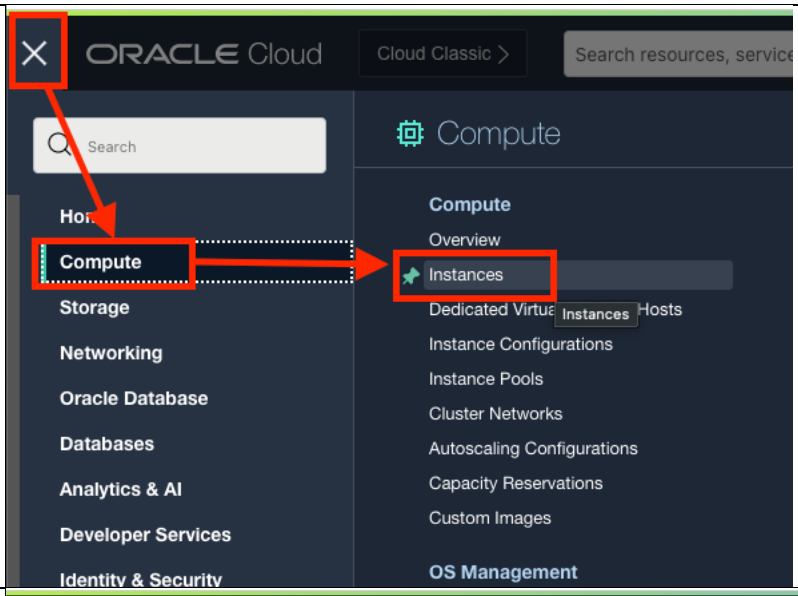
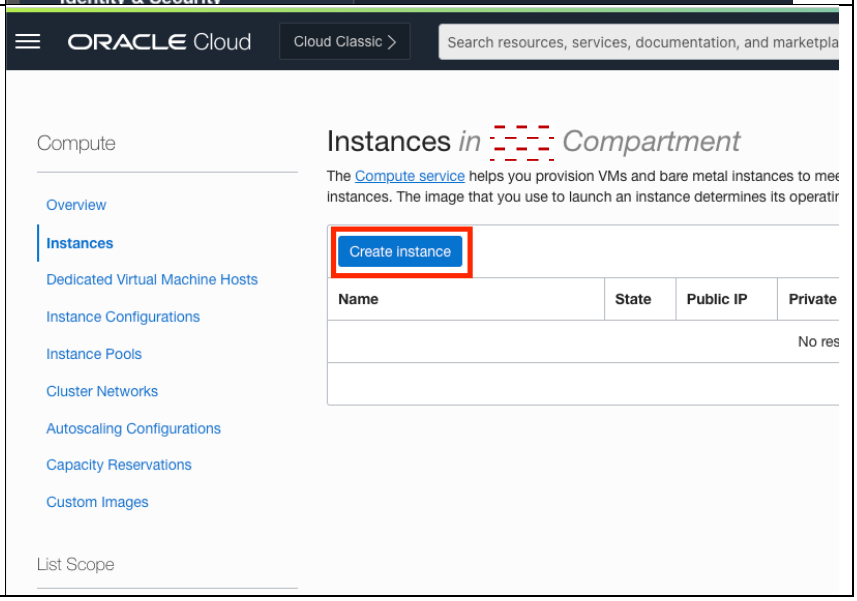
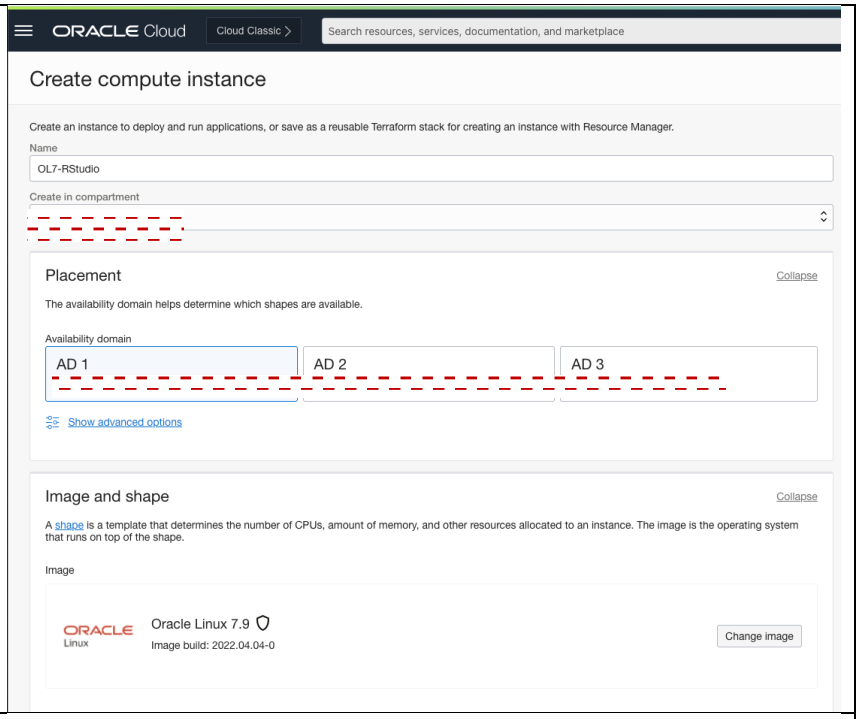
R Studio Install on Oracle Linux 7

This documentation will walk you through the steps to install R Studio Server within an Oracle Linux Virtual Machine running on Oracle Cloud Infrastructure. This documentation will then lay out the steps to establish a connection from your R Studio Server to the Autonomous Data Warehouse and query some data.

Step	Screenshot
Login to your OCI Console at cloud.oracle.com ***Navigate to Menu > Compute > Instances.***	
Click on ***'Create Instance'***.	

Enter the following:

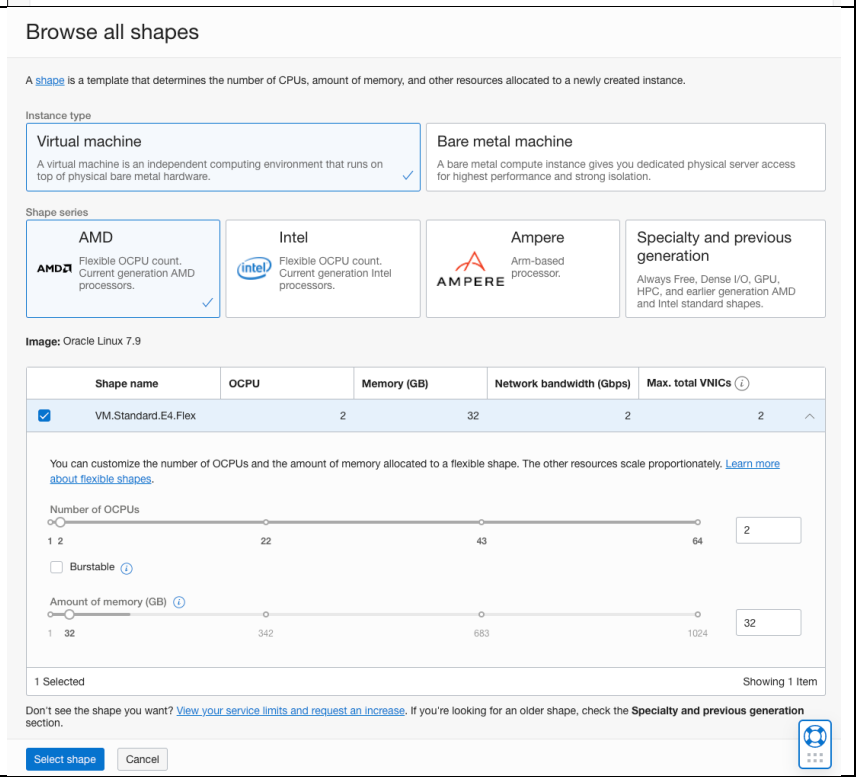
- VM Name
- Compartment
- Availability Domain
- OS Image – Oracle Linux 7.9

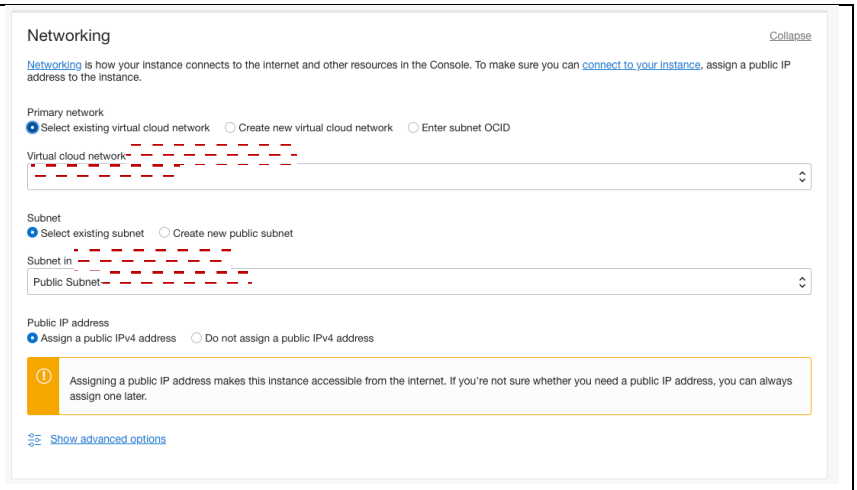
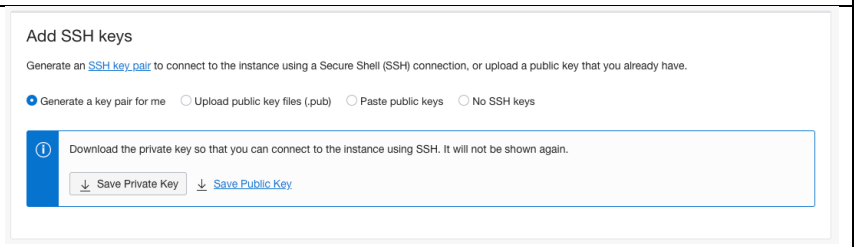
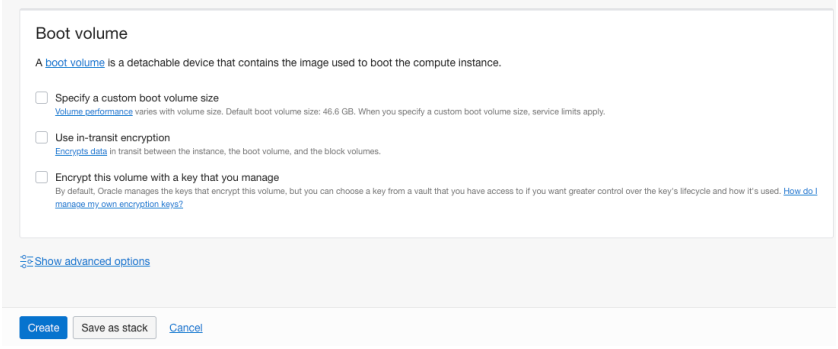


Select your VM Shape Configuration.

I have gone for:

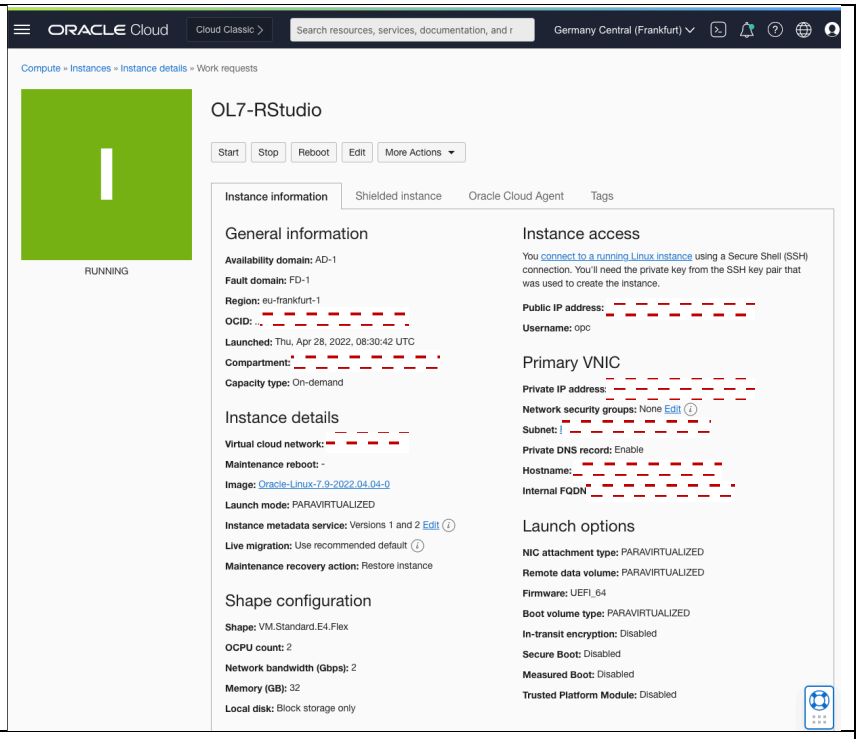
- Virtual Machine
- AMD Series
- 2 OCPU
- 32 GB Memory



Select an existing ***VCN*** and ***Public Subnet*** if you have one available. Else you can create a new VCN and Public Subnet. Ensure ***"Assign a public IPv4 address"*** is selected.	
Upload existing SSH Public Key File if you have an existing key. Else we can generate a new pair. Click on ***'Save Private Key'*** and ***'Save Public Key'.*** On Mac – it is recommended to save these keys under the directory ***~/.ssh.*** It is also recommended to update the permissions to the files as ***chmod 600.***	  
You have the option to specify a bigger boot volume that the default (46.6GB). I will leave these settings as default. Click on ***'Create'*** and the creation of your VM will begin.	

Once the VM is up and running you should see the status turn from ***'Creating'*** to ***'Running'***.

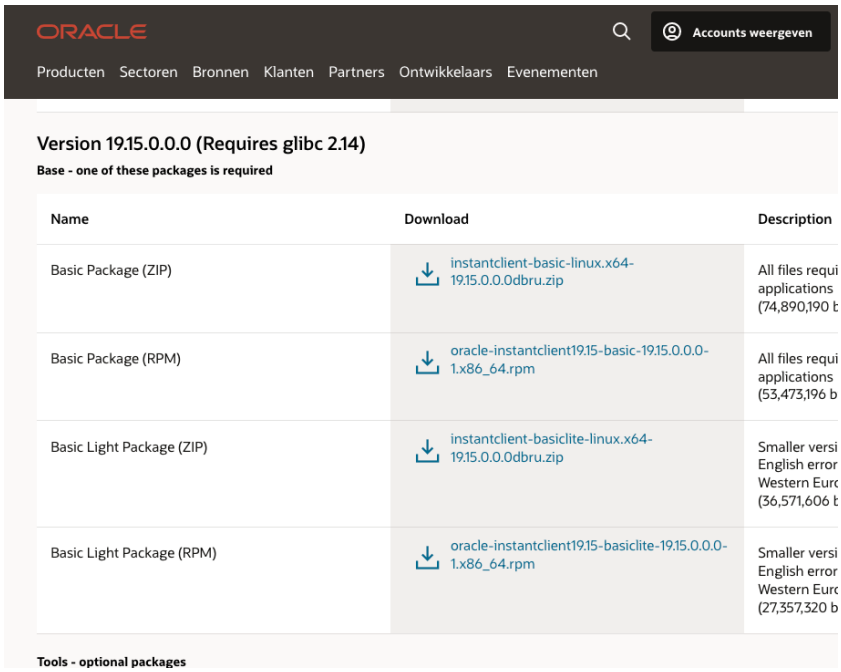
Make note of the Public IP Address and Username displayed. Under ***'Instance Information'***.



Now we will download a series of artifacts that will allow us to connect into the Autonomous Data Warehouse from our R Studio Server.

First download the Oracle Instant Client Version 19c.

https://www.oracle.com/uk/database/technologies/instant-client/linux-x86-64-downloads.html



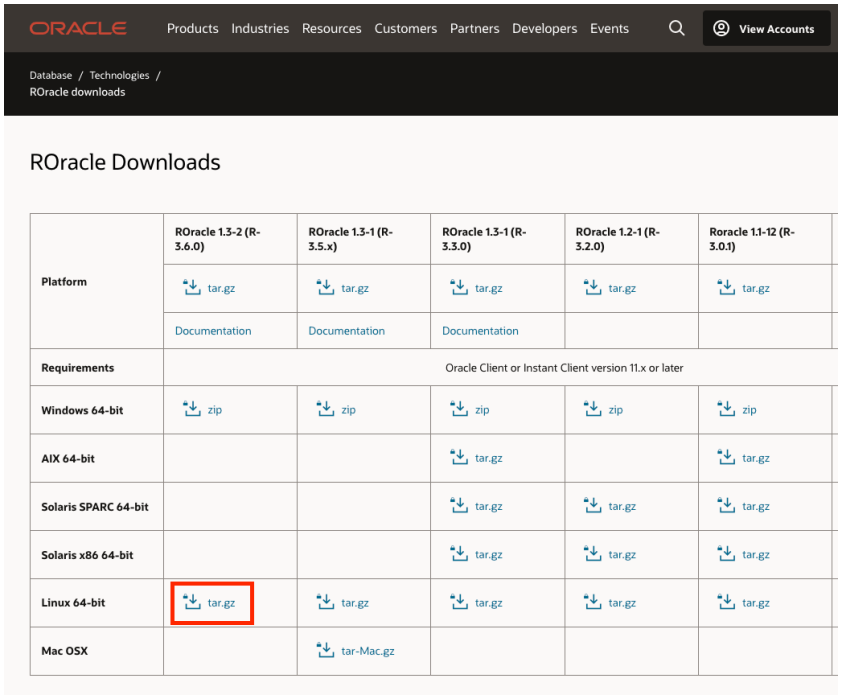
Download the following packages:

oracle-instantclient19.15-basic-19.15.0.0.0-1.x86_64.rpm
oracle-instantclient19.15-sqlplus-19.15.0.0.0-1.x86_64.rpm
oracle-instantclient19.15-tools-19.15.0.0.0-1.x86_64.rpm
oracle-instantclient19.15-devel-19.15.0.0.0-1.x86_64.rpm
oracle-instantclient19.15-jdbc-19.15.0.0.0-1.x86_64.rpm
oracle-instantclient19.15-odbc-19.15.0.0.0-1.x86_64.rpm

Now we will download R Oracle - https://www.oracle.com/database/technologies/roracle-downloads.html

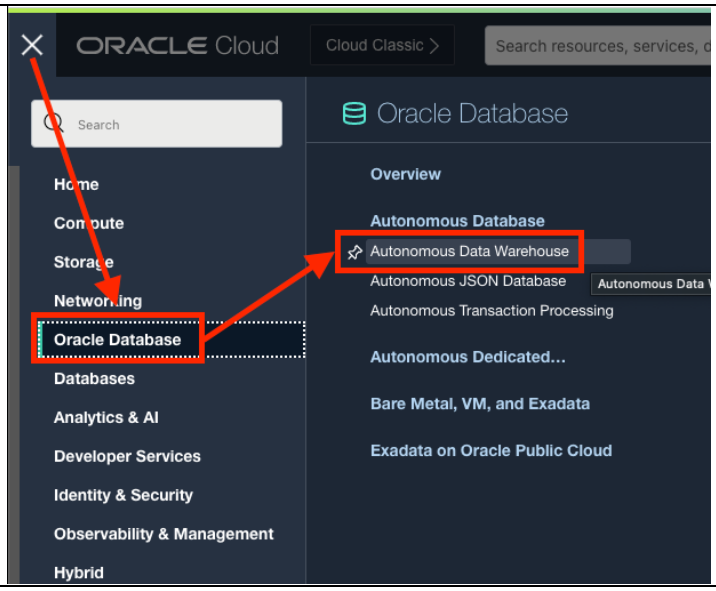
I have downloaded ***R Oracle 1.3-2.***

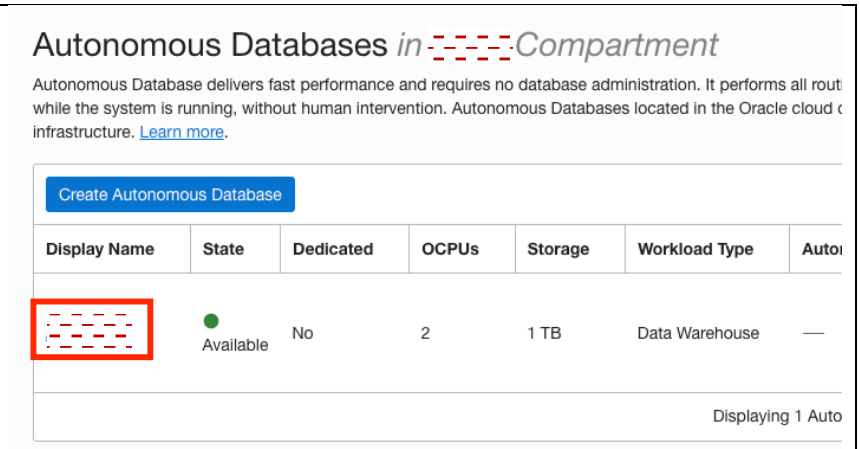
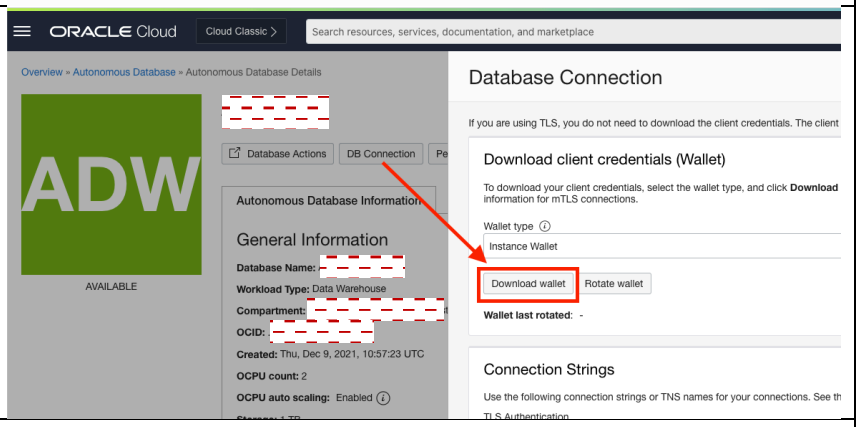
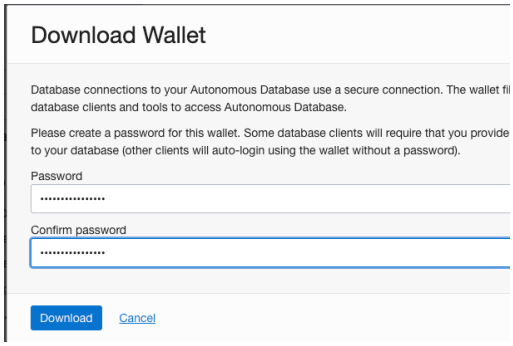
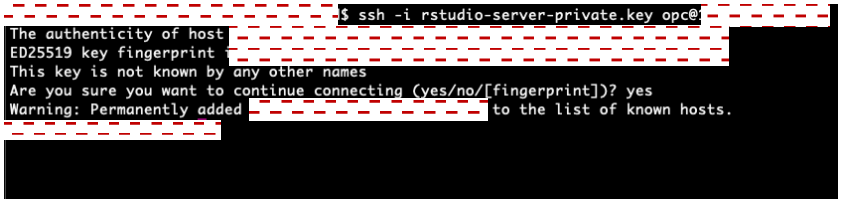
ROracle is an open-source R package supporting a DBI-compliant Oracle driver based on the high performance OCI library. ROracle is publicly available on the Comprehensive R Archive Network (CRAN) and is maintained by Oracle. It enables highly scalable and performant connectivity to Oracle Database for data transfer, along with enables transaction level control and execution of user-provided SQL.

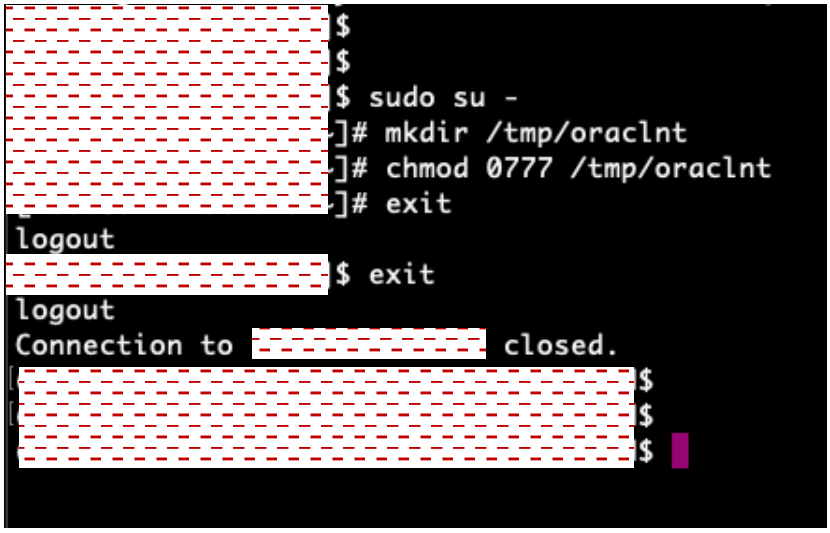
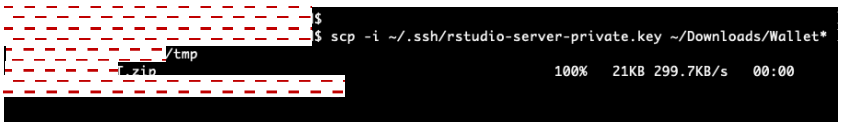


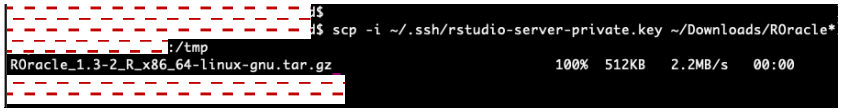
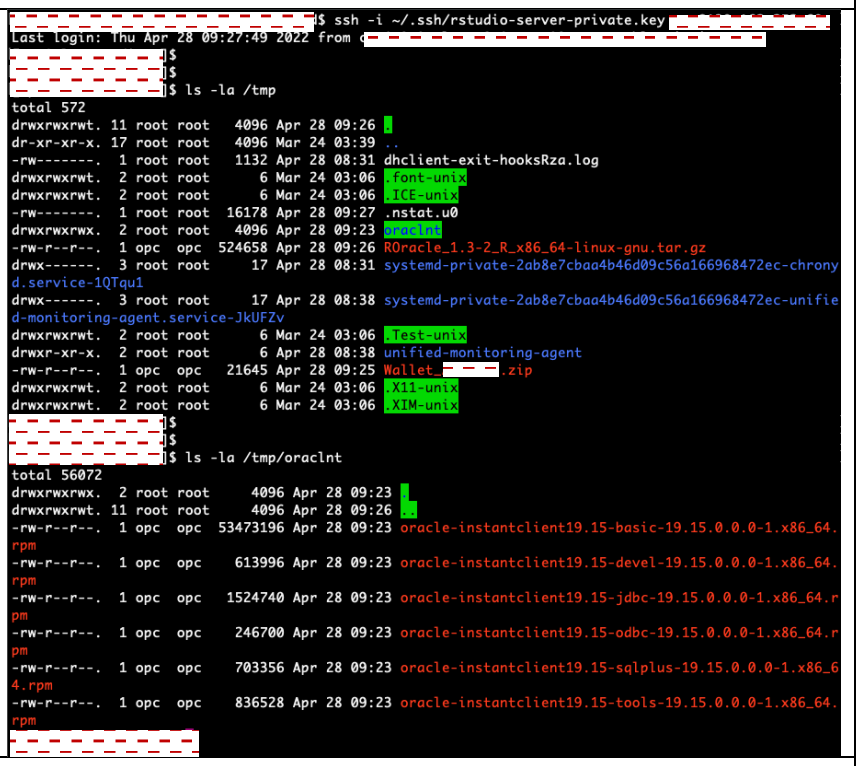
Finally, we will download our Autonomous Data Warehouse Wallet File which contains the connection details for our Database.

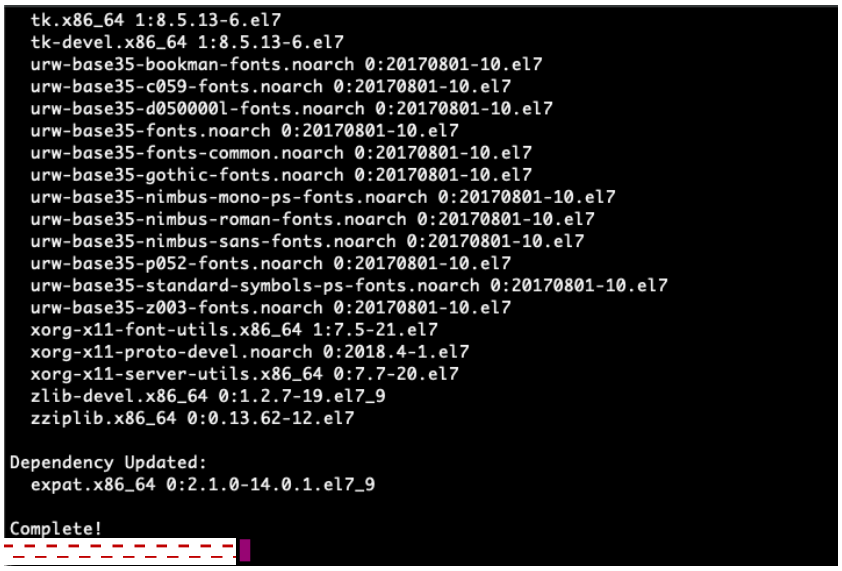
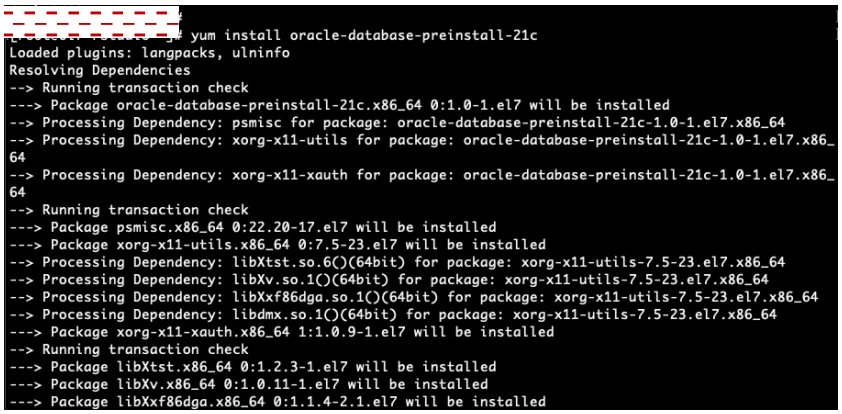
Within the OCI Console Navigate to ***Menu > Oracle Database > Autonomous Data Warehouse.***

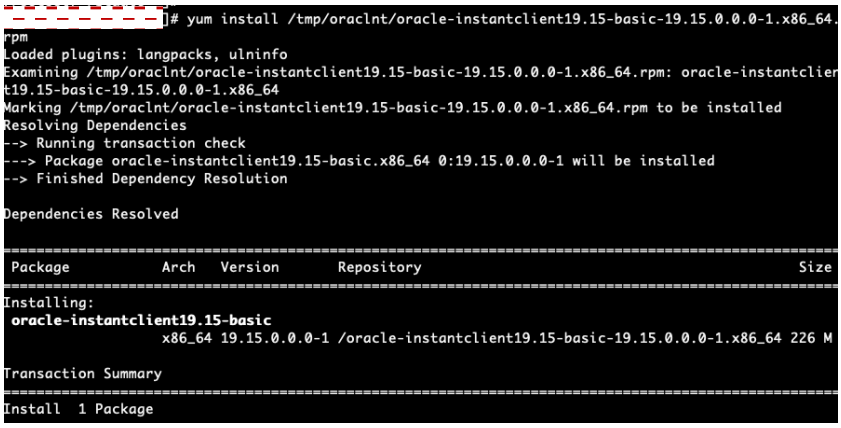


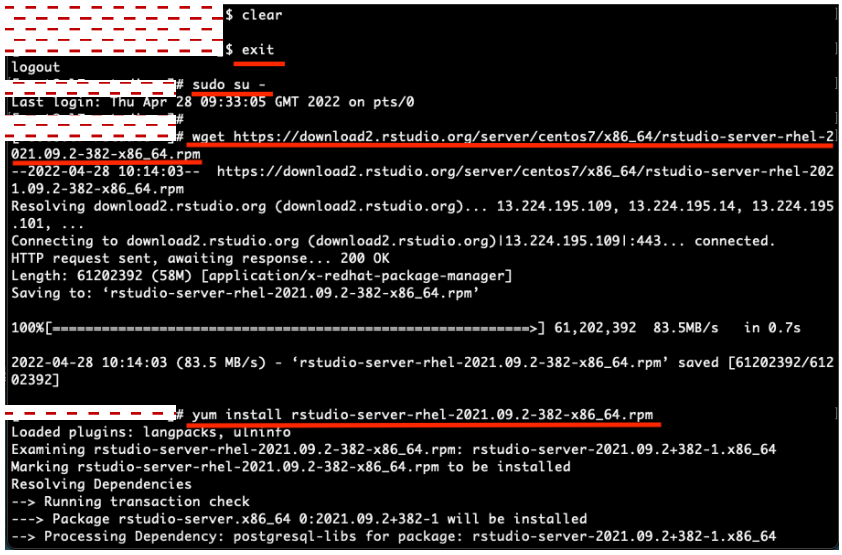
Select your Autonomous Data Warehouse.	
Under the DB Connection Tab, click on **'Download Wallet'**.	
Enter a Password, Confirm the Password and then Click on Download.	
Using the Public IP Address and Username stated within your VM Instance Details Page, use your local machine to SSH into your VM. ***ssh -i ~/.ssh/rstudio-server-private.key opc@<host-public-ip>***	

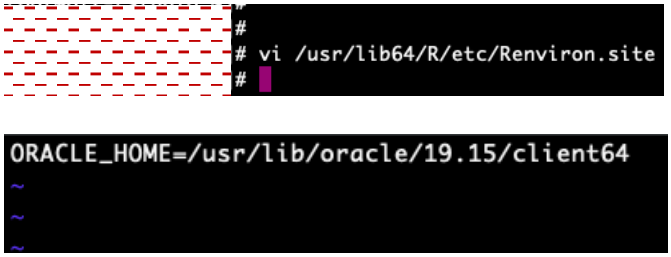
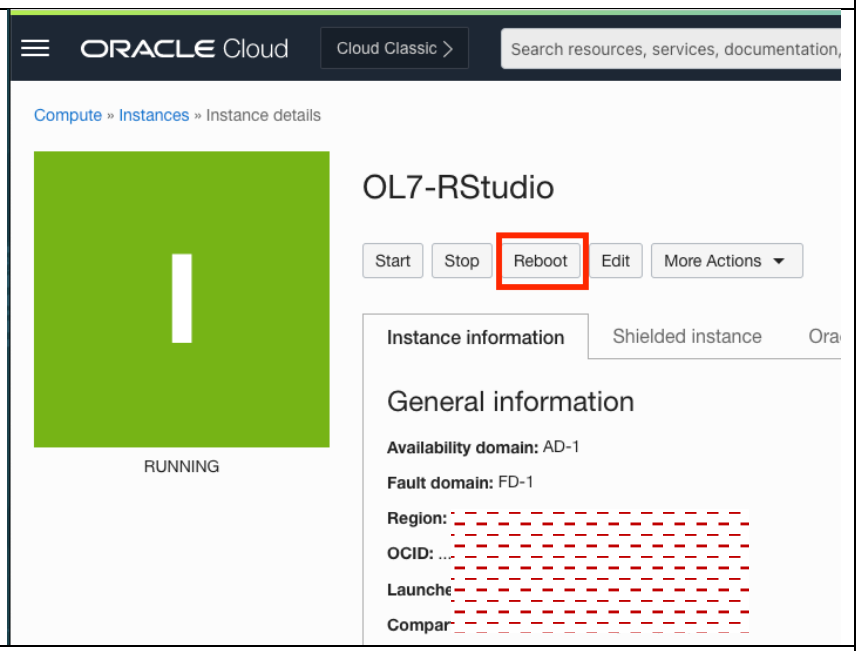
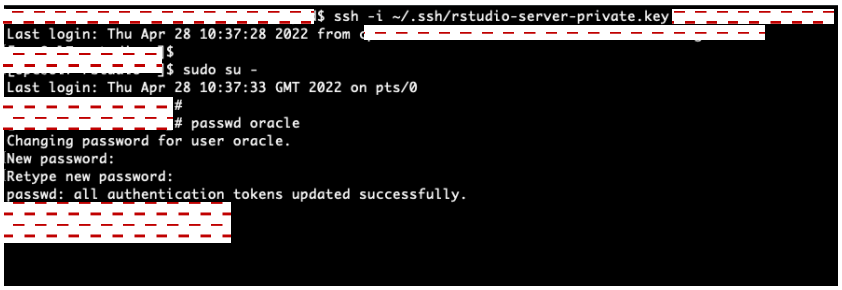
We will now switch user to root within the environment and create a temp directory to store our Oracle Instant Client downloaded artifacts. ***sudo su –*** ***mkdir /tmp/oraclnt*** ***chmod 0777 /tmp/oraclnt*** We can then exit from out VM. ***Exit***	
From our local machine let's upload the downloaded Oracle Instant Client artifacts into the VM tmp folder we just created. **scp -i ~/.ssh/rstudio-server-private.key ~/Downloads/oracle-* *opc@<host-public-ip>*:/tmp/oraclnt**	
Now let's upload the downloaded Autonomous Data Warehouse Wallet file to the /tmp directory on our VM. **scp -i ~/.ssh/rstudio-server-private.key ~/Downloads/Wallet* *opc@<host-public-ip>*:/tmp**	

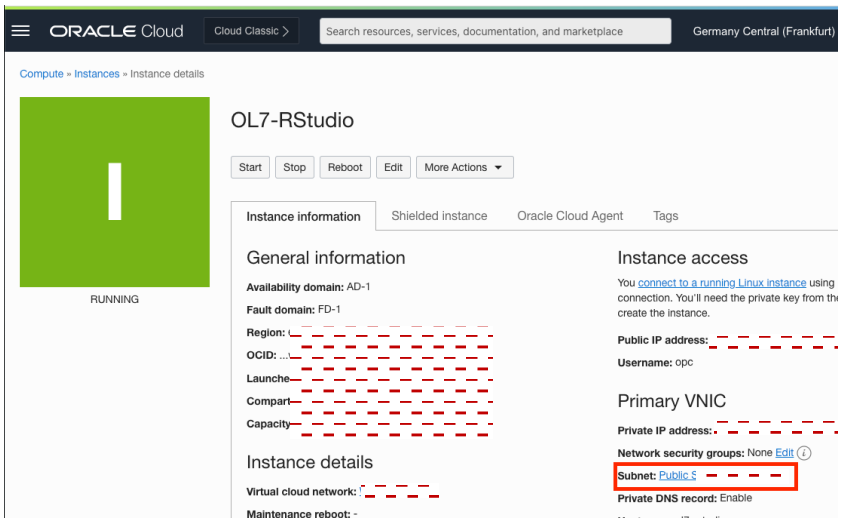
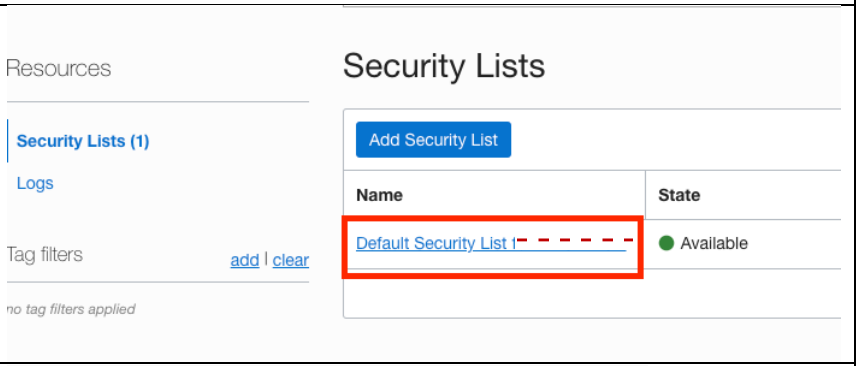
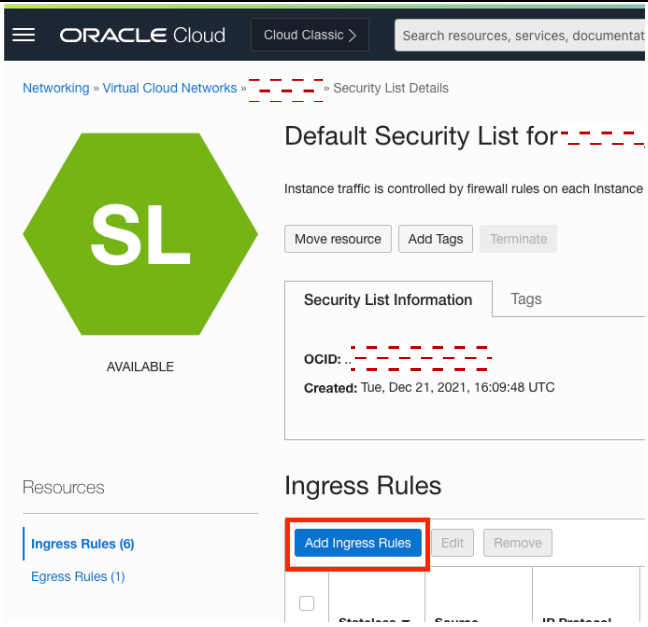
Now let's upload the downloaded R Oracle Package to the /tmp directory on our VM. **scp -i ~/.ssh/rstudio-server-private.key ~/Downloads/ROracle* *opc@<host-public-ip>*:/tmp**	
SSH back into your VM to check if the files have all be copied across correctly. **ssh -i ~/.ssh/rstudio-server-private.key *opc@<host-public-ip>*** **ls -la /tmp** **ls -la /tmp/oraclnt**	
While we are logged into the VM let's modify some of the system settings. Switch to root: **sudo su –** Disable the firewalld: **systemctl disable firewalld** **systemctl stop firewalld**	

Next, we will edit the /etc/selinux/config file and set the **SELINUX parameter** to **permissive**. ***vi /etc/selinux/config*** ***Save and Quit (:wq)***	
We will now install R on the VM. ***yum install R***	
We will now download and installs the Oracle Preinstallation RPM and the Oracle Database RPM packages. ***yum install oracle-database-preinstall-21c***	

We can now yum install all the Oracle Instant Client Packages we downloaded earlier and saved within the /tmp/oraclnt directory.	 yum install /tmp/oraclnt/oracle-instantclient19.15-basic-19.15.0.0.0-1.x86_64.rpm yum install /tmp/oraclnt/oracle-instantclient19.15-devel-19.15.0.0.0-1.x86_64.rpm yum install /tmp/oraclnt/oracle-instantclient19.15-jdbc-19.15.0.0.0-1.x86_64.rpm yum install /tmp/oraclnt/oracle-instantclient19.15-odbc-19.15.0.0.0-1.x86_64.rpm yum install /tmp/oraclnt/oracle-instantclient19.15-sqlplus-19.15.0.0.0-1.x86_64.rpm yum install /tmp/oraclnt/oracle-instantclient19.15-tools-19.15.0.0.0-1.x86_64.rpm
Now, change ownership of the /usr/lib/oracle directory to the oracle user. This directory contains the installation of Oracle Instant Client. ***chown -R oracle:dba /usr/lib/oracle*** Then switch to the Oracle User. ***sudo su - oracle***	 
Now create a directory within our Instant Client Installation to store the Wallet File for the Autonomous Data Warehouse. ***mkdir -p /usr/lib/oracle/19.15/client64/network/admin***	

Navigate into our newly created directory and unzip the Wallet file stored within the tmp directory. ***cd /usr/lib/oracle/19.15/client64/network/admin*** ***unzip /tmp/Wallet_****	
Logout from Oracle user – ***exit*** Login as root – ***sudo su -*** Download R Studio Server: ***wget https://download2.rstudio.org/server/centos7/x86_64/rstudio-server-rhel-2021.09.2-382-x86_64.rpm*** Install R Studio Server: ***yum install rstudio-server-rhel-2021.09.2-382-x86_64.rpm***	
We will now edit the R Studio Config File: ***vi /etc/rstudio/rserver.conf*** Set the following parameters listed on the right-hand side. Exit the editor ***:wq***	 www-port=8787 www-address=127.0.0.1 rsession-ld-library-path=/usr/lib64/R/lib:/usr/lib/oracle/19.15/client64/lib

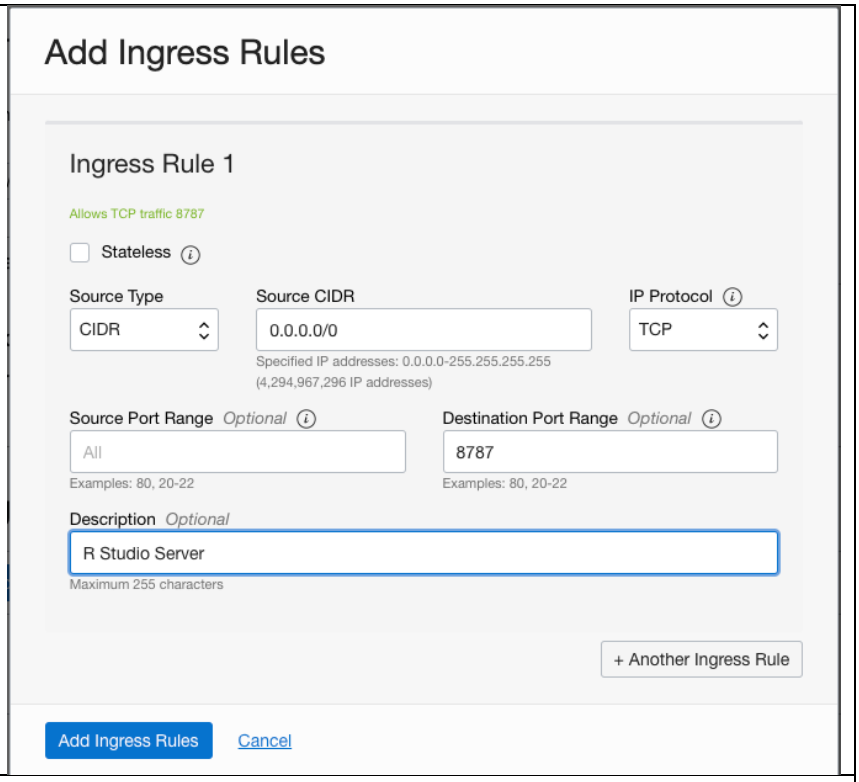
Next, we will set the Oracle Home within the R Environment file. ***vi /usr/lib64/R/etc/Renviron.site*** ***ORACLE_HOME=/usr/lib/oracle/19.15/client64*** Exit the editor ***:wq***	
After making the above changes we will reboot the VM for the changes to take effect. From within the OCI Console, visit your VM from ***Menu > Compute > Instance > Your Instance.*** Click on ***Reboot***.	
Once rebooted, SSH back into our R Studio Server VM and switch to the root user ***ssh -i ~/.ssh/rstudio-server-private.key opc@<host-ip-address>*** **sudo su -** Set the Oracle user a password: ***passwd oracle***	

Before me make a connection from our local machine to the R Studio Server we must first configure a few networking components. First, we will edit the security list of our Public Subnet where our R Studio Server lives to accept traffic coming on ***port 8787***. From your R Studio Server VM Instance Page, ***Click on the Subnet Link.***	
Click on the ***'Default'*** Security List.	
Click on **'Add Ingress Rule'.**	

Enter the following:

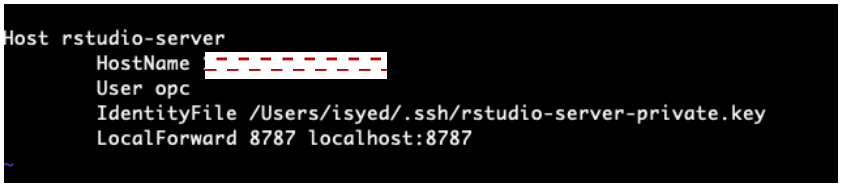
- Source Type: CIDR
- Source CIDR: 0.0.0.0/0
- IP Protocol: TCP
- Destination Port: 8787

Click 'Add Ingress Rules'



On our local machine we will edit the ~/.ssh/config file and add an entry for our SSH tunnel for Port Forwarding.

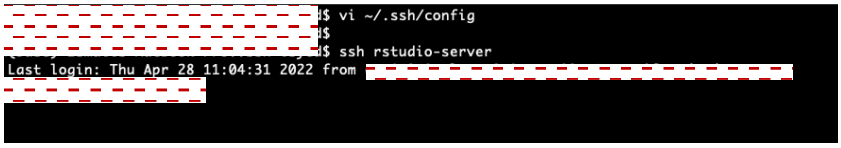
vi ~/.ssh/config



Host rstudio-server
HostName XXX.XXX.XXX.XX
User opc
IdentityFile /Users/isyed/.ssh/rstudio-server-private.key
LocalForward 8787 localhost:8787

We can then open the SSH Tunnel with Port Forwarding by:

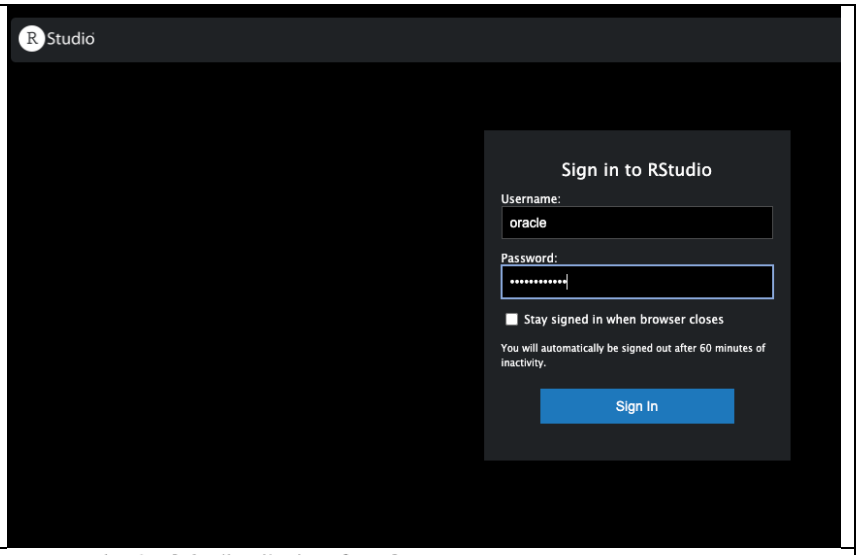
ssh rstudio-server



While leaving your SSH Tunnel open, from your local machine start a browser and visit your R Studio Server URL:

localhost:8787

Login as the oracle user with the password you just set.



We will now install a couple R Packagaes (Libraries), one being the R Oracle Package.

From the R Console, run the following:

install.packages("DBI")

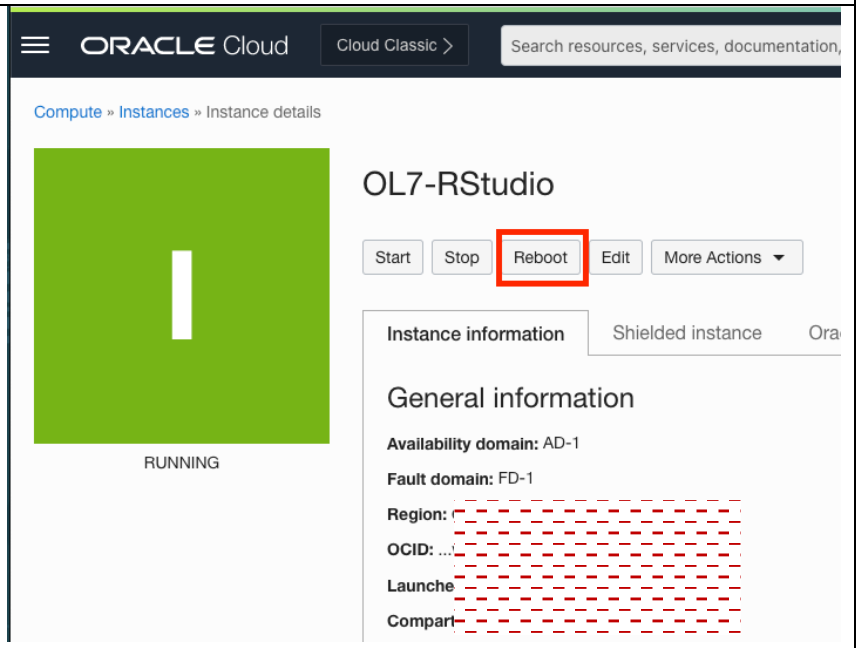
install.packages("/tmp/ROracle_1.3-2_R_x86_64-linux-gnu.tar.gz", repos=NULL)

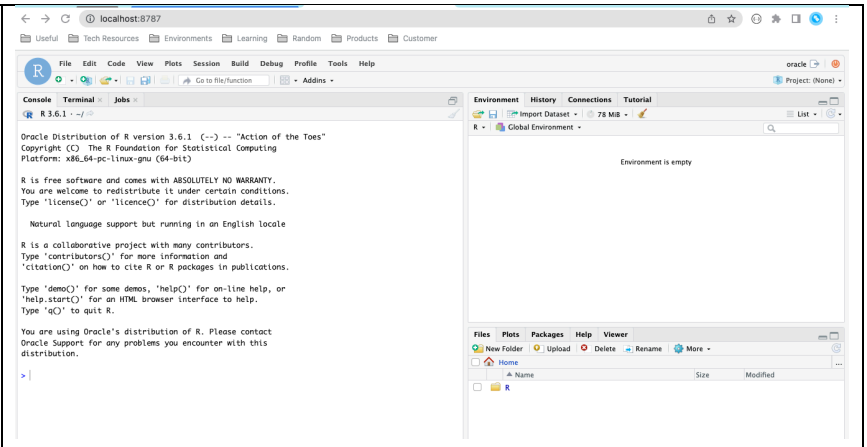
```
You are using Oracle's distribution of R. Please contact
Oracle Support for any problems you encounter with this
distribution.

> install.packages("DBI")
Installing package into '/home/oracle/R/x86_64-pc-linux-gnu-library/3.6'
(as 'lib' is unspecified)
--2022-04-28 12:41:58--  https://cran.rstudio.com/src/contrib/DBI_1.1.2.tar.gz
Resolving cran.rstudio.com (cran.rstudio.com)... 13.224.195.24, 13.224.195.125, 13.224.195.7,
Connecting to cran.rstudio.com (cran.rstudio.com)|13.224.195.24|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 706518 (690K) [application/x-gzip]
Saving to: '/tmp/RtmpjoLOjZ/downloaded_packages/DBI_1.1.2.tar.gz'

     0K .......... .......... .......... .......... ..........  7% 48.3M 0s

> install.packages("/tmp/ROracle_1.3-2_R_x86_64-linux-gnu.tar.gz", repos=NULL)
Installing package into '/home/oracle/R/x86_64-pc-linux-gnu-library/3.6'
(as 'lib' is unspecified)
* installing *binary* package 'ROracle' ...
* DONE (ROracle)
>
```

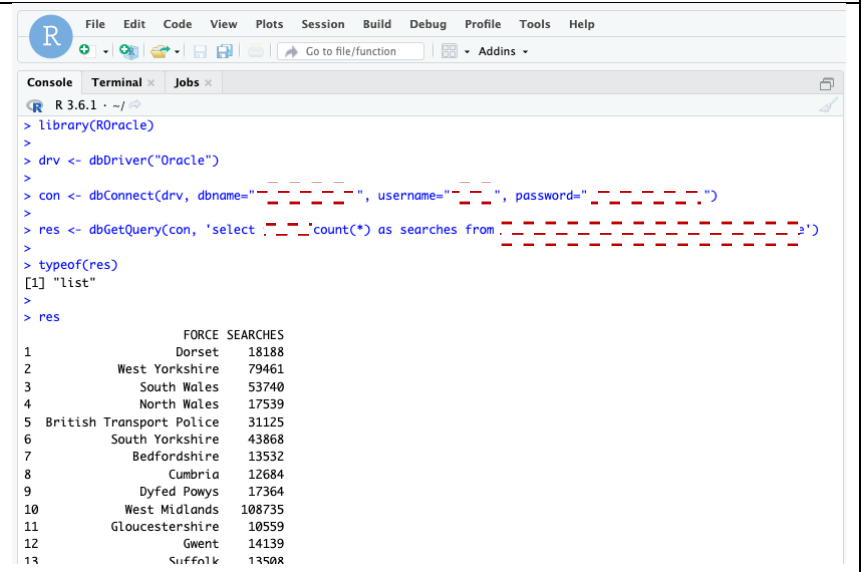
After making the above changes we will reboot the VM for the changes to take effect.

From within the OCI Console, visit your VM from ***Menu > Compute > Instance > Your Instance.***

Click on ***Reboot***.

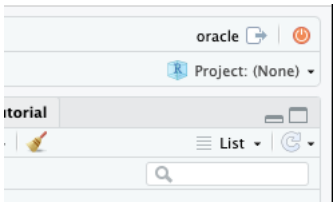
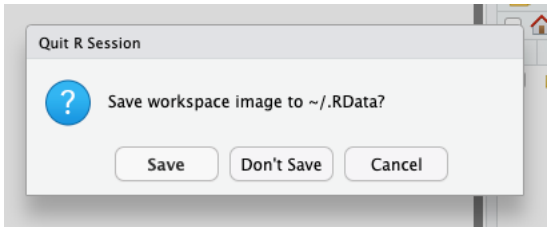


Re-Establish the SSH Tunnel and Login via the browser. ***ssh rstudio-server*** ***localhost:8787*** ***Login with the oracle user.***	

We can then start querying our Autonomous Data Warehouse.
 	
Load in R Oracle Library
 	
Instantiate Driver
 	
Establish Connect
 	
Submit Query
 	
Print Results
	
	`> library(ROracle)`
	`>`
	`> drv <- dbDriver("Oracle")`
	`>`
	`> con <- dbConnect(drv, dbname="[redacted]", username="[redacted]", password="[redacted]")`
	`>`
	`> res <- dbGetQuery(con, 'select [redacted] count(*) as searches from [redacted]')`
	`>`
	`> typeof(res)`
	`[1] "list"`
	`>`
	`> res`
	FORCE SEARCHES
	1 Dorset 18188
	2 West Yorkshire 79461
	3 South Wales 53740
	4 North Wales 17539
	5 British Transport Police 31125
	6 South Yorkshire 43868
	7 Bedfordshire 13532
	8 Cumbria 12684
	9 Dyfed Powys 17364
	10 West Midlands 108735
	11 Gloucestershire 10559
	12 Gwent 14139
	13 Suffolk 13508

R Code Listed.	`> library(ROracle)`
	`>`
	`> drv <- dbDriver("Oracle")`
	`>`
	`> con <- dbConnect(drv, dbname="service_name", username="username", password="password")`
	`>`
	`> res <- dbGetQuery(con, 'select 1 from dual')`
	`>`
	`> typeof(res)`
	`>`
	`> res`

You can then disconnect from the DB
 	
dbDisconnect(con)
	`>`
	`>`
	`>`
	`>`
	`> dbDisconnect(con)`
	`[1] TRUE`
	`>`

You can then disconnect from the R Studio Session using the ***'Red Power Icon'*** in the top right. You will then be prompted to save you workspace if you wish.	 
Once done you can close the R Studio browser tab and exit the SSH Tunnel. ***exit***	
Finally, you can shut down your R Studio Serve VM when it is not in use from the OCI Console. ***Menu > Compute > Instance > Your Instance*** ***Click Stop.***