
Oracle Cloud Infrastructure Labs

Creating Oracle Linux Images

V2.0

ORACLE LAB BOOK | APRIL 2018



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ORACLE®



1. Disclaimer

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2. Overview

Lab Overview

The lab exercises are designed to complement your training, reinforcing the key concepts by applying and demonstrating what you learned in the presentation sessions. This lab book is comprised of individual exercises. These exercises allow you to get first hands-on exposure working with the Oracle OCI Infrastructure Cloud, where you will see how key features and functionality are deployed in the software. Using what you learn in the presentations and individual exercises working with the software, you will collaborate as a team in developing and delivering practice presentations.

Launch and configure a Virtual Machine (VM) Instance in Oracle OCI

In the lab you will create an Oracle Linux instance, add a 2. Disk and mount it, install VNC and install Oracle 12c. Client on the instance.

Configure your Cloud

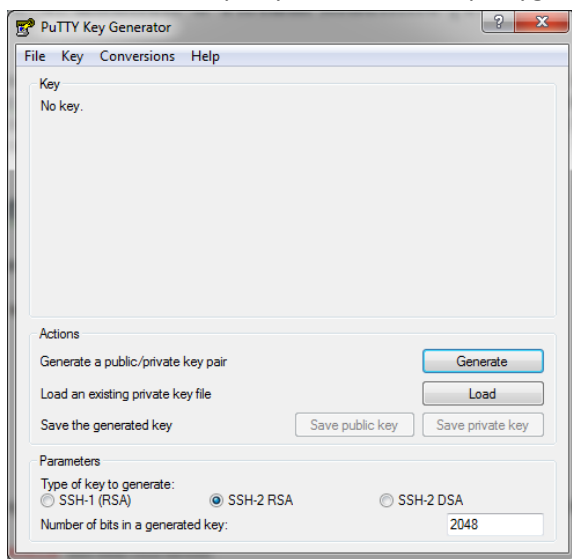
Prereq

To build the instance is to have a public/private key set, used for ssh authentication. It is strongly recommended to use public/private key and block for any login with username/password. Always protect the private key with a passphrase.

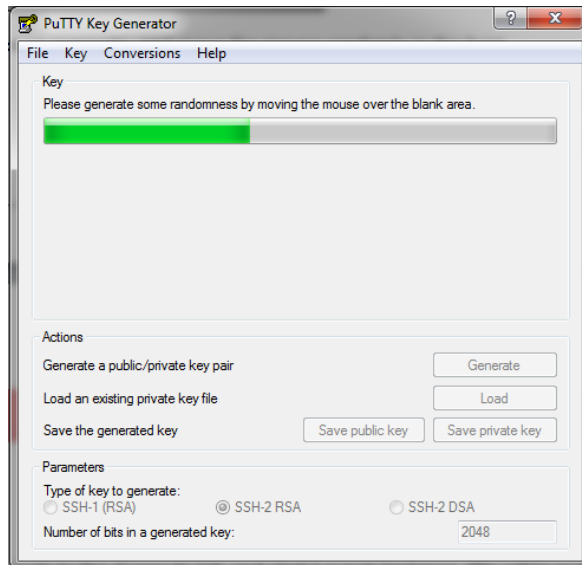
2.1 Generation of public and private key.

For the generation of a public/private key set.

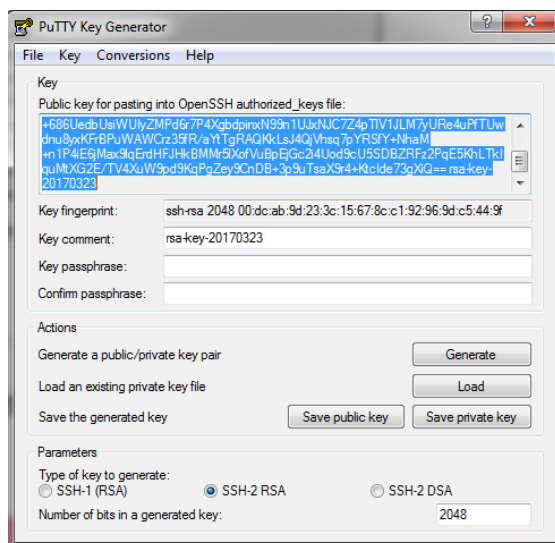
1. For windows with putty installed, start puttygen

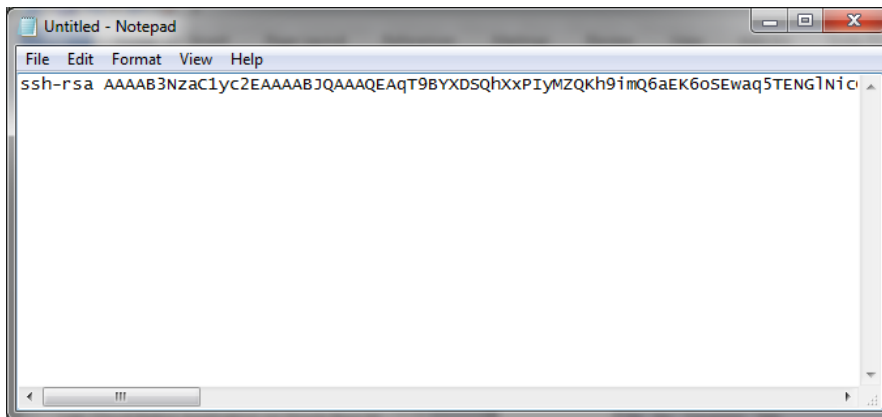


2. Click on generate, and move the mouse randomly in the field

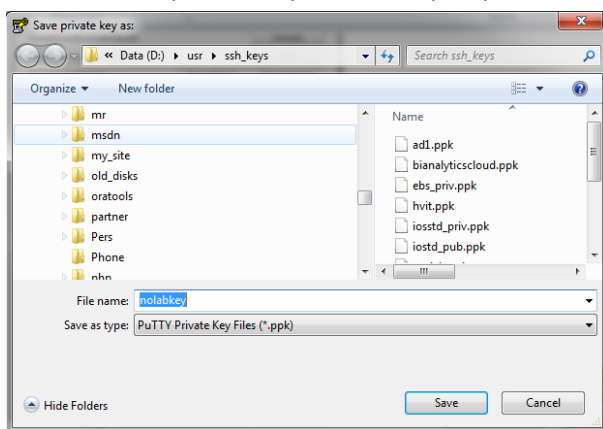


3. When the key is generated, copy the public key onto ie. notepad





4. Save the private key and add a passphrase.

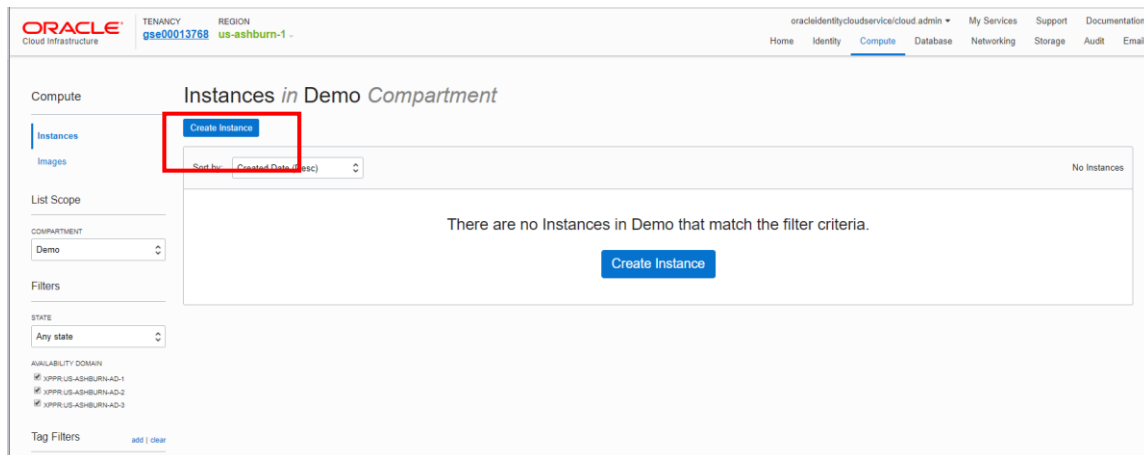


For Mac and Linux, please refer to ie. <https://help.github.com/articles/generating-a-new-ssh-key-and-adding-it-to-the-ssh-agent/#platform-mac>

2.2 Create the VM

Navigate to the Compute tab and click Launch Instance. We will launch a VM instance for this lab

Make sure you have selected the correct compartment.



In order to launch the instance, choose an image (Oracle Linux 7.4), choose a shape of the instance (VM.Standard1.4), AD to launch the instance (choose the correct AD as per below), the VCN network, subnet and the public SSH keys (generated in previous step) to access the instance. In this lab, we will focus on launching only a single instance VM in one AD. Provide the values as shown below and click on Launch Instance. If you get host out of capacity error, choose a different AD and try again. As you select a specific AD, the subnet dropdown will show you the correct subnet for the particular AD.

Create Instance

[help](#) [cancel](#)

If the image, Virtual Cloud Network, or Subnet is in a different Compartment than the Instance, [click here](#) to enable Compartment selection for those resources.

Instance

NAME

instance-20180417-1244

AVAILABILITY DOMAIN

xppR:US-ASHBURN-AD-1

BOOT VOLUME

☒ ORACLE-PROVIDED OS IMAGE ☐ CUSTOM IMAGE ☐ BOOT VOLUME ☐ IMAGE OCID

IMAGE OPERATING SYSTEM

Oracle Linux 7.4

The image will be booted using native mode.

SHAPE TYPE

☒ VIRTUAL MACHINE ☐ BARE METAL MACHINE

SHAPE

VM.Standard2.1 (1 OCPU, 15GB RAM)

Shape compatibility based on selected operating system.

IMAGE VERSION

2018.02.21-1 (latest)

[Release Notes](#)

BOOT VOLUME SIZE (IN GB)

Selected image's default boot volume size: 47.0 GB

☐

CUSTOM BOOT VOLUME SIZE

SSH KEYS

☐ CHOOSE SSH KEY FILES

☒ PASTE SSH KEYS

SSH KEYS

☐ CHOOSE SSH KEY FILES

☒ PASTE SSH KEYS

SSH KEY

ssh-rsa AAAAB3NzaC1yc2EAAAABJQAAAQEAJjJmN1eQib7C+KgHCv+gAglqKkPTFkoywBoOnZn1Fvw5lwpyzOGEOCAKoiTd2W

Add SSH Key

Show Advanced Options

Networking

VIRTUAL CLOUD NETWORK

Nolab13768

SUBNET

Public Subnet xppR:US-ASHBURN-AD-1

☒ ASSIGN PUBLIC IP ADDRESS

Show Advanced Options

TAGS

Tagging is a metadata system that allows you to organize and track resources within your tenancy. Tags are composed of keys and values which can be attached to resources.

[Learn more about tagging](#)

TAG NAMESPACE

None (apply a free-form tag)

TAG KEY

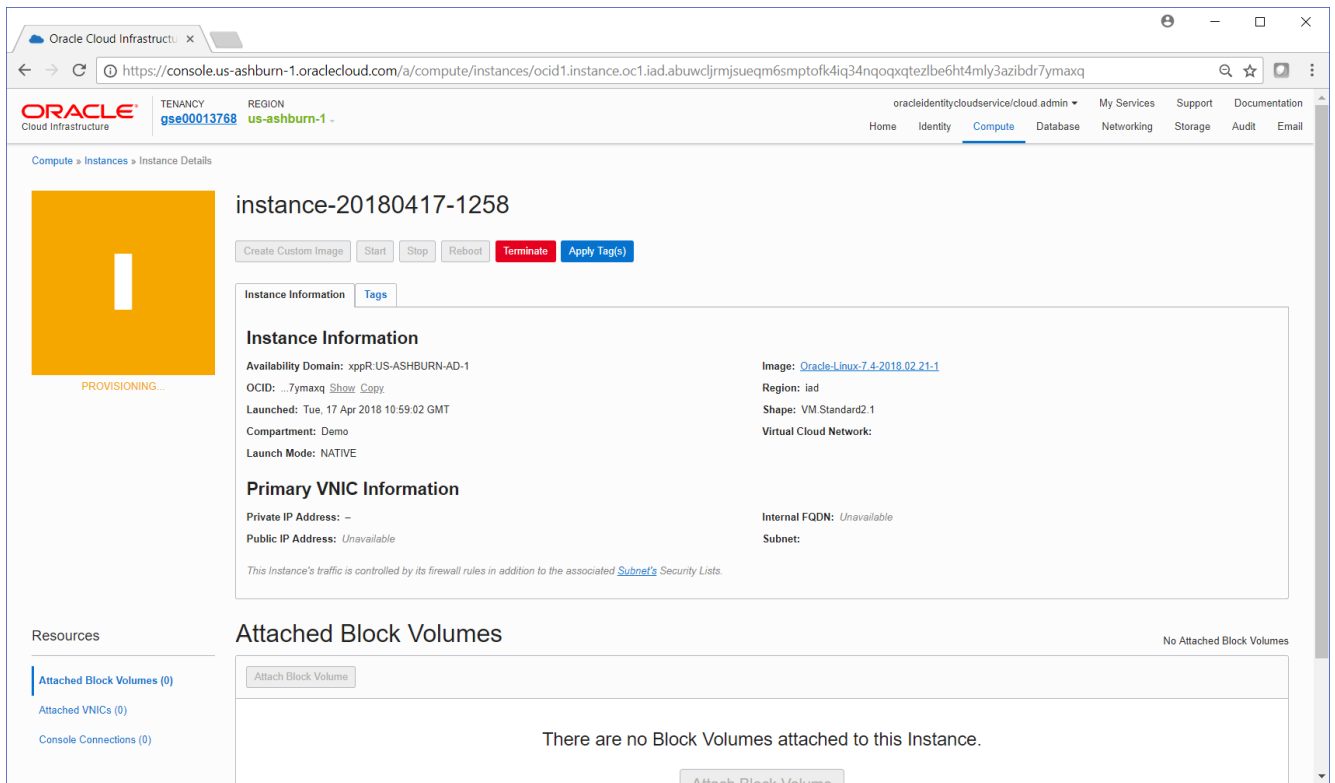
VALUE

+

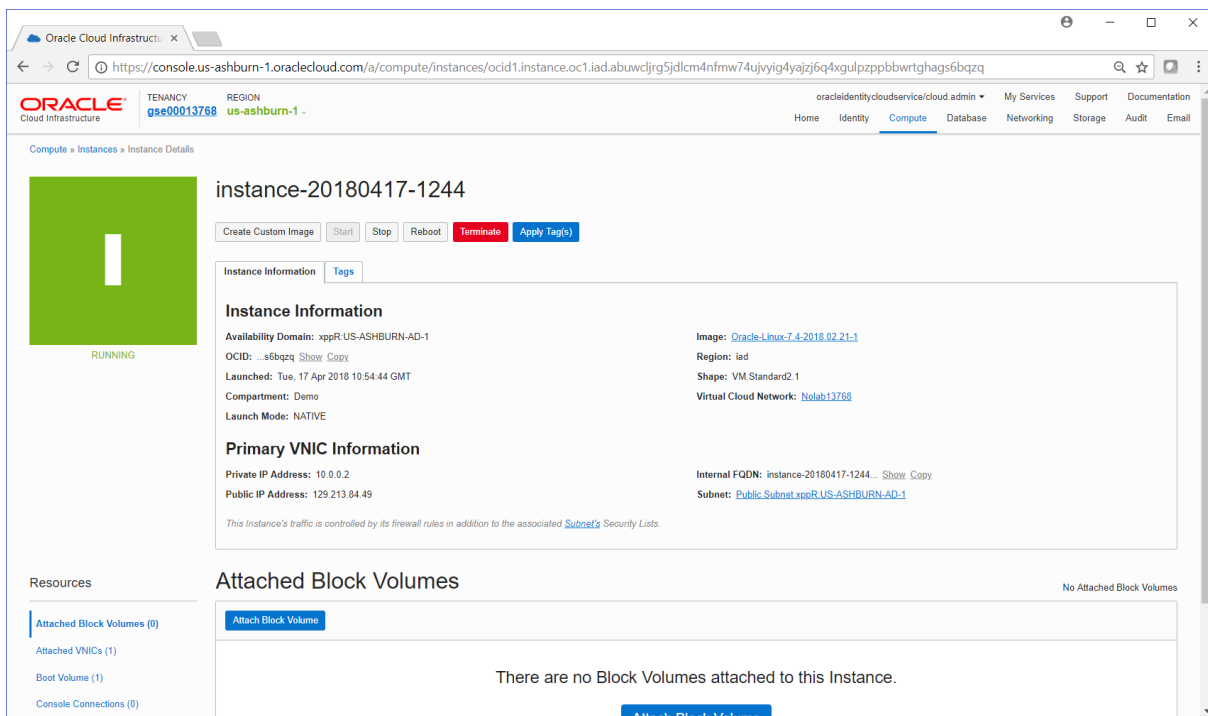
☒ View detail page after this instance is launched

Create Instance

Launching an instance is simple and intuitive with few options to select. You will see a screen like this with the provisioning underway:



When the instance creation is complete the screen looks like this:



2.3 Connect to the Instance

1. Once the instance state changes to Running, you can SSH to the Public IP address of the instance. Click on the labvm01 and you will find the public IP address listed there.

instance-20180417-1244

Create Custom Image Start Stop Reboot Terminate Apply Tag(s)

Instance Information Tags

Instance Information

Availability Domain: xppR:US-ASHBURN-AD-1
OCID: ...s6bqzq [Show](#) [Copy](#)
Launched: Tue, 17 Apr 2018 10:54:44 GMT
Compartment: Demo
Launch Mode: NATIVE

Image: [Oracle-Linux-7.4-2018.02.21-1](#)
Region: iad
Shape: VM.Standard2.1
Virtual Cloud Network: [Nolab13768](#)

Primary VNIC Information

Private IP Address: 10.0.0.2
Public IP Address: 129.213.84.49

Internal FQDN: instance-20180417-1244... [Show](#) [Copy](#)
Subnet: [Public Subnet xppR:US-ASHBURN-AD-1](#)

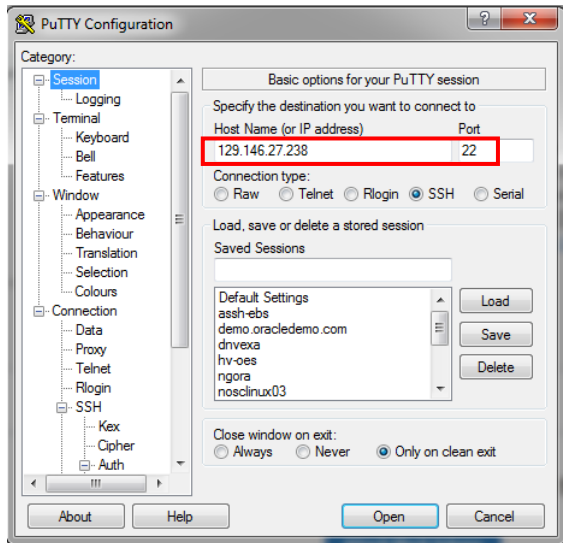
This Instance's traffic is controlled by its firewall rules in addition to the associated [Subnet's](#) Security Lists.

2. SSH to the instance and mount the Volume as provided in next section.

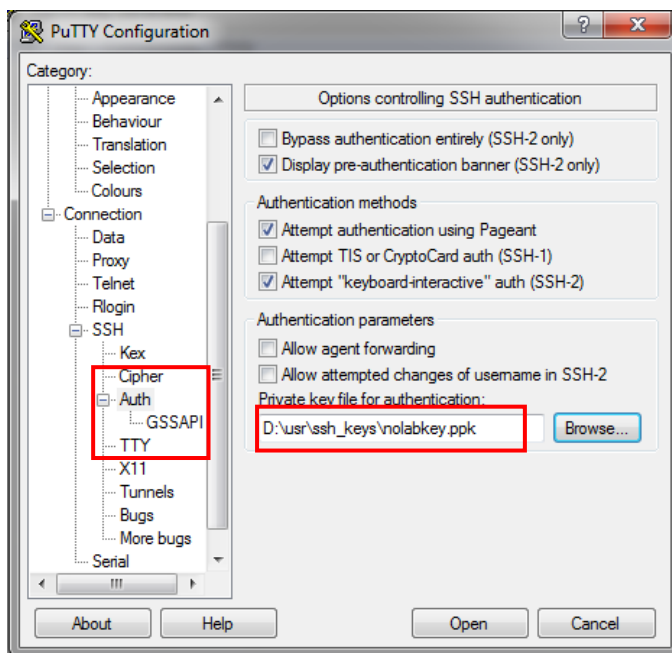
You can use the following command to SSH into the OCI VM on UNIX-style system (including Linux, Solaris, BSD, and OS X).

```
$ ssh -i </path/privateKey> <PublicIP_Address>
```

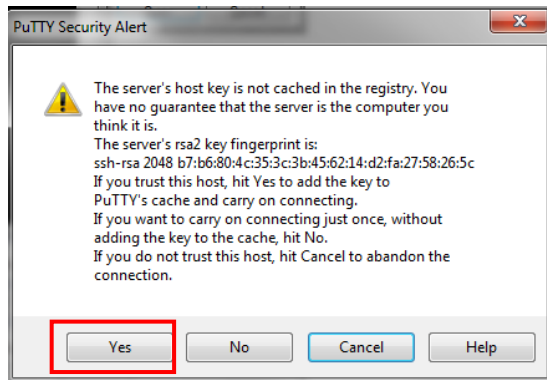
- For windows, use a tool like PUTTY as shown below – provide the public IP address of the OCI VM.



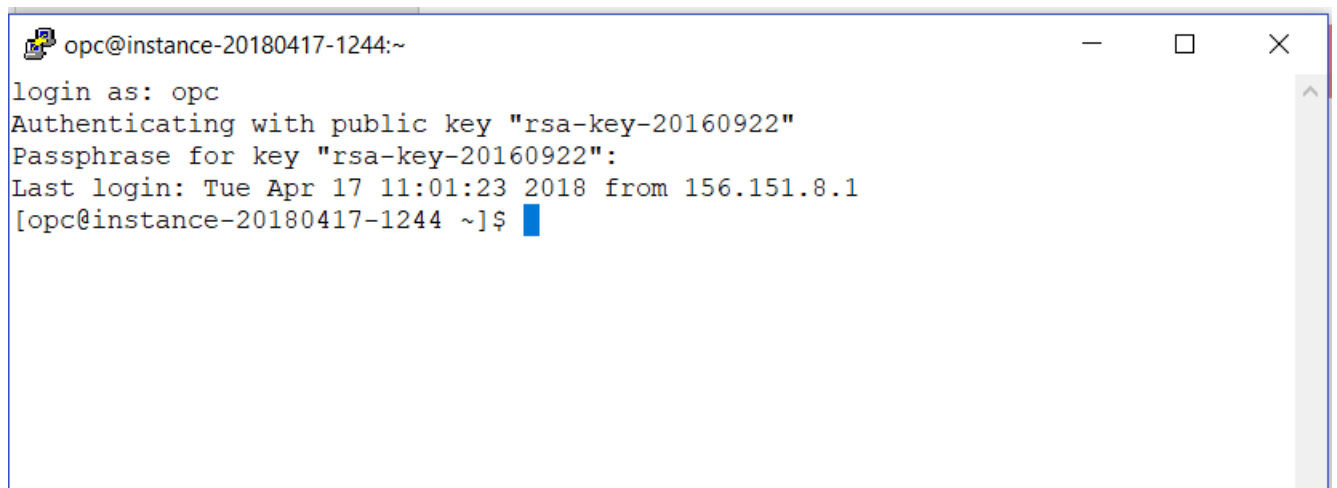
- Expand on SSH in the LHS menu, click on Auth. Click on browse, and provide the Private SSH key that you had saved in Exercise 1.



5. Click on Yes in the PuTTY Security Alert window.



6. Login with the user name **opc** as shown below.

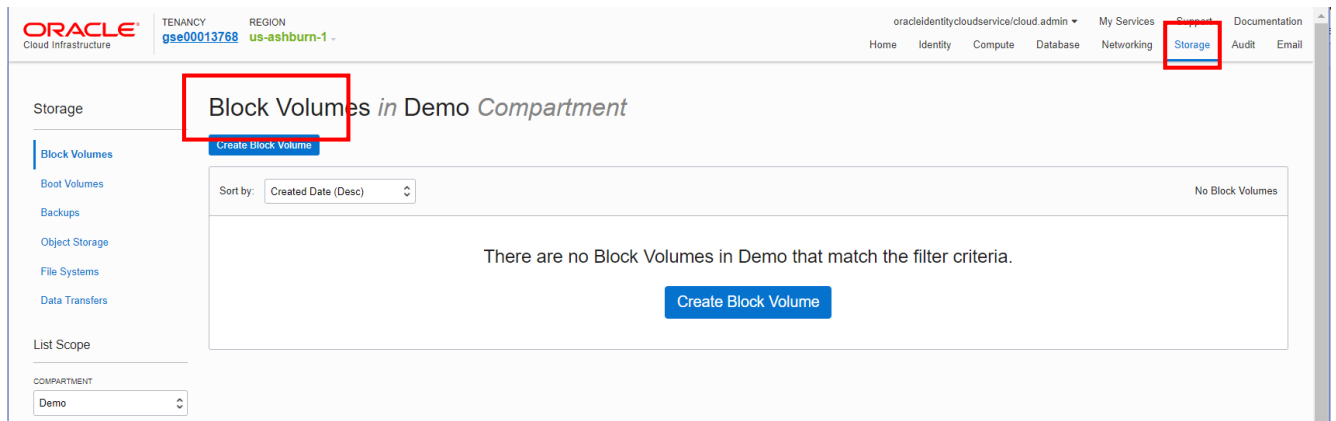


Key Takeaway:

- ✓ Customers can reboot their instance (Stop and Start) and Oracle Bare Metal Cloud Services preserves their Private IP address and Public IP address.

2.4 Create and Mount Block Volume Storage

1. Navigate to the Storage tab on top right hand corner and click on Create Block Volume.



2. Click on Create Block Volume that opens the window below and fill in the appropriate information as below. Make sure that your block volume is in the same AD as your instance. You can choose a 256.0 GB volume for this lab. Click Create Block Volume.

Create Block Volume

[help](#)[cancel](#)

CREATE IN COMPARTMENT

Demo

NAME

u01_drive

AVAILABILITY DOMAIN

xppR:US-ASHBURN-AD-1

SIZE (IN GB)

256

Size must be between 50 GB and 16384 GB (16 TB). Volume performance varies with volume size.

BACKUP POLICY

None

TAGS

Tagging is a metadata system that allows you to organize and track resources within your tenancy. Tags are composed of keys and values which can be attached to resources.

[Learn more about tagging](#)

TAG NAMESPACE

None (apply a free-form tag)

TAG KEY

VALUE

☒ View detail page after this resource is created

Create Block Volume

Check that the block volume has been created

Storage > Block Volumes > Block Volume Details

u01_drive

[Detach from Instance](#)
[Delete Block Volume](#)
[Apply Tag\(s\)](#)

Block Volume Information [Tags](#)

OCID: ...jcxopa [Show](#) [Copy](#)
 Size: 256.0 GB
 Created: Tue, 17 Apr 2018 11:05:45 GMT
 Backup Policy: None [Assign](#)

Attached Instance: None in this Compartment.
 Availability Domain: xppR-US-ASHBURN-AD-1
 Hydrated: true

Resources

- Backups (0)
- Clones (0)

Backups

[Create Backup](#)

There are no Backups for this Block Volume.

[Create Backup](#)

3. Once the Block Volume is created, you can attach it to the VM instance you just launched. Go to the Compute instance tab, and navigate to the VM instance and click on the Attach Block Volume button.

ORACLE Cloud Infrastructure

TENANCY [gse00013768](#) REGION [us-ashburn-1](#)

oracleidentitycloudservice/cloud.admin My Services Support Documentation

Home Identity Compute Database Networking Storage Audit Email

instance-20180417-1244

[Create Custom Image](#)
[Start](#)
[Stop](#)
[Reboot](#)
[Terminate](#)
[Apply Tag\(s\)](#)

Instance Information [Tags](#)

Instance Information
 Availability Domain: xppR-US-ASHBURN-AD-1
 OCID: ...s6bqzq [Show](#) [Copy](#)
 Launched: Tue, 17 Apr 2018 10:54:44 GMT
 Compartment: Demo
 Launch Mode: NATIVE
 Image: [Oracle-Linux-7.4-2018.02.21-1](#)
 Region: iad
 Shape: VM.Standard2.1
 Virtual Cloud Network: [Nolab13768](#)

Primary VNIC Information
 Private IP Address: 10.0.0.2
 Public IP Address: 129.213.84.49
 Internal FQDN: instance-20180417-1244. [Show](#) [Copy](#)
 Subnet: [Public Subnet xppR-US-ASHBURN-AD-1](#)

This Instance's traffic is controlled by its firewall rules in addition to the associated [Subnet's](#) Security Lists.

Resources

- Attached Block Volumes (0)
- Attached VNICs (1)
- Boot Volume (1)
- Console Connections (0)

Attached Block Volumes

[Attach Block Volume](#)

There are no Block Volumes attached to this Instance.

[Attach Block Volume](#)

4. Select the block volume you created earlier from the drop down and click on attach.

Attach Block Volume [help](#) [cancel](#)

Choose how you want to attach your block volume.

☒ iSCSI
☐ PARAVIRTUALIZED

This instance supports only iSCSI attachments. Check [Documentation](#) for details.

BLOCK VOLUME COMPARTMENT
Demo

BLOCK VOLUME
u01_drive

REQUIRE CHAP CREDENTIALS
☐

ACCESS
☒ READ/WRITE
☐ READ-ONLY

Attach

Note: For the purpose of this lab, leave the “Require CHAP Credentials” box unchecked. In customer scenarios, this provides added authentication to attach the volume with an instance.

5. Once the block volume is attached, you can navigate to view the iSCSI details for the volume in order to connect to the volume. It takes a minute for the volume to complete attaching. More details on connecting to volume is in our docs (<https://docs.us-az-phoenix-1.oracleiaas.com/Content/Block/Tasks/connectingtoavolume.htm?Highlight=mounting%20block%20volume>)

Attached Block Volumes

Displaying 1 Attached Block Volumes

[Attach Block Volume](#)



[u01_drive](#)

OCID: ...jcxopa [Show](#) [Copy](#)

Attachment Type: iscsi

Size: 256.0 GB

Availability Domain: xppR-US-ASHBURN-AD-1

Created: Tue, 17 Apr 2018 11:05:45 GMT

Attachment Access: Read/Write

Block Volume Compartment: Demo



Click on the ellipsis and then click **iSCSI Command and Information link**. Connect to the instance through SSH and **run the iSCSI commands** as provided in the iSCSI Command and Information link shown below. The first two commands are for configure iSCSI and the last one is for logging to iSCSI. **Do not proceed without connecting to the volume!** Run these commands one at a time.

ISCSI Commands & Information

[help](#) [close](#)

Use OS tools to edit your /etc/fstab volume to have the _netdev and nofail options from the OS. Failure to run commands will cause instance boot failure.

ATTACH COMMANDS

```
sudo iscsiadm -m node -o new -T iqn.2015-12.com.oracleiaas:703547e1-0905-4ac7-be93-4966feff4b00 -p 169.254.2.2
sudo iscsiadm -m node -o update -T iqn.2015-12.com.oracleiaas:703547e1-0905-4ac7-be93-4966feff4b00 -n node.sta
sudo iscsiadm -m node -T iqn.2015-12.com.oracleiaas:703547e1-0905-4ac7-be93-4966feff4b00 -p 169.254.2.2:3260 -
```

[Copy](#)

DETACH COMMANDS

```
sudo iscsiadm -m node -T iqn.2015-12.com.oracleiaas:703547e1-0905-4ac7-be93-4966feff4b00 -p 169.254.2.2:3260 -
sudo iscsiadm -m node -o delete -T iqn.2015-12.com.oracleiaas:703547e1-0905-4ac7-be93-4966feff4b00 -p 169.254.
```

[Copy](#)

IP ADDRESS AND PORT

[Copy](#)

VOLUME IQN

[Copy](#)

```
root@instance-20180417-1244:/home/opc
login as: opc
Authenticating with public key "rsa-key-20160922"
Passphrase for key "rsa-key-20160922":
Last login: Tue Apr 17 11:01:23 2018 from 156.151.8.1
[opc@instance-20180417-1244 ~]$ sudo bash
[root@instance-20180417-1244 opc]# sudo iscsiadm -m node -o new -T iqn.2015-12.com.oracleiaas:703547e1-0905-4ac7-be93-4966feff4b00 -p 169.254.2.2:3260
New iSCSI node [tcp:[hw=,ip=,net_if=,iscsi_if=default] 169.254.2.2,3260,-1 iqn.2015-12.com.oracleiaas:703547e1-0905-4ac7-be93-4966feff4b00] added
[root@instance-20180417-1244 opc]# sudo iscsiadm -m node -o update -T iqn.2015-12.com.oracleiaas:703547e1-0905-4ac7-be93-4966feff4b00 -n node.startup -v automatic
[root@instance-20180417-1244 opc]# sudo iscsiadm -m node -T iqn.2015-12.com.oracleiaas:703547e1-0905-4ac7-be93-4966feff4b00 -p 169.254.2.2:3260 -l
Logging in to [iface: default, target: iqn.2015-12.com.oracleiaas:703547e1-0905-4ac7-be93-4966feff4b00, portal: 169.254.2.2,3260] (multiple)
Login to [iface: default, target: iqn.2015-12.com.oracleiaas:703547e1-0905-4ac7-be93-4966feff4b00, portal: 169.254.2.2,3260] successful.
[root@instance-20180417-1244 opc]#
```

6. You can now format (if needed) and mount the volume. To get a list of mountable iSCSI devices on the instance, run the following command:

```
[opc@instance-20180417-1244 ~]$ sudo bash
[root@instance-20180417-1244 ~]# fdisk -l
```

7. Run the following commands

```
[root@instance-20180417-1244 ~]# mkfs -t ext4 /dev/sdb
# Press y when prompted
[root@instance-20180417-1244 ~]# mkdir /mnt/home
[root@instance-20180417-1244 ~]# mount /dev/sdb /mnt/home
```

Verify with the df command

```
[root@instance-20180417-1244 opc]# df -h
Filesystem      Size  Used Avail Use% Mounted on
devtmpfs        7.2G     0  7.2G   0% /dev
tmpfs           7.3G     0  7.3G   0% /dev/shm
tmpfs           7.3G   8.5M  7.3G   1% /run
tmpfs           7.3G     0  7.3G   0% /sys/fs/cgroup
/dev/sda3       39G   1.8G   37G   5% /
/dev/sda1       512M   9.8M  502M   2% /boot/efi
tmpfs           1.5G     0  1.5G   0% /run/user/0
tmpfs           1.5G     0  1.5G   0% /run/user/1000
/dev/sdb        252G   61M  239G   1% /mnt/home
```

Update linux with latest updates

Update linux with yum

```
[root@instance-20180417-1244 ~]# yum update -y
```

```
root@instance-20180417-1244:/home/opc
/dev/sda1      512M  9.8M  502M   2% /boot/efi
tmpfs          1.5G    0  1.5G   0% /run/user/0
tmpfs          1.5G    0  1.5G   0% /run/user/1000
/dev/sdb       252G   61M  239G   1% /mnt/home
[root@instance-20180417-1244 opc]# yum update -y
Loaded plugins: langpacks, ulninfo
ksplice-uptrack                | 951 B      00:00
ol7_UEKR4                      | 1.2 kB     00:00
ol7_addons                    | 1.2 kB     00:00
ol7_developer                 | 1.2 kB     00:00
ol7_developer_EPEL           | 1.2 kB     00:00
ol7_latest                    | 1.4 kB     00:00
ol7_optional_latest          | 1.2 kB     00:00
ol7_preview                   | 1.2 kB     00:00
ol7_software_collections     | 1.2 kB     00:00
(1/18): ol7_addons/x86_64/primary | 82 kB     00:00
(2/18): ksplice-uptrack/7Server/x86_64/primary | 2.3 kB     00:00
(3/18): ol7_UEKR4/x86_64/primary | 32 MB     00:00
(4/18): ol7_UEKR4/x86_64/updateinfo | 172 kB     00:00
(5/18): ol7_addons/x86_64/updateinfo | 42 kB     00:00
(6/18): ol7_latest/x86_64/group | 659 kB     00:00
(7/18): ol7_developer/x86_64/updateinfo | 134 B     00:00
(8/18): ol7_latest/x86_64/updateinfo | 1.7 MB     00:00
(9/18): ol7_optional_latest/x86_64/updateinfo | 1.2 MB     00:00
```

Create and configure the oracle user

Step1: Create the oracle user

For the oracle user two groups is created oinstall and dba. Oinstall will be default group during logon. A additional directory will be created in the /mnt/home/home directory.

First create the groups and add user

```
[root@instance-20180417-1244 ~]# groupadd -g 600 dba
```

```
[root@instance-20180417-1244 ~]# groupadd -g 601 oinstall
```

Create the oracle user and add supplemental groups

```
[root@instance-20180417-1244 ~]# useradd -g oinstall oracle  
[root@instance-20180417-1244 ~]# usermod -G dba oracle
```

It could be convenient to be able to su directly from user opc to user oracle. Define a password for oracle.

An alternative is to use `sudo su - oracle` over `su - oracle` with password

Set password for user oracle to Oracle123

```
[root@instance-20180417-1244 ~]# passwd oracle  
Changing password for user oracle.  
New password:  
BAD PASSWORD: it is based on a dictionary word  
Retype new password:  
passwd: all authentication tokens updated successfully.
```

The simple approach is to configure the oracle user to use the same public key as opc. Copy the SSH key for user opc

```
[root@instance-20180417-1244 ~]# cd /home/oracle  
[root@instance-20180417-1244 ~]# cp -R /home/opc/.ssh .  
[root@instance-20180417-1244 ~]# chown -R oracle:oinstall .ssh
```

2.5 Download and Configure VNC

This lab is added. Often software require a UI or browser to install. Most VM's in the OCI Classic and OCI cloud services is without UI, just stripped to the command line. This procedure will give you a UI for the VM.

There are the steps needed for downloading and installing vnc server:

- Update the Linux installation on the VM
- Install required X-resources on the VM
- Install tigervnc server
- Configure the tigervnc server
- Create SSH tunnel for the vnc traffic
- Connect with vnc viewer from local laptop to VM

Step1: Add additional features to the Linux installation on the instance

Download wget , zip and unzip for pulling an image from a web page, and unpack software

```
[root@instance-20180417-1244 ~]# yum install wget -y
[root@instance-20180417-1244 ~]# yum install zip -y
[root@instance-20180417-1244 ~]# yum install unzip -y
```

Disable the firewall since we are sitting behind the cloud firewall (OEL 6)

```
[root@instance-20180417-1244 ~]# sh /etc/init.d/iptables stop
```

Disable the firewall since we are sitting behind the cloud firewall (OEL 7)

```
[root@instance-20180417-1244 ~]# systemctl stop firewalld
[root@instance-20180417-1244 ~]# systemctl disable firewalld
```

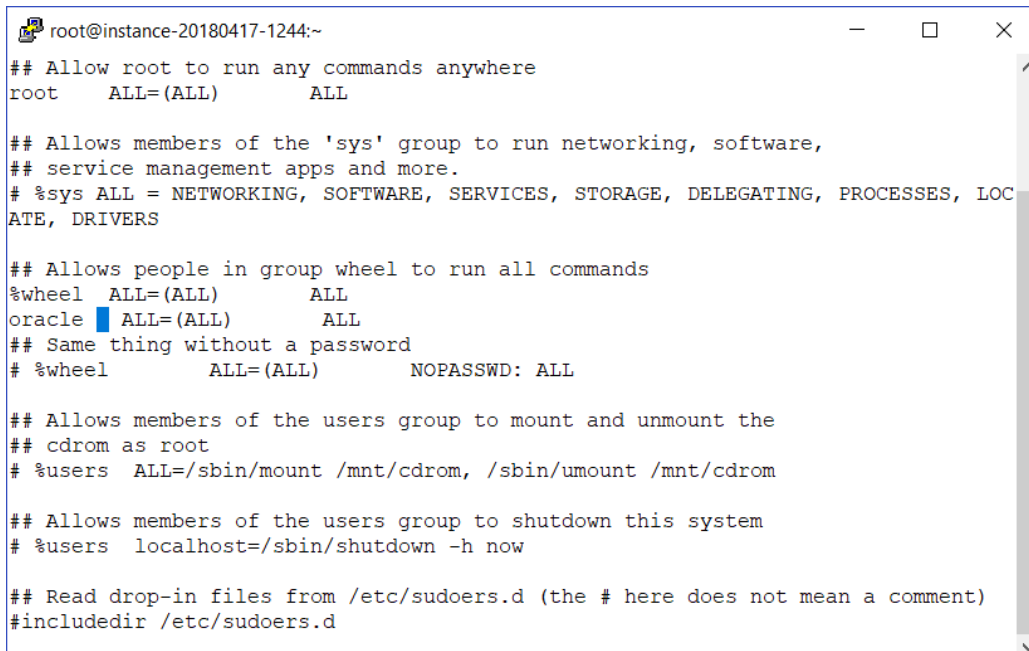
Create the directory for ORACLE_BASE (oracle software install) (sudo to root)

```
[root@instance-20180417-1244 ~]# mkdir /mnt/home/oracle
[root@instance-20180417-1244 ~]# chown oracle:oinstall /mnt/home/oracle
```

The final step is to add user oracle to the sudoers file. Edit the file /etc/sudoers and add the line:

```
oracle    ALL=(ALL)        NOPASSWD: ALL
```

Tip of the day, /etc/sudoers is write protected. If you use vi, save changes with :w!, and exit with :q



```
root@instance-20180417-1244:~
## Allow root to run any commands anywhere
root    ALL=(ALL)        ALL

## Allows members of the 'sys' group to run networking, software,
## service management apps and more.
# %sys ALL = NETWORKING, SOFTWARE, SERVICES, STORAGE, DELEGATING, PROCESSES, LOC
ATE, DRIVERS

## Allows people in group wheel to run all commands
%wheel  ALL=(ALL)        ALL
oracle  ALL=(ALL)        ALL
## Same thing without a password
# %wheel    ALL=(ALL)        NOPASSWD: ALL

## Allows members of the users group to mount and unmount the
## cdrom as root
# %users  ALL=/sbin/mount /mnt/cdrom, /sbin/umount /mnt/cdrom

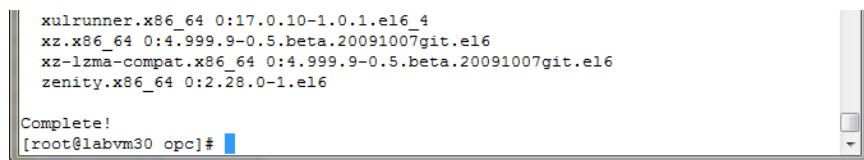
## Allows members of the users group to shutdown this system
# %users  localhost=/sbin/shutdown -h now

## Read drop-in files from /etc/sudoers.d (the # here does not mean a comment)
#includedir /etc/sudoers.d
```

Step 2a: Install required X-resources on the instance, OEL6

Install required X-Software

```
[root@labvm30 opc]# yum groupinstall "X Window System" "Desktop" "Desktop Platform" "General Purpose Desktop" -y
```



```
xulrunner.x86_64 0:17.0.10-1.0.1.el6_4
xz.x86_64 0:4.999.9-0.5.beta.20091007git.el6
xz-lzma-compat.x86_64 0:4.999.9-0.5.beta.20091007git.el6
zenity.x86_64 0:2.28.0-1.el6

Complete!
[root@labvm30 opc]#
```

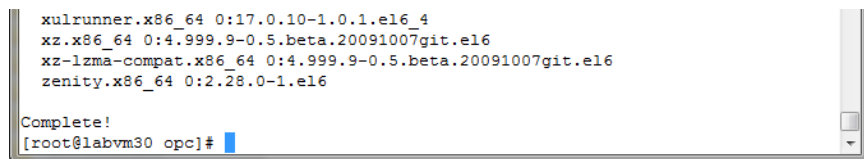
Install X-Init

```
[root@labvm30 opc]# yum install xorg-x11-xinit-session -y
```

Step 2a: Install required X-resources on the instance, OEL7

Install required X-Software

```
[root@instance-20180417-1244 ~]# yum install mesa-libGL -y
[root@instance-20180417-1244 ~]# yum groupinstall "Server with GUI" -y
```



```
xulrunner.x86_64 0:17.0.10-1.0.1.el6_4
xz.x86_64 0:4.999.9-0.5.beta.20091007git.el6
xz-lzma-compat.x86_64 0:4.999.9-0.5.beta.20091007git.el6
zenity.x86_64 0:2.28.0-1.el6

Complete!
[root@labvm30 opc]#
```

Step 3: Install and configure tigervnc server

Install TigerVNC server

```
[root@instance-20180417-1244 ~]# yum install tigervnc-server -y
```

Tiger VNC requires the dbus service to be running (OEL 6 Only)

```
[root@labv05 init.d]# /etc/init.d/messagebus start
```


Exit back to your `opc` user, and `sudo` to user `oracle`. Do an initial start of `vncserver`. This generates the `.vnc` directory. Enter password `Oracle123`.

```
$[root@instance-20180417-1244 ~]# exit
Exit
[opc@instance-20180417-1244 ~]$ sudo su - oracle
[oracle@instance-20180417-1244 ~]$ vncserver :1

You will require a password to access your desktops.

Password:

Verify:

xauth:  file /home/oracle/.Xauthority does not exist

xauth: (stdin):1:  bad display name "labvm30:1" in "add" command

New 'labvm30:1 (oracle)' desktop is labvm30:1

Creating default startup script /home/oracle/.vnc/xstartup
Starting applications specified in /home/oracle/.vnc/xstartup
Log file is /home/oracle/.vnc/labvm30:1.log
```

Stop the `vnc` server with the `-kill` option

We now need to create a `xstartup` file that gives a normal `gnome` desktop. To do this:

- `cd` to `.vnc`
- Rename `xstartup` to `xstartup_old`
- Create a new `xstartup`
- Set file permissions correctly

Set correct directory and kill the `vncserver`

```
[oracle@ instance-20180417-1244 ~]$ cd .vnc
[oracle@ instance-20180417-1244 .vnc]$ vncserver -kill :1
```

Rename `xstartup`

```
[oracle@instance-20180417-1244 .vnc]$ mv xstartup xstart_org
```

Create new `xstartup` file

```
[oracle@instance-20180417-1244 .vnc]$ vi xstartup
```

Enter the following content to the new `xstartup` file

```
#!/bin/sh
```

```
# Uncomment the following two lines for normal desktop:

unset SESSION_MANAGER

exec /etc/X11/xinit/xinitrc

[ -x /etc/vnc/xstartup ] && exec /etc/vnc/xstartup

[ -r $HOME/.Xresources ] && xrdp $HOME/.Xresources

xsetroot -solid grey

vncconfig -iconic &

xterm -geometry 80x24+10+10 -ls -title "$VNCDESKTOP Desktop" &

#twm &

gnome-session&
```

Set file permissions and restart the vncserver

```
[oracle@instance-20180417-1244 .vnc]$ chmod a+x xstartup

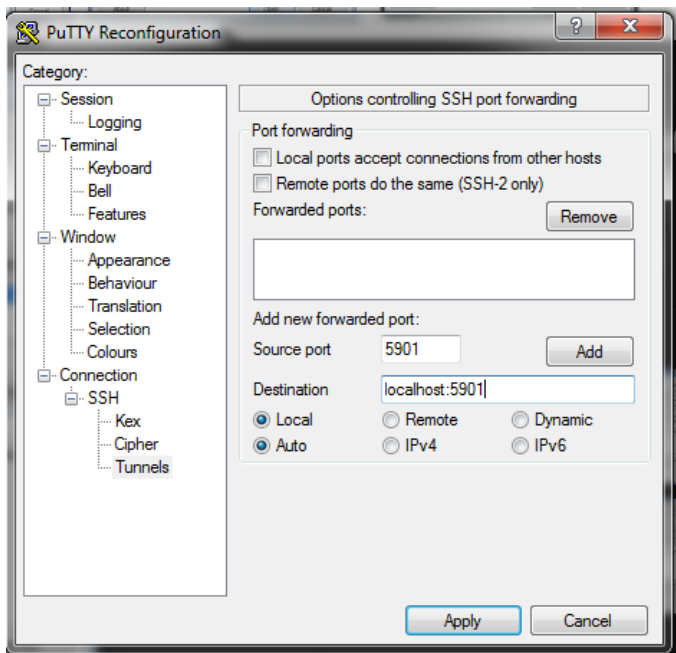
[oracle@instance-20180417-1244 .vnc]$ vncserver :1
```

Step 4: Create SSH tunnel for the vnc traffic

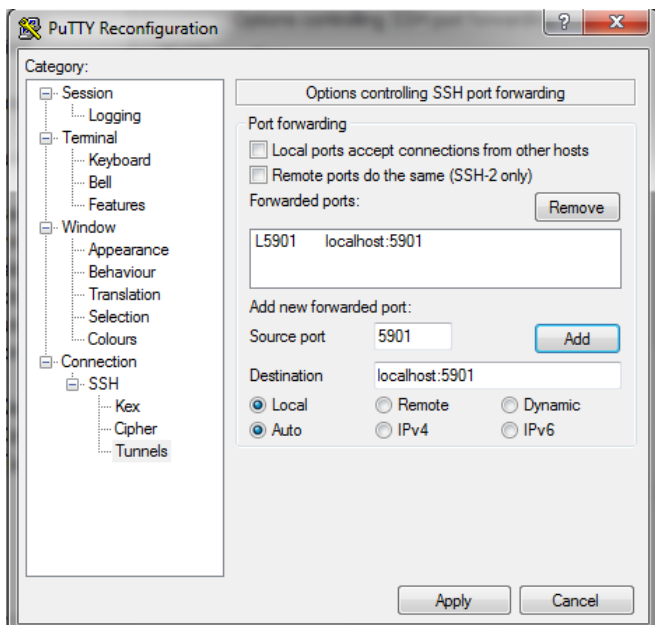
For security reasons we have not opened the firewall for the X- or VNC traffic. The best option, if not a VPN gateway is installed, is to tunnel the vnc traffic via ssh, in our case with putty.

Go to putty change setting, and click on connection ->ssh->Tunnels

Enter source port 5901 and destination localhost:5901 and click add

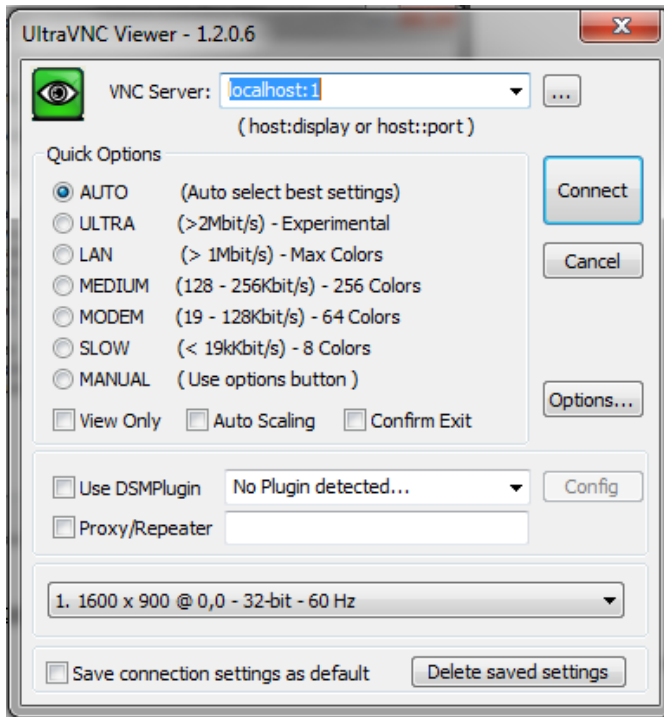


Your putty config should now look like below

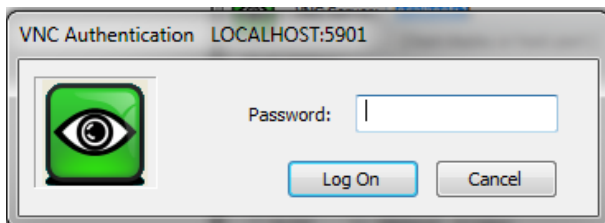


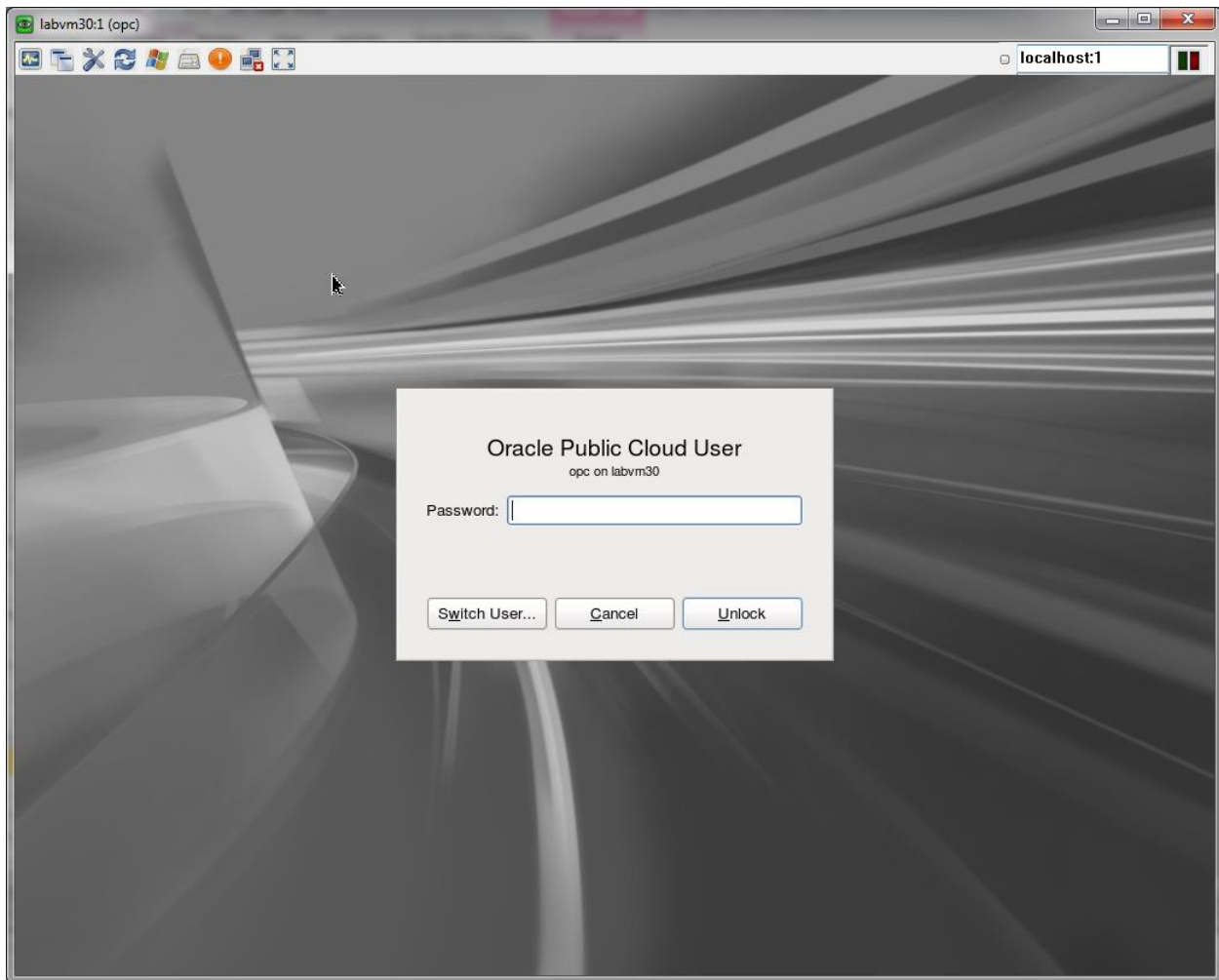
Step 5: Connect with vnc viewer from local laptop to VM

If you run ultravnc or vncviewer, connect to localhost:1



The display should look like the display below:





Step 6: Install firefox

To have access with firefox might be very convenient. Install firefox:

```
[oracle@instance-20180417-1244 .vnc]$ cd  
[oracle@instance-20180417-1244 ~]$ sudo yum install firefox -y
```