determines how much real **CPU** time in seconds the currently running **R** process has already taken.

The **proc.time** function **returns five elements** for backwards compatibility, but its print method **prints** a named vector of **length 3**. The first two entries are the **total user** and **system CPU** times of the current R process and any child processes on which it has waited, and the third entry is the ‘**real**’ elapsed time since the process was started.

Test 2 read the result set **RStudio**

### 2/9/17

|  |
| --- |
| >  >  > ptm <- proc.time()  > rs <- dbSendQuery(con, "SELECT EXTRACT(MONTH FROM TPEP\_PICKUP\_DATETIME ) AS TMONTH, COUNT(\*) FROM SEARSTGI\_ADMIN.YELLOW\_TAXI\_TRIP GROUP BY EXTRACT(MONTH FROM TPEP\_PICKUP\_DATETIME )")  > proc.time() - ptm  user system elapsed  0.01 0.02 0.04  >  >  >  >  > ptm <- proc.time()  >  > fetch(rs)  TMONTH COUNT(\*)  1 1 12741017  2 6 12332380  3 2 12442388  4 4 13063760  5 5 13158079  6 3 13342951  >  > proc.time() - ptm  user system elapsed  0.02 0.00 198.38  >  > |

### 2/8/17

|  |
| --- |
| >  > ptm <- proc.time()  >  > rs <- dbSendQuery(con, "SELECT EXTRACT(MONTH FROM TPEP\_PICKUP\_DATETIME ) AS TMONTH, COUNT(\*) FROM SEARSTGI\_ADMIN.YELLOW\_TAXI\_TRIP GROUP BY EXTRACT(MONTH FROM TPEP\_PICKUP\_DATETIME )")  >  > proc.time() - ptm  user system elapsed  0 0 0  >  > ptm <- proc.time()  >  > fetch(rs)  > proc.time() – ptm  TMONTH COUNT(\*)  1 1 12741017  2 6 12332380  3 2 12442388  4 4 13063760  5 5 13158079  6 3 13342951  > proc.time() - ptm  user system elapsed  0.00 0.00 389.82  >  > |

I

n SQL Developer 4.15 we will execute the same query, see below:

### 2/9/17

set echo on;

set timing on;

SELECT EXTRACT(MONTH FROM TPEP\_PICKUP\_DATETIME ) AS TMONTH, COUNT(\*) FROM SEARSTGI\_ADMIN.YELLOW\_TAXI\_TRIP GROUP BY EXTRACT(MONTH FROM TPEP\_PICKUP\_DATETIME );

All Rows Fetched: 6 in 220.094 seconds

1 12741017

6 12332380

2 12442388

4 13063760

5 13158079

3 13342951

### 2/8/17

set echo on;

set timing on;

SELECT EXTRACT(MONTH FROM TPEP\_PICKUP\_DATETIME ) AS TMONTH, COUNT(\*) FROM SEARSTGI\_ADMIN.YELLOW\_TAXI\_TRIP GROUP BY EXTRACT(MONTH FROM TPEP\_PICKUP\_DATETIME );

All Rows Fetched: 6 in 262.229 seconds

1 12741017

6 12332380

2 12442388

4 13063760

5 13158079

3 13342951

-- ###################################################################

-- 2/6/2017 9:21pm

set echo on;

set timing on;

SELECT COUNT(\*) FROM SEARSTGI\_ADMIN.YELLOW\_TAXI\_JUNE;

All Rows Fetched: 1 in 56.187 seconds

24664760

ptm <- proc.time()

rs <- dbSendQuery(con, "SELECT COUNT(\*) FROM SEARSTGI\_ADMIN.YELLOW\_TAXI\_JUNE")

## We now fetch records from the resultSet into a data.frame.

proc.time() - ptm

ptm <- proc.time()

data <- fetch(rs) ## extract all rows

dim(data)

proc.time() – ptm

> ptm <- proc.time()

>

> rs <- dbSendQuery(con, "SELECT COUNT(\*) FROM SEARSTGI\_ADMIN.YELLOW\_TAXI\_JUNE")

>

> ## We now fetch records from the resultSet into a data.frame.

> proc.time() - ptm

user system elapsed

0.00 0.00 0.01

>

> ptm <- proc.time()

>

> data <- fetch(rs) ## extract all rows

>

> dim(data)

[1] 1 1

> proc.time() - ptm

>

> dim(data)

[1] 1 1

> proc.time() - ptm

user system elapsed

0.00 0.00 53.48

> data

COUNT(\*)

1 24664760

Test 6 is to in SQL Developer to read from the database and create a copy of a table using a CTAS. For **RStudio** the code reads the same table in Oracle and writes it to the ‘**.RData**‘ file and in every case is faster or the same. This result is very interesting since it means that the ‘**.RData**‘ is faster than the database on writes. This is a consistent result when no matter what query I run it’s faster.

####

set echo on;

set timing on;

CREATE TABLE RESTAURANT\_CP3

AS

SELECT \* FROM SEARSTGI\_ADMIN.RESTAURANT;

**Task completed in 60.545 seconds**

SQL> set echo on

SQL> set timing on

SQL> CREATE TABLE RESTAURANT\_CP3

AS

SELECT \* FROM SEARSTGI\_ADMIN.RESTAURANT;

Table RESTAURANT\_CP3 created.

**Elapsed: 00:00:50.915**

ptm <- proc.time()

rs <- dbSendQuery(con, "select \* from searstgi\_admin.restaurant")

## We now fetch records from the resultSet into a data.frame.

Data8 <- fetch(rs) ## extract all rows

dim(data)

proc.time() - ptm

## 2/9/17

> Data8 <- fetch(rs) ## extract all rows

>

> dim(data)

[1] 1 1

> proc.time() - ptm

user system elapsed

2.14 0.30 4.20

>

## 2/8/17

>

> ptm <- proc.time()

> rs <- dbSendQuery(con, "select \* from searstgi\_admin.restaurant")

>

> ## We now fetch records from the resultSet into a data.frame.

>

> Data6 <- fetch(rs) ## extract all rows

>

> dim(data)

[1] 1 1

> proc.time() - ptm

**user system elapsed**

**2.15 0.25 6.77**

>

|  |
| --- |
|  |
|  |
| |  | | --- | |  | |

Test 7 writing to the database there is no significant difference between **RStudio** and **SQL Developer** the results are consistent.

CREATE TABLE SEARSTGI\_ADMIN.YELLOW\_TAXI\_JUNE

AS

SELECT \* FROM SEARSTGI\_ADMIN.YELLOW\_TAXI\_TRIP WHERE EXTRACT(MONTH FROM TPEP\_PICKUP\_DATETIME ) = 6;

Table SEARSTGI\_ADMIN.YELLOW\_TAXI\_JUNE created.

815.164 seconds

This error occurred because two fields in the “**YELLOW\_TAXI\_JUNE**” are formatted as timestamps. Which creates this error when the data is written back to the database.

> ptm <- proc.time()

>

> ##dbWriteTable(conn, "ORACLE\_DB\_TABLE", r\_data\_table, overwrite = F, append = T, row.names = F)

> dbWriteTable(con, "YELLOW\_TAXI\_JUNE", allrecs, overwrite = FALSE, append=TRUE, row.names = F, schema="SEARSTGI\_ADMIN")

Error in .oci.WriteTable(conn, name, value, row.names = row.names, overwrite = overwrite, :

Error in .oci.ValidateZoneInEnv(FALSE) :

environment variable 'ORA\_SDTZ()' must be set to the same time zone region as the the environment variable 'TZ()'

>

> proc.time() - ptm

user system elapsed

0.01 0.07 0.14

>

>

By changing the TZ and the ORS\_SDTZ values to “GMT” this issue can be resolved, see below.

|  |
| --- |
| >  >  > ptm <- proc.time()  >  > Sys.setenv(TZ = "GMT")  > Sys.setenv(ORA\_SDTZ = "GMT")  >  > proc.time() - ptm  user system elapsed  0.00 0.00 0.03  >  > ptm <- proc.time()  >  > ##dbWriteTable(conn, "ORACLE\_DB\_TABLE", r\_data\_table, overwrite = F, append = T, row.names = F)  > dbWriteTable(con, "YELLOW\_TAXI\_JUNE", allrecs, overwrite = FALSE, append=TRUE, row.names = F, schema="SEARSTGI\_ADMIN")  [1] TRUE  >  > proc.time() - ptm  user system elapsed  51.35 9.53 816.10  >  > |
| Eror |

-- ########################################################################

|  |
| --- |
| > Sys.getenv()  ALLUSERSPROFILE C:\ProgramData  APPDATA C:\Users\Joseph\AppData\Roaming  CommonProgramFiles C:\Program Files\Common Files  CommonProgramFiles(x86)  C:\Program Files (x86)\Common Files  CommonProgramW6432 C:\Program Files\Common Files  COMPUTERNAME LAPTOP-DFH7GT5A  ComSpec C:\WINDOWS\system32\cmd.exe  DISPLAY :0  DOCKER\_TOOLBOX\_INSTALL\_PATH  C:\Program Files\Docker Toolbox  FPS\_BROWSER\_APP\_PROFILE\_STRING  Internet Explorer  FPS\_BROWSER\_USER\_PROFILE\_STRING  Default  GFORTRAN\_STDERR\_UNIT -1  GFORTRAN\_STDOUT\_UNIT -1  HOME C:/Users/Joseph/Documents  HOMEDRIVE C:  HOMEPATH \Users\Joseph  LOCALAPPDATA C:\Users\Joseph\AppData\Local  LOGONSERVER \\LAPTOP-DFH7GT5A  NUMBER\_OF\_PROCESSORS 4  OCI\_INC C:\app\OraDt16\product\12.1.0\client\_1\oci\include  OCI\_LIB64 C:\app\OraDt16\product\12.1.0\client\_1\bin  OneDrive C:\Users\Joseph\OneDrive  OS Windows\_NT  PATH C:\Program  Files\R\R-3.3.1\bin\x64;C:\app\OraDT16\product\12.1.0\client\_1\bin;C:\Program  Files\Python35\Scripts\;C:\Program  Files\Python35\;C:\app\OraDt16\product\12.1.0\dbhome\_1\bin;C:\Program  Files (x86)\Intel\iCLS Client\;C:\Program  Files\Intel\iCLS  Client\;C:\WINDOWS\system32;C:\WINDOWS;C:\WINDOWS\System32\Wbem;C:\WINDOWS\System32\WindowsPowerShell\v1.0\;C:\Program  Files (x86)\Intel\Intel(R) Management Engine  Components\DAL;C:\Program Files\Intel\Intel(R)  Management Engine Components\DAL;C:\Program Files  (x86)\Intel\Intel(R) Management Engine  Components\IPT;C:\Program Files\Intel\Intel(R)  Management Engine Components\IPT;C:\Program Files  (x86)\scala\bin;C:\Program Files\Microsoft SQL  Server\Client SDK\ODBC\110\Tools\Binn\;C:\Program  Files (x86)\Microsoft SQL  Server\120\Tools\Binn\;C:\Program Files\Microsoft  SQL Server\120\Tools\Binn\;C:\Program  Files\Microsoft SQL  Server\120\DTS\Binn\;C:\Program Files  (x86)\Microsoft SQL  Server\120\Tools\Binn\ManagementStudio\;C:\Program  Files (x86)\Microsoft SQL  Server\120\DTS\Binn\;C:\Anaconda3;C:\Anaconda3\Scripts;C:\Anaconda3\Library\bin;C:\Program  Files\Python35\Scripts\;C:\Program  Files\Python35\;C:\app\OraDt16\product\12.1.0\dbhome\_1\bin;C:\Program  Files (x86)\Intel\iCLS Client\;C:\Program  Files\Intel\iCLS  Client\;C:\WINDOWS\system32;C:\WINDOWS;C:\WINDOWS\System32\Wbem;C:\WINDOWS\System32\WindowsPowerShell\v1.0\;C:\Program  Files (x86)\Intel\Intel(R) Management Engine  Components\DAL;C:\Program Files\Intel\Intel(R)  Management Engine Components\DAL;C:\Program Files  (x86)\Intel\Intel(R) Management Engine  Components\IPT;C:\Program Files\Intel\Intel(R)  Management Engine Components\IPT;C:\Program Files  (x86)\scala\bin;C:\Program Files\Microsoft SQL  Server\Client SDK\ODBC\110\Tools\Binn\;C:\Program  Files (x86)\Microsoft SQL  Server\120\Tools\Binn\;C:\Program Files\Microsoft  SQL Server\120\Tools\Binn\;C:\Program  Files\Microsoft SQL  Server\120\DTS\Binn\;C:\Program Files  (x86)\Microsoft SQL  Server\120\Tools\Binn\ManagementStudio\;C:\Program  Files (x86)\Microsoft SQL  Server\120\DTS\Binn\;C:\Anaconda3;C:\Anaconda3\Scripts;C:\Anaconda3\Library\bin;C:\Program  Files\Docker  Toolbox;C:\Users\Joseph\AppData\Local\Microsoft\WindowsApps;  PATHEXT .COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.WSF;.WSH;.MSC;.PY;.PYW  PROCESSOR\_ARCHITECTURE AMD64  PROCESSOR\_IDENTIFIER Intel64 Family 6 Model 78 Stepping 3, GenuineIntel  PROCESSOR\_LEVEL 6  PROCESSOR\_REVISION 4e03  ProgramData C:\ProgramData  ProgramFiles C:\Program Files  ProgramFiles(x86) C:\Program Files (x86)  ProgramW6432 C:\Program Files  PSModulePath C:\WINDOWS\system32\WindowsPowerShell\v1.0\Modules\;C:\Program  Files (x86)\Microsoft SQL  Server\120\Tools\PowerShell\Modules\  PUBLIC C:\Users\Public  R\_ARCH /x64  R\_COMPILED\_BY gcc 4.9.3  R\_DOC\_DIR C:/PROGRA~1/R/R-33~1.1/doc  R\_HOME C:/PROGRA~1/R/R-33~1.1  R\_LIBS\_USER C:/Users/Joseph/Documents/R/win-library/3.3  R\_USER C:/Users/Joseph/Documents  RMARKDOWN\_MATHJAX\_PATH C:/Program Files/RStudio/resources/mathjax-23  RS\_LOCAL\_PEER \\.\pipe\12343-rsession  RS\_RPOSTBACK\_PATH C:/Program Files/RStudio/bin/rpostback  RS\_SHARED\_SECRET 63341846741  RSTUDIO 1  RSTUDIO\_MSYS\_SSH C:/Program Files/RStudio/bin/msys-ssh-1000-18  RSTUDIO\_PANDOC C:/Program Files/RStudio/bin/pandoc  RSTUDIO\_SESSION\_PORT 12343  RSTUDIO\_USER\_IDENTITY Joseph  SESSIONNAME Console  SystemDrive C:  SystemRoot C:\WINDOWS  TEMP C:\Users\Joseph\AppData\Local\Temp  TMP C:\Users\Joseph\AppData\Local\Temp  USERDOMAIN LAPTOP-DFH7GT5A  USERDOMAIN\_ROAMINGPROFILE  LAPTOP-DFH7GT5A  USERNAME Joseph  USERPROFILE C:\Users\Joseph  VBOX\_MSI\_INSTALL\_PATH C:\Program Files\Oracle\VirtualBox\  windir C:\WINDOWS  ALLUSERSPROFILE C:\ProgramData  APPDATA C:\Users\Joseph\AppData\Roaming  CommonProgramFiles C:\Program Files\Common Files  CommonProgramFiles(x86)  C:\Program Files (x86)\Common Files  CommonProgramW6432 C:\Program Files\Common Files  COMPUTERNAME LAPTOP-DFH7GT5A  ComSpec C:\WINDOWS\system32\cmd.exe  DISPLAY :0  DOCKER\_TOOLBOX\_INSTALL\_PATH  C:\Program Files\Docker Toolbox  FPS\_BROWSER\_APP\_PROFILE\_STRING  Internet Explorer  FPS\_BROWSER\_USER\_PROFILE\_STRING  Default  GFORTRAN\_STDERR\_UNIT -1  GFORTRAN\_STDOUT\_UNIT -1  HOME C:/Users/Joseph/Documents  HOMEDRIVE C:  HOMEPATH \Users\Joseph  LOCALAPPDATA C:\Users\Joseph\AppData\Local  LOGONSERVER \\LAPTOP-DFH7GT5A  NUMBER\_OF\_PROCESSORS 4  OCI\_INC C:\app\OraDt16\product\12.1.0\client\_1\oci\include  OCI\_LIB64 C:\app\OraDt16\product\12.1.0\client\_1\bin  OneDrive C:\Users\Joseph\OneDrive  OS Windows\_NT  PATH C:\Program  Files\R\R-3.3.1\bin\x64;C:\app\OraDT16\product\12.1.0\client\_1\bin;C:\Program  Files\Python35\Scripts\;C:\Program  Files\Python35\;C:\app\OraDt16\product\12.1.0\dbhome\_1\bin;C:\Program  Files (x86)\Intel\iCLS Client\;C:\Program  Files\Intel\iCLS  Client\;C:\WINDOWS\system32;C:\WINDOWS;C:\WINDOWS\System32\Wbem;C:\WINDOWS\System32\WindowsPowerShell\v1.0\;C:\Program  Files (x86)\Intel\Intel(R) Management Engine  Components\DAL;C:\Program Files\Intel\Intel(R)  Management Engine Components\DAL;C:\Program Files  (x86)\Intel\Intel(R) Management Engine  Components\IPT;C:\Program Files\Intel\Intel(R)  Management Engine Components\IPT;C:\Program Files  (x86)\scala\bin;C:\Program Files\Microsoft SQL  Server\Client SDK\ODBC\110\Tools\Binn\;C:\Program  Files (x86)\Microsoft SQL  Server\120\Tools\Binn\;C:\Program Files\Microsoft  SQL Server\120\Tools\Binn\;C:\Program  Files\Microsoft SQL  Server\120\DTS\Binn\;C:\Program Files  (x86)\Microsoft SQL  Server\120\Tools\Binn\ManagementStudio\;C:\Program  Files (x86)\Microsoft SQL  Server\120\DTS\Binn\;C:\Anaconda3;C:\Anaconda3\Scripts;C:\Anaconda3\Library\bin;C:\Program  Files\Python35\Scripts\;C:\Program  Files\Python35\;C:\app\OraDt16\product\12.1.0\dbhome\_1\bin;C:\Program  Files (x86)\Intel\iCLS Client\;C:\Program  Files\Intel\iCLS  Client\;C:\WINDOWS\system32;C:\WINDOWS;C:\WINDOWS\System32\Wbem;C:\WINDOWS\System32\WindowsPowerShell\v1.0\;C:\Program  Files (x86)\Intel\Intel(R) Management Engine  Components\DAL;C:\Program Files\Intel\Intel(R)  Management Engine Components\DAL;C:\Program Files  (x86)\Intel\Intel(R) Management Engine  Components\IPT;C:\Program Files\Intel\Intel(R)  Management Engine Components\IPT;C:\Program Files  (x86)\scala\bin;C:\Program Files\Microsoft SQL  Server\Client SDK\ODBC\110\Tools\Binn\;C:\Program  Files (x86)\Microsoft SQL  Server\120\Tools\Binn\;C:\Program Files\Microsoft  SQL Server\120\Tools\Binn\;C:\Program  Files\Microsoft SQL  Server\120\DTS\Binn\;C:\Program Files  (x86)\Microsoft SQL  Server\120\Tools\Binn\ManagementStudio\;C:\Program  Files (x86)\Microsoft SQL  Server\120\DTS\Binn\;C:\Anaconda3;C:\Anaconda3\Scripts;C:\Anaconda3\Library\bin;C:\Program  Files\Docker  Toolbox;C:\Users\Joseph\AppData\Local\Microsoft\WindowsApps;  PATHEXT .COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.WSF;.WSH;.MSC;.PY;.PYW  PROCESSOR\_ARCHITECTURE AMD64  PROCESSOR\_IDENTIFIER Intel64 Family 6 Model 78 Stepping 3, GenuineIntel  PROCESSOR\_LEVEL 6  PROCESSOR\_REVISION 4e03  ProgramData C:\ProgramData  ProgramFiles C:\Program Files  ProgramFiles(x86) C:\Program Files (x86)  ProgramW6432 C:\Program Files  PSModulePath C:\WINDOWS\system32\WindowsPowerShell\v1.0\Modules\;C:\Program  Files (x86)\Microsoft SQL  Server\120\Tools\PowerShell\Modules\  PUBLIC C:\Users\Public  R\_ARCH /x64  R\_COMPILED\_BY gcc 4.9.3  R\_DOC\_DIR C:/PROGRA~1/R/R-33~1.1/doc  R\_HOME C:/PROGRA~1/R/R-33~1.1  R\_LIBS\_USER C:/Users/Joseph/Documents/R/win-library/3.3  R\_USER C:/Users/Joseph/Documents  RMARKDOWN\_MATHJAX\_PATH C:/Program Files/RStudio/resources/mathjax-23  RS\_LOCAL\_PEER \\.\pipe\12343-rsession  RS\_RPOSTBACK\_PATH C:/Program Files/RStudio/bin/rpostback  RS\_SHARED\_SECRET 63341846741  RSTUDIO 1  RSTUDIO\_MSYS\_SSH C:/Program Files/RStudio/bin/msys-ssh-1000-18  RSTUDIO\_PANDOC C:/Program Files/RStudio/bin/pandoc  RSTUDIO\_SESSION\_PORT 12343  RSTUDIO\_USER\_IDENTITY Joseph  SESSIONNAME Console  SystemDrive C:  SystemRoot C:\WINDOWS  TEMP C:\Users\Joseph\AppData\Local\Temp  TMP C:\Users\Joseph\AppData\Local\Temp  USERDOMAIN LAPTOP-DFH7GT5A  USERDOMAIN\_ROAMINGPROFILE  LAPTOP-DFH7GT5A  USERNAME Joseph  USERPROFILE C:\Users\Joseph  VBOX\_MSI\_INSTALL\_PATH C:\Program Files\Oracle\VirtualBox\  windir C:\WINDOWS |
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-- #########################################################################

set echo on;

set timing on;

SELECT COUNT(\*) FROM SEARSTGI\_ADMIN.YELLOW\_TAXI\_JUNE;

All Rows Fetched: 1 in 86.187 seconds

24664760

C:\app\OraDt16\diag\rdbms\data16pr\data16pr\trace

**Examples**

## Not run:

## Create an Oracle Database instance and create one connection on the

## same machine.

drv <- dbDriver("Oracle")

## Use username/password authentication.

con <- dbConnect(drv, username = "scott", password = "tiger")

## Run a SQL statement by creating first a resultSet object.

rs <- dbSendQuery(con, "select \* from emp where deptno = 10")

## We now fetch records from the resultSet into a data.frame.

data <- fetch(rs) ## extract all rows

dim(data)

## End(Not run)

## Not run:

## Create an Oracle Database instance and create one connection to a

## remote database using the SID in the connect string.

drv <- dbDriver("Oracle")

## Refer to Oracle Database Net Services Administator's Guide for

## details on connect string specification.

host <- "myhost"

port <- 1521

sid <- "mysid"

connect.string <- paste( "(DESCRIPTION=",

"(ADDRESS=(PROTOCOL=tcp)(HOST=", host, ")(PORT=", port, "))",

"(CONNECT\_DATA=(SID=", sid, ")))", sep = "")

## Use username/password authentication.

con <- dbConnect(drv, username = "scott", password = "tiger",

dbname = connect.string)

## Run a SQL statement by creating first a resultSet object.

rs <- dbSendQuery(con, "select \* from emp where deptno = 10")

## We now fetch records from the resultSet into a data.frame.

data <- fetch(rs) ## extract all rows

dim(data)

## End(Not run)

## Not run:

## Create an Oracle Database instance and create one connection to a

## remote database using the service name.

drv <- dbDriver("Oracle")

## Refer to Oracle Database Net Services Administator's Guide for

## details on connect string specification.

host <- "myhost"

port <- 1521

svc <- "mydb.example.com"

connect.string <- paste(

"(DESCRIPTION=",

"(ADDRESS=(PROTOCOL=tcp)(HOST=", host, ")(PORT=", port, "))",

"(CONNECT\_DATA=(SERVICE\_NAME=", svc, ")))", sep = "")

## Use username/password authentication.

con <- dbConnect(drv, username = "scott", password = "tiger",

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dbname = connect.string)

## Run a SQL statement by creating first a resultSet object.

rs <- dbSendQuery(con, "select \* from emp where deptno = 10")

## We now fetch records from the resultSet into a data.frame.

data <- fetch(rs) ## extract all rows

dim(data)

## End(Not run)

## Not run:

## Create an Oracle Database instance and create one connection.

drv <- dbDriver("Oracle")

## Use Oracle Wallet authentication.

con <- dbConnect(drv, username ="", password="",

dbname = "<wallet\_connect\_string>")

## Run a SQL statement by creating first a resultSet object.

rs <- dbSendQuery(con, "select \* from emp where deptno = 10")

## We now fetch records from the resultSet into a data.frame.

data <- fetch(rs) ## extract all rows

dim(data)

## End(Not run)

## Not run:

## Create an Oracle Database instance and create one connection.

drv <- dbDriver("Oracle")

## Connect to a TimesTen IMDB instance using the easy connect

## naming method where SampleDb is a direct driver TimesTen DSN.

con <- dbConnect(drv, username ="scott", password="tiger",

dbname = "localhost/SampleDb:timesten\_direct")

## Run a SQL statement by creating first a resultSet object.

rs <- dbSendQuery(con, "select \* from dual")

## We now fetch records from the resultSet into a data.frame.

data <- fetch(rs) ## extract all rows

dim(data)

## End(Not run)

## Not run:

## Connect to an extproc (this assumes that the driver has already

## been initialized in the embedded R code by passing an external

## pointer representing the extproc context).

con <- dbConnect(Extproc())

## Run a SQL statement by creating first a resultSet object.

rs <- dbSendQuery(con, "select \* from dual")

## We now fetch records from the resultSet into a data.frame.

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data <- fetch(rs) ## extract all rows

dim(data)

## End(Not run)

## Not run:

## Create an Oracle Database instance and create one connection.

drv <- dbDriver("Oracle")

## Create connection with SYSDBA privileges.

con <- dbConnect(drv, username ="scott", password="tiger",

sysdba = TRUE)

## Run a SQL statement by creating first a resultSet object.

rs <- dbSendQuery(con, "select \* from emp where deptno = 10")

## We now fetch records from the resultSet into a data.frame.

data <- fetch(rs) ## extract all rows

dim(data)

## End(Not run)

## Not run:

## Create an Oracle Database instance and create one connection.

drv <- dbDriver("Oracle")

## Use OS authentication as an example of external authentication

## Make sure that databse user exist to allow an OS authentication

## Create connection authenticated with external credentials.

con <- dbConnect(drv, username ="", password="",

external\_credentials = TRUE)

## Above dbConnect() used OS credentials to connect with database.

## Run a SQL statement by creating first a resultSet object.

rs <- dbSendQuery(con, "select \* from emp where deptno = 10")

## We now fetch records from the resultSet into a data.frame.

data <- fetch(rs) ## extract all rows

dim(data)

## End(Not run)

dbDriver-methods Oracle Implementation of the Database Interface (DBI) Classes and

Drivers

Description

Oracle driver initialization and closing.

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Usage

## S4 method for signature 'OraDriver'

dbUnloadDriver(drv, ...)

## S4 method for signature 'ExtDriver'

dbUnloadDriver(drv, ...)

Arguments

drv An object that inherits from OraDriver or ExtDriver as created by dbDriver.

... Any other arguments to pass to the driver drvName.

**Details**

**dbDriver** This object is a singleton, that is, subsequent invocations of dbDriver return the same

initialized object.

This implementation allows you to connect to multiple host servers and run multiple connections

on each server simultaneously. When interruptible is set to **TRUE**, it allows for interrupting long-running queries on the server by executing the query in a thread. Main thread checks for **Ctrl-C** and issues **OCIBreak/OCIReset** to cancel the operation on the server. By default, interruptible is **FALSE**. When **unicode\_as\_utf8** is set to **FALSE**, **NCHAR**, **NVARCHAR** and **NCLOB** data is fetched using the character set specified by the **NLS\_LANG** setting. By default, **unicode\_as\_utf8** is set to **TRUE**. When **ora.attributes** is set to **TRUE**, the result set from **dbGetQuery** and fetch contains DBMS-specific attributes like **ora.encoding**, **ora.type**, and **ora.maxlength** for the corresponding column.

**dbUnloadDriver** This implementation removes communication links between the R client and the database. It frees all connections and all result sets associated with those connection objects.

**dbDriver** An object **OraDriver** or **ExtDriver** whose class extends **DBIDriver**. This object

is used to create connections, using the function **dbConnect**, to one or more Oracle Database engines.

**dbUnloadDriver** Free all resources occupied by the driver object.

**dbDriver** The **R** client part of the database communication is initialized, but note that connecting to the database engine needs to be done through calls to dbConnect.

**dbUnloadDriver** Remove the communication link between the R client and the database.