How to install Oracle 12c RAC on a VirtualBox Roee Ebenstein

This guide is not a dumb "step by step", but only nearly one. Some steps are skipped (for example – the "user configuration" after the first login to the newly installed Linux machines).

I assume the user is familiar with Linux, and a bit with Oracle, therefore not every step is explained.

The important stuff is explained in a "step by step" with screenshots.

Note: you cannot skip parts of the tutorial, you have to follow the text. The process is likely to fail if you won't follow all that is written.

If I wrote something, it is because without doing it - the process would either fail, or would not behave as expected.

You will need:

Oracle VirtualBox, latest version, installed on your machine (I use version 4.3.30) Oracle Unbreakable Linux installation DVD (version 7.1) Oracle installation disks for 12c - Grid Infrastructure and Database

Your machine should have at least 12GB of RAM and at least 8 cores (more than 4). Your processor has to support virtualization. You will need about 185GB of free hard drive space.

You are expected to have basic understanding of linux (ssh, shell commands, yum, etc.) and Oracle DB (you don't have to be a DBA, but you need to know how to use sqlplus).

You are expected to know how to operate vi, or to migrate whatever I write for vi to a different text editor. Although I usually write how to do stuff in vi, I do expect you to be able to use it without additional help.

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Machine Creation

High level

We will create two machines, each has to have at least 4GB of RAM (we'll use 4.5GB), hard drive of 65GB (dynamic growing, so it won't use this area), at least 2 processors for each (we will use 4), and 3 network adapters each – public, private, and NAT.

VirtualBox machines creation

Create two machines – one named rac01, and the other – rac02.

Notice that at some of the images the machine is named "rac1" – this is because I already created "rac01", and didn't want to rename it – yet you will use "rac01" and "rac02" – on all the demo fields – I show the correct values for you to fill.

In VirtualBox, hit the "new" button, and create "rac01"

	8 ×
G Create	Virtual Machine
Name a	and operating system
Please ch type of o be used t	oose a descriptive name for the new virtual machine and select the perating system you intend to install on it. The name you choose will hroughout VirtualBox to identify this machine.
Name:	rac01
<u>Type</u> :	Linux 🗾 🚭
Version:	Orade (64-bit)
	Hide Description Next Cancel

Assign 4512MB for memory (4096 is the minimum by Oracle, while after installation about 150MB disappear for system purposes – therefore the exaggeration ...):

	R 🗸
Create Virtual Machine	
Memory size	
Select the amount of memory (RAM) in megabytes to be allocat virtual machine.	ed to the
The recommended memory size is 512 MB.	
·····	4512 🚔 MB
4 MB 16384 MB	
Next	Cancel



Create a Virtual disk of type VDI, increasing dynamically (which means – the virtual machine hard drive will be slow, we don't care about it -- the size of the VDI on the host will be as the inhabitant data within the VM – you should expect about 25-35GB):

Create Virtual Machine
Hard drive
If you wish you can add a virtual hard drive to the new machine. You can either create a new hard drive file or select one from the list or from another location using the folder icon.
If you need a more complex storage set-up you can skip this step and make the changes to the machine settings once the machine is created.
The recommended size of the hard drive is 12.00 GB .
Do not add a virtual hard drive
Oreate a virtual hard drive now
Use an existing virtual hard drive file
rac02.vdi (Normal, 65.00 GB)
Create Cancel
? <mark>×</mark>
Create Virtual Hard Drive
Create Virtual Hard Drive
Create Virtual Hard Drive Hard drive file type
Create Virtual Hard Drive Hard drive file type Please choose the type of file that you would like to use for the new virtual hard drive. If you do not need to use it with other virtualization software you can leave this setting unchanged.
 Create Virtual Hard Drive Hard drive file type Please choose the type of file that you would like to use for the new virtual hard drive. If you do not need to use it with other virtualization software you can leave this setting unchanged. VDI (VirtualBox Disk Image)
 Create Virtual Hard Drive Hard drive file type Please choose the type of file that you would like to use for the new virtual hard drive. If you do not need to use it with other virtualization software you can leave this setting unchanged. VDI (VirtualBox Disk Image) VMDK (Virtual Machine Disk)
 Create Virtual Hard Drive Hard drive file type Please choose the type of file that you would like to use for the new virtual hard drive. If you do not need to use it with other virtualization software you can leave this setting unchanged. VDI (VirtualBox Disk Image) VMDK (Virtual Machine Disk) VHD (Virtual Hard Disk) UIDD (Documentation of the provided of the provided
 Create Virtual Hard Drive Hard drive file type Please choose the type of file that you would like to use for the new virtual hard drive. If you do not need to use it with other virtualization software you can leave this setting unchanged. VDI (VirtualBox Disk Image) VMDK (Virtual Machine Disk) VHD (Virtual Hard Disk) HDD (Parallels Hard Disk) OED (OEMU enhanced disk)
 Create Virtual Hard Drive Hard drive file type Please choose the type of file that you would like to use for the new virtual hard drive. If you do not need to use it with other virtualization software you can leave this setting unchanged. VDI (VirtualBox Disk Image) VMDK (Virtual Machine Disk) VHD (Virtual Hard Disk) HDD (Parallels Hard Disk) QED (QEMU enhanced disk) QCOW (QEMU Copy-On-Write)
 Create Virtual Hard Drive Hard drive file type Please choose the type of file that you would like to use for the new virtual hard drive. If you do not need to use it with other virtualization software you can leave this setting unchanged. VDI (VirtualBox Disk Image) VMDK (Virtual Machine Disk) VHD (Virtual Hard Disk) HDD (Parallels Hard Disk) QED (QEMU enhanced disk) QCOW (QEMU Copy-On-Write)
 Create Virtual Hard Drive Hard drive file type Please choose the type of file that you would like to use for the new virtual hard drive. If you do not need to use it with other virtualization software you can leave this setting unchanged. VDI (VirtualBox Disk Image) VMDK (Virtual Machine Disk) VHD (Virtual Hard Disk) HDD (Parallels Hard Disk) QED (QEMU enhanced disk) QCOW (QEMU Copy-On-Write)
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8 ×
Create Virtual Hard Drive
Storage on physical hard drive
Please choose whether the new virtual hard drive file should grow as it is used (dynamically allocated) or if it should be created at its maximum size (fixed size).
A dynamically allocated hard drive file will only use space on your physical hard drive as it fills up (up to a maximum fixed size), although it will not shrink again automatically when space on it is freed.
A fixed size hard drive file may take longer to create on some systems but is often faster to use.
Operation Dynamically allocated
Eixed size
Next Cancel

Create the file, notice where you store it, and do not forget to allocate 65GB for it:

	8
Create Virtual Hard Drive	
File location and size	
Please type the name of the new virtual hard drive file into the box below or click of folder icon to select a different folder to create the file in.	on the
D:\Users\Roee\VirtualBox VMs\rac1\rac01.vdi	
Select the size of the virtual hard drive in megabytes. This size is the limit on the a file data that a virtual machine will be able to store on the hard drive.	mount of
	65,00 GB
4.00 MB 2.00 TB	
Create	Cancel

After the machine was created, right click on it, and hit "settings".

In the "Advanced" tab (of the defaulted menu, "General") checkmark "Show at Top of Screen":

🥝 rac1 - Settings	8 ×
 rac1 - Settings General System Display Storage Audio Network Serial Ports USB Shared Folderr 	General Basic Advanced Description Snapshot Folder: D:\Users\Roee\VirtualBox VMs\rac1\Snapshots Shared Clipboard: Disabled Drag'nDrop: Disabled Removable Media: Remember Runtime Changes Mini ToolBar: Show in Fullscreen/Seamless
Shared Folders	Show at Top of Screen

On the "System" menu, under "Processor" increase the number of the chosen processors to at least 2 (I use 4):

🥝 rac1 - Settings	8 ×
General	System
Display	Motherboard Processor Acceleration
Storage Audio Audio Audio Serial Ports OSB Shared Folders	Execution Cap: 1% Extended Features: V Enable PAE/NX
	OK Cancel <u>H</u> elp



You don't have to,	but you can	activate under	"Display"	the 3D	acceleration:
--------------------	-------------	----------------	-----------	--------	---------------

🥝 rac1 - Settings	le l	? X
 rac1 - Settings General System Display Storage Audio Network Serial Ports USB Shared Folders 	Display Video Remote Display Video Capture Video Memory: 12 1MB 128 MB 12 Monitor Count: 1 1 1 1 8 Extended Features: Imable 3D Acceleration 8 Enable 2D Video Acceleration 1	MB
	OK Cancel	Help

On the "Storage" configuration, select the CD-Rom icon, and on its right hit the icon for selecting an ISO. Select the ISO that contains the Oracle Unbreakable Linux (7/7.1) installation – the name of the ISO should be V74844-01.iso (though by the time you'll get it – it might be different):

🥝 rac1 - Settings		2 2	x	
📃 General	Storage			
System	Storage Tree	Attributes CD/DVD Drive: IDE Secondary Master	• 💽	
 Storage Audio Network Serial Ports 	Controller: SATA	Information Type: Image Size: 4.00 GB		Choose a virtual CD/DVD disk file Host Drive 'F:' Host Drive 'H:' V74844-01.iso
✓ USB☐ Shared Folders		Location: D:\Users\Roee\Downloads\ Attached to:	v7 [.]	Remove disk from virtual drive
	E = 4 4			
		OK Cancel He	lp	



This is very important:

Under Network, create 3 devices – the naming of the networks is not important as long as it is consistent among all machines:

Adapter 1 should be configured as "Internal Network" named "pubnet":

🕑 ra	c1 - Settings	2 ×	
	General	Network	
	System Display	Adapter 1 Adapter 2 Adapter 3 Adapter 4	
	Storage Audio	Enable Network Adapter <u>A</u> ttached to: Internal Network	
	Network Serial Ports	Name: pubnet ✓ ▶ Advanced ✓	
	USB		
	Shared Folders		
		OK Cancel <u>H</u> elp	

Adapter 2 should be configured as "Internal Network" named "privnet":

ę	🗿 ra	c1 - Settings	A X
		General System Display Storage	Network Adapter 1 Adapter 2 Adapter 3 Adapter 4 Image: Comparison of the standard set of the s
		Audio Network Serial Ports USB	<u>N</u> ame: privnet ∧ A <u>d</u> vanced
		Shared Folders	
			OK Cancel <u>H</u> elp

Adapter 3	should	be configured	as NAT (or bridged):
		. /		

🥝 rac1 - Settings	<u>ଟି ×</u>
📃 General	Network
SystemDisplay	Adapter 1 Adapter 2 Adapter 3 Adapter 4
Storage	<u>Attached to:</u> <u>NAT</u>
Serial Ports	Name:▼
Shared Folders	
	OK Cancel <u>H</u> elp

Hit OK.

Do the same process again for rac02 (We are building a 2 nodes RAC). Don't forget to type "rac02" wherever I used "rac01" here.



OS Installation

The following process can be done in parallel for both machines. Make sure you are not getting confusing when filling fields.

After starting the machine, hit enter within the VM to start the installer. Notice, and remember, which key will release the control from the VM and give it back to the OS. Without it you'd might get "stuck" in the virtual machine, and won't be able to go back to the hosting operating system. On my Windows machine it is the right Ctrl, and on my Mac it is the right command. Notice closely which key it is!

The first screen allows you to select the language you would like the machine to use. Select "English (United States)".

Next the main installation menu is shown.

After each configuration we will go back to it by pressing "Done" at the top left of the screen.





On the Network & Host name settings:

On each machine, write the name of the machine in the bottom of the screen "rac01.ractest" for example.

For rac01 we will use the public ip address 192.168.56.71, while for rac02 - 192.168.56.72.

For rac01 we will use the private ip address 192.168.10.1, while for rac02 - 192.168.10.2.

The NAT device will be assigned an IP automatically (and because of it cannot be used for the RAC easily).

If you're trying to use more nodes -increase the number for each additional node.

To change the configuration of a specific device – stand on the device and choose configure.

Don't forget to set each network device to auto-connect (as shown in the following illustration) – it has to be done for each of the devices in addition for setting the IP address:

NETWORK & HOST NAME			ORACLE LINUX 7.1 INSTALLATIO	N !
Ethernet (enpOs3) Intel Corporation PRO/1000 MT Dest Ethernet (enpOs8) Intel Corporation PRO/1000 MT De Ethernet (enpOs9) Intel Corporation PRO/1000 MT De	Connection name: enp0s3 General Ethernet 802.1x Automatically connect to All users may connect to Automatically connect to Firewall zone: Default	Ethernet (enpOs3) Disconnected Editing enpOs3 Security DCB IPv4 Settings IPv6 Settings this network when it is available this network VPN when using this connection	• OFF	
+ - Host name: rac01.ractest		Cancel Save	Configure	



For the first device, the public one, set the IP as shown (192.168.56.71, 255.255.255.0, 0.0.0.0).

Make sure the device is set to auto-connect in the "General" tab.

Editing enp0s3									
Connection name: enp0s3									
General / Ethernet / 802.1x Security / DCB / IPv4 Settings / IPv6 Settings									
Method: Manual 🗸									
Addresses									
Address		Netmask	Gateway	Add					
192.168.56.7	l	255.255.255.0	0.0.0	Delete					
DNS servers:									
Search domair	ns:								
DHCP client ID									
 Require IPv4 addressing for this connection to complete 									
				Routes					
			Cancel	Save					

For the second device, the private one, set the IP as shown (192.168.10.1 , 255.255.255.0 , 0.0.0.0).

Make sure the device is set to auto-connect in the "General" tab.

Editing enpOs8								
Connection name: enp0s8								
General / Ethernet / 802.1x Security / DCB / IPv4 Settings / IPv6 Settings								
Method: Manual	Method: Manual V							
Addresses								
Address	Netmask	Gateway	Add					
192.168.10.1	255.255.255.0	0.0.0	Delete					
DNS servers:								
Search domains:								
DHCP client ID:								
Require IPv4 addressing for this connection to complete								
			Routes					
		Cancel	Save					

For the third device, on the general field, set it to auto-connect (it will use DHCP, so not change is required for the IPv4 settings).



On the "Installation Destination":

Make sure the only existing hard drive has a checkmark on it, and hit the "I will configure partitioning":

INSTALLATION DESTINATION	ORACLE LINUX 7.1 INSTALLATION
Device Selection	
Select the device(s) you'd like to install to. They will be left untouched until you click on the main	menu's "Begin Installation" button.
Local Standard Disks	
65 GiB	
sda / 65 GiB free	
	Disks left unselected here will not be touched.
Specialized & Network Disks	
Add a disk	
	Disks left unselected here will not be touched.
Other Storage Options	
Partitioning	
 Automatically configure partitioning. I will configure partitioning. 	
I would like to make additional space available.	
Encryption	
Encrypt my data. You'll set a passphrase later.	
Full disk summary and boot loader	1 disk selected; 65 GiB capacity; 65 GiB free

Hit the "Done". You will get to the partition configuration screen. Hit the "Click here to create them automatically" (in a moment we'll modify it):





This	is	the	default	configuration	VOL	should	500.
11112	12	uie	ueraun	connyuration	you	Should	see.

ı	Linux 7.1 li	New Oracle
'1 GiB		DATA /home ol_rac01-home
4iB ≻		SYSTEM /boot
		sdal
6 GiB	_	/ ol_rac01-root
о МіВ		swap ol_rac01-swap
	, 🗑	+ - C
	TOTAL SPACE	AVAILABLE SPACE
	65 GiB	92.5 KiB

If the swap is less than 4G – make sure you increase it to at least 4GB(recommended to be the RAM size allocated to the machine, no more than 16GB is required for swap).

Now, select /home, decrease it to 10GiB, select / and increase it by the 10 Gib taken from /home (make sure you hit "update settings" after each change). The final results should look like that:

New Oracle Linux 7	1.1 Installation	ol_racO1-root	
DATA /home oL_rac01-home SYSTEM	10 GiB	Mount Point: / Desire® Capacity:	Device(s): ATA VBOX HARDDISK (sda) Modify
/boot sdal	500 MiB	50.13 GiB	
/ ol_rac01-root	50.13 GiB >	Device Type:	Volume Group
SWap ol_rac01-swap	4480 MiB	LVM V Encrypt	oLrac01 (O B free) V Modify
		Label:	Name: root
+ - C 🗑			Update Settings Note: The settings you make on this screen wil not be applied until you click on the main menu' "Brein Installation" button
VAILABLE SPACE TOTAL S	SPACE iiB		begin installation button

When hitting "done" you'll have to confirm the changes by hitting "Accept Changes".



Next, Software Selection:

Select "Server with GUI",

With the following packages: "Java Platform", "KDE", "Load Balancer", "Performance Tools", "Compatibility Libraries", and "Development Tools" – not all are necessary for oracle, but it will be useful.

Now, Disable KDUMP (I don't think a screen shot is necessary for it).

You'd might have to wait for a few seconds until the "Begin Installation" button appears.

Once it appears – hit it.

While the installation is running we need to set the users and their passwords:



Select ROOT password, and type oracle as the password in both fields. Because it is a weak password, you'll have to hit the "Done" twice.





Now hit "User Creation".

We will create a user named user with a password oracle who's configured to be an administrator.

You'll have to hit "done" twice again.

CREATE USER	ORACLE LINUX 7.1 INST	ALLATION Help!
Full name	user]
User name	User)
	 Tip: Keep your user name shorter than 32 characters and do not use spaces. Make this user administrator Require a password to use this account 	
Password		j
	Weak	1
	Advanced	J
A The password you have prov	vided is weak: The password is shorter than 8 characters. You will have to press Done twice to confirm it.	

After the installation is complete, reboot the machine, accept the license, and skip / decline the registration to the Oracle Network (ULN).

Congratulations! You now have two machine that are running Oracle Unbreakable Linux, and have the network configuration for RAC.



Software and OS updates and configuration

Software update

After you're done installing the OS, and you login for the first time – this is the screen that will appear (your password is oracle):



A few minutes after you login, the "Install Updates" popup will appear. Hit it and follow the instruction for updating everything (or type yum update in a terminal as root).

Notice that it will update the Kernel, a process that we will revert later because ASMLib drivers are not usually available for the latest kernel version.

Restart the machine, while making sure you start into a kernel version that has an ASMLib driver. In my case it is 3.8.13-68.3.4 (version 3.10* that appears would not be



able to use an ASM drivers the day this text was written):



Later we will configure it to be the default (since it will change through the process, in the meanwhile on every reboot select it manually).

Make sure you're consistent with it, otherwise things will fail with weird error messages that do not reflect the problem.



Guest additions

Now install guest additions, by choosing "insert Guest Additions CD image..." from the "Devices" menu on both machines.







Hit the run within the VM afterwards (it will automatically detect the inserted "CD"):

Insert your password (oracle) when asked to, hit "authenticate", and wait for the install to finish.

When the installation is completed, hit "enter" to exit it and manually **shut down** the machine (from the top right of the screen, under the menu that pops when you hit the word user (your username).

You'd probably notice that now your mouse can move in and out of the VM without being locked in (and it is unnecessary to use the host key to release the keyboard and mouse from the virtual machine).

NOTE: if you login to your system, and you get a message the VM guest additions is not running, you probably use the wrong kernel (run uname -a to make sure you use the right kernel version). If necessary – reboot and choose the right kernel manually.



Bidirectional clipboard and shared folders:

In the VM machine, right click on each machine and choose "settings". In the "General" menu, and the "Advanced" tab –choose "bidirectional" for shared keyboard:

🙆 ra	c01 - Settings	ि <mark>×</mark>
	General	General
	System Display Storage Audio Network Serial Ports USB Shared Folders	Basic Advanced Description Spapshot Folder: Image: Disabled Disabled ghared Clipboard: Disabled Disabled Drag'n'Drop: Bisabled Disabled Mini ToolBar: Image: Show in Fullscreen/Seamless Image: Show at Top of Screen
		OK Cancel Help

In the "shared folders" menu, hit the "+" icon:

6	🧿 ra	:01 - Settings						8	X	
		General System	Shar Eolders I	ed Folders						_
		Display Storage Audio	Name M	Path achine Folders			Auto-mount	Access		Ad
	₽ ≫	Network Serial Ports								
		USB Shared Folders								
						ОК	Cancel	<u>H</u> elp	,	

Browse into the directory where you saved the oracle installer files and mark "automount". Name the folder oracle, if you'll give a different name – you will have to



manually change the scripts given later:

🥝 Add Share	? ×
Folder Path:]] D:\Users\RDownloads\oracle 🔻
Folder Name:	orade
	Read-only
	V Auto-mount

Start your machines by hitting the "start" (don't forget to choose the right kernel version) and login to user.

Start the terminal (under "Applications" and "Favorite" menus at the top of the screen). We will have to switch to root first, add oracle to the "vboxsf" group, and re-login (the groups permission within this environment apply only at login, therefore you have to logout and login).

Execute the following commands to allow access to the shared directory on both machines (note – you can copy from this document, and paste in the terminal by using "ctrl+shift+v" if the shared clipboard was set correctly, and the guest additions run): su –

```
type the password "oracle" when requested
usermod -a -G vboxsf user
exit
exit
Log out from the user, and relogin to linux,
```

If you haven't unzipped the installation disks, we'll do so now. On one of the machines restart the terminal, and execute (if the files have not been unzipeed yet):

```
cd /media/sf_oracle
unzip linuxamd64_12102_database_1of2.zip
unzip linuxamd64_12102_database_2of2.zip
unzip linuxamd64_12102_grid_1of2.zip
unzip linuxamd64_12102_grid_2of2.zip
```



Network settings

Hostname and hosts configuration

We need to be able to ping among all the machines freely, for that – we build a hosts file that contains all the machine names and IP addresses.

Some addresses should have been configure in a DNS server (scan for example). We will be lazy and won't configure a DNS server. The installation will yell about it, we will instruct the installation to ignore it.

From a terminal, on both machines:

su – type your password, oracle.

vi /etc/hosts

Hit "shift+g" (go to end of file) simultaneously, type "o" (add text after), and paste (ctrl+shift+v) the following few lines (if you changed the names of the machines, the ip addresses, or the domain, make sure to adjust the file content):

#public:			
192.168.56.71	rac01.ractest	rac01	
192.168.56.72	rac02.ractest	rac02	
<pre>#private:</pre>			
192.168.10.1	rac01-priv.ract	cest	rac01-priv
192.168.10.2	rac02-priv.ract	cest	rac02-priv
<pre>#virtual:</pre>			
192.168.56.81	rac01-vip.racte	est	rac01-vip
192.168.56.82	rac02-vip.racte	est	rac02-vip
#Scan:			
192.168.56.91	rac-scan.ractes	st	rac-scan
192.168.56.92	rac-scan.ractes	st	rac-scan
192,168,56,93	rac-scan.ractes	st	rac-scan

if completed successfully – hit "esc" (escape button, leave text edit mode) and type ":wq" (write and quit) and afterward the enter key, if not hit "esc" and type ":q!" (quit without writing), and redo it.

Make sure you can ping between all machines to all machines.

On each machine run:

vi /etc/hostname

and make sure the name of the machine is as expected. If it is not modify it (use "dd" to delete the wrong line, "i" to change to text edit mode, "esc" to leave edit mode, and ":wq" + the enter key afterwards to save and quit).

The content should be the machine name, with the domain name(rac01.ractest for example).



Password less SSH

Whatever is written here should be done for both, the oracle user and root. I will demonstrate it here for the oracle user (which is required for oracle to be installed). The root should be done afterwards, the same way, and although it is not required, it will save you a lot of headache managing the machine.

If you don't want to follow these instructions – you can use whichever guide you'd like to for setting passwordless ssh between linux machines. The important thing is that you have to be able to ssh passwordless from each machine to each machine, using the oracle user, without entering a password – including to the same machine.

Log in to the oracle user and open a terminal. Within execute (on all machines): **ssh-keygen -t rsa**

hit "enter" multiple times, until you get back to the terminal (allow the defaults to apply). If you're asked to overwrite an existing file – answer "yes".

On the first machine run:

cd ~

vi .ssh/authorized_keys

Hit the "i", and paste (ctrl+shift+v) the results of the following command on all machines to the first machine(you need to hit the "i" only once, that will put you in text edit mode, now paste one after another the results of these commands from all machines):

cd ~ cat .ssh/id_rsa.pub

The output of this command should look similar to (**do not use this example!** Each machine get a different key for ssh):

ssh-rsa

```
AAAAB3NzaC1yc2EAAAADAQABAAABAQDImzUyhtTnFi8nYOwDbaWwZUVycL1VH9nH
ElPom3XhEm48KF+PRq/dO1hV9BA/oCJnUK7IVBlWyUFo2JuoeisuyB1jVIg4I3K0
XJZQP5JVqdy04czb6GdzkGoSwL828j4QrzFej9lOOw5np7tzowFR10F9wTQyTXTX
h9zEnb3dA7RwT4JpmoDRHg24PeDI0B6rbt2TwPD1LVDp4xrDH2yLlm4Td43sbakv
cfhPxEDkxadIxG5fWSj92VgSAZLI8Z/gIAzsTIwNl5xhZ6pIjQxe7B9Z2FUkNUou
zJU/C0Skt3lvokC3dOTdhH50WLxxOIVZIRq645qViLe8gThX7ewH
oracle@rac02.ractest
```

After all the machine's ssh keys have been copied to the first one, open another terminal (and log in the relevant user – oracle or root by running su –) and get the local ssh key. On the first machine within the second terminal run:

```
cat .ssh/id rsa.pub
```

and copy the output (ctrl+shift+c).



Switch to the other terminal, where all the other keys have been pasted to. Paste the local key (ctrl+shift+v), hit "esc" and ":w" to save the document without exiting from it.

Mark all the content of the file, and copy it (ctrl+shift+c) – you can now exit this specific terminal by typing ":q" and the enter key (if you cannot exit – it means you didn't save the changes – validate the file content and type ":wq" and enter). On all other machines, within a terminal logged in with the relevant user, run: cd ~

vi .ssh/authorized_keys

and paste the content copied (type "i" to edit the text and "ctrl+shift+v" to paste, "esc" and ":wq" + the enter key).

```
Now - on all machines run:
cd ~
chmod -R 700 .ssh
chmod 640 .ssh/authorized_keys
```

Now validate you can ssh from each machine to each machine, including itself, by executing ssh *machine_name*. For example:

```
ssh rac01
ssh rac01.ractest
ssh rac02
ssh rac02.ractest
```

If you can't – you probably forgot to paste the content of .ssh/id_rsa.pub to the authorized_keys file on the machine that can't connect (or didn't change the file permission with the chmod).

Repeat this process for the root user (login to root from each terminal using su -)



Disable selinux and firewall

On all machine, in a terminal execute: vi /etc/selinux/config Find the line with the text: SELINUX=enforcing Delete it (by hitting "dd") instead of it, put the following line (by hitting "o" and pasting "ctrl+shift+v"): SELINUX=disabled Save the edit and exit by hitting "esc" and ":wq"+enter.

MAKE SURE THE FILE CONTENT IS CORRECT, THE MACHINE WILL NOT RESTART IF THERE IS ANY SPELLING MISTAKE HERE.

On all machines, as root, execute: systemctl disable firewalld systemctl stop firewalld

Restart both machines to disable selinux either from the user interface, or by running init 6

in a terminal with root permissions.



Oracle Software pre-requisits

```
In a terminal login as root, and install all required software:
su -
type your password, oracle .
yum install binutils compat-libcap1 gcc gcc-c++ glibc.i686
glibc glibc-devel.i686 glibc-devel ksh libaio.i686 libaio
libaio-devel.i686 libaio-devel libgcc.i686 libgcc libstdc++.i686
libstdc++ libstdc++-devel.i686 libstdc++-devel libXi.i686 libXi
```

Hit "y" and enter to approve the installation of all of the prerequisite software.

The following installation will create the user oracle.

It can be run, out of the box, only on Oracle Unbreakable Linux. If you decided to use a different distribution, which is not recommended – go to Oracle web site and find the instruction on how to configure Oracle's repository for your distribution. yum install oracle-rdbms-server-12cR1-preinstall
Approve the installation by typing "y"+enter.

Now, on both machines, we will configure additional required settings for oracle (still from within the root user):

vi /etc/security/limits.conf

Add the following lines at the end of the file ("shifg+g", "o", "ctrl+shift+v" after copying both lines, and ":wq"+enter to save the file):

oracle soft nproc 2047 oracle hard nproc 16384

```
Continue by executing:

passwd oracle

type the password oracle twice.

usermod -a -G vboxsf oracle

groupadd asm

groupadd asmop

usermod -a -G asm oracle

usermod -a -G asmop oracle

mkdir /u01

chown oracle:oinstall /u01

cd /media/sf_oracle/grid/rpm/

CVUQDISK_GRP=oinstall; export CVUQDISK_GRP

rpm -iv cvuqdisk-1.0.9-1.rpm
```

you'd might have to change the above rpm file name to fit the version that is on the oracle installation disk you have. I recommend typing "rpm -iv cvuqdisk" and hitting the tab to autocomplete it automatically

su - oracle vi .bashrc



Hit "shift+g" simultaneously, type "o", and paste (ctrl+shift+v) the following command: umask 022

```
if you completed it successfully – hit "esc" (escape) and type ":wq"+enter, if not hit "esc" and type ":q!"+enter, and redo it.
```

exit

The exit will return the control to the root user.

The terminal should be in the user root on all machines.

vi /etc/security/limits.conf

type "shift+g" simultaneously, type "o", and paste the following two lines:

oracle	soft	nofile	4096
oracle	hard	nofile	65536

if you completed it successfully – hit "esc" (escape) and type ":wq"+enter, if not hit "esc" and type ":q!"+enter, and redo it.

Now we will set shared memory for the machine:

```
vi /etc/fstab
```

type "shift+g" simultaneously, type "o", and paste the following two lines: shmfs /dev/shm tmpfs size=12g 0 0

if you completed it successfully – hit "esc" (escape) and type ":wq"+enter, if not hit "esc" and type ":q!"+enter, and redo it.

Restart the machine, and this time login as the user "oracle" and not the user user. You can restart the machine from the user root by issuing the command: init 6

Make sure you use the right Kernel version – her, my kernel version changed – therefore I used the commands given in the "Setting the system to boot to the right kernel version" subsection to make it automatically run the right kernel.

After the restart, you can check the configuration applied by running:

df -h

and looking for the 12g shm drive,

other changes would be noticeable from the oracle installation (it will warn about it)



Setting the system to boot to the right kernel version

From a terminal logged in as root, execute the following command (you would really want to copy paste it...):

```
grep "submenu\|^\menuentry" /boot/grub2/grub.cfg | cut -d "'" -
f2
```

The output of this command should be similar to that:

root@racO1:~
 _____X
File Edit View Search Terminal Help
 [root@racO1 ~]# grep "submenu\|^\menuentry" /boot/grub2/grub.cfg | cut -d "'" -f
2
Oracle Linux Server 7.1, with Linux 3.10.0-229.el7.x86_64
Oracle Linux Server 7.1, with Linux 3.10.0-229.7.2.el7.x86_64
Oracle Linux Server 7.1, with Unbreakable Enterprise Kernel 3.8.13-68.3.4.el7uek
.x86_64
Oracle Linux Server 7.1, with Unbreakable Enterprise Kernel 3.8.13-55.1.6.el7uek

.x86_64 Oracle Linux Server 7.1, with Linux 0-rescue-9a23fb61c79e4674a2d12a2439bf85b5 [root@rac01 ~]# ■

Mark with the mouse the line of the kernel version you want the system to boot to (make sure you're choosing the right kernel version), and attach it by pasting it between the commas of the following command: grub2-set-default ""

The result should be similar to: grub2-set-default "Oracle Linux Server 7.1, with Unbreakable Enterprise Kernel 3.8.13-68.3.4.el7uek.x86_64"

Restart the machine and validate it boots to the right kernel.

You can always run uname -a to validate the currently executing kernel version



ASM disk configuration

This section is divided to two: setting the shared drive for the ASM in VirtualBox, and setting the oracleasm within the virtual machine.

Setting the shared drive

First, turn off all the machines by issuing init 0

as root (or through the menu).

Within the VirtualBox application, right click on one of the machines, and select "Settings..", browse into the "Storage" menu, Select the "Controller: Sata", and hit the "+" on the hard disk icon:

🙆 ra	c01 - Settings	8 ×
	General	Storage
	System Display Storage Audio Network Serial Ports USB Shared Folders	Storage Tree Storage Tree Controller: IDE Storage Tree Name: SATA Type: AHCI Port Count: 1 Add Hard Disk Use Host I/O Cache
		Cancel Help

Choose "Create new disk":





Select "VDI"	for	the	file	type	and	hit	next:
--------------	-----	-----	------	------	-----	-----	-------

	?	×	
Create Virtual Hard Drive			
Hard drive file type			
Please choose the type of file that you would like to use for the new virtual har you do not need to use it with other virtualization software you can leave this s unchanged.	d drive etting	e. If	
 VDI (VirtualBox Disk Image) 			
VMDK (Virtual Machine Disk)			
VHD (Virtual Hard Disk)			
MDD (Parallels Hard Disk)			
QED (QEMU enhanced disk)			
QCOW (QEMU Copy-On-Write)			
Hide Description Next	Car	ncel	

Now, we will use "Fixed size" (since performance is important here), and hit next:



Choose a file size of 60GB (less than 55GB won't work! It is a minimum requirement of oracle).

Make sure your placing the file where you want it to be (notice it is a shared disk among multiple machines, therefore – you'd might want to put it in its on directory, and



name it with a suffix of "01" so you could play with adding a "02" disk later):

	2 X
G Create Virtual Hard Drive	
File location and size	
Please type the name of the new virtual hard drive file into the box below or of folder icon to select a different folder to create the file in.	lick on the
D:\Users\Roee\VirtualBox VMs\rac\SharedDrive01.vdi	
Select the size of the virtual hard drive in megabytes. This size is the limit on the file data that a virtual machine will be able to store on the hard drive.	ne amount of
······································	60.00 GB
4.00 MB 2.00 TB	
Create	Cancel

Hit Create, and wait patiently as the line is filled:

S Create Virtual	Hard Drive: Creating fixed medium storage unit 'D:\Users\Roee\VirtualBox	V	x
0	Creating fixed medium storage unit 'D: \Users\Roee\VirtualBox VMs\rac\SharedDr	ive01 3%	.vdi' X

When the creation is done,

you should get back to this screen, and you should see an additional drive:

Storage	
 System Display Storage Audio Network Serial Ports USB Shared Folders 	Attributes Name: SATA Iype: AHCI Port Count: 2

Sometimes, as a result of a bug, another grayed screen appears in front of it. Just hit the enter key, and it will take you back to the virtual box main screen.

Now on the VirtualBox main screen, choose the "file" menu at the top left, and select "Virtual Media Manager..."

Select the shared disk, right click on it, and choose "Modify...":

Virtual Media N	lanager					8 ×
<u>A</u> ctions						
Copy Modify R	emove Release Refr	esh	oppy disks			
Name	A				Virtual Size	Actual Size
Gagan-disk1	Lvmdk				60.00 GB	23.25 GB
rac01.vdi					65.00 GB	4.83 GB
rac01.vdi					65.00 GB	7.16 GB
rac02.vdi					65.00 GB	7.16 GB
SharedDrive	01.vdi	-			60.00 GB	60.00 GB
			<u>C</u> opy	Ctrl+O		
		2	Modify	Ctrl+Space		
		0	R <u>e</u> move	Del		
		3	Re <u>l</u> ease	Ctrl+L		
Type: Location: Format: Storage details: Attached to:	Normal D:\Users\Roee\VirtualE VDI Fixed size storage rac01	lox VM	s\rac\SharedDri	ive01.vdi		
Andifu the attribut	ter of the relected diel	kimar	e file			Close Help

Change it to be "Shareable", hit OK, and close the virtual media manager:



Now on each of the rest of the machines, go to the "Settings..." by right clicking on the machine, and in the storage menu add a hard drive as before, but instead of creating a



new disk, hit the "Choose existing disk" and browse to the shared drive you created:

Please choose a virtual h	ard drive file	×
COO K Roee >	VirtualBox VMs 🕨 rac 🔍 🚽	Search rac 🔎
Organize 🔻 New fold	ler	:≡ ▼ 🔟 🔞
Users 🔺	Name	Date modified Type
📕 Roee	¥ SharedDrive01.vdi	7/27/2015 7:53 PM Virtual Dis
🔓 Contacts		
Desktop		
Favorites		
🕞 Links		
My Docum		
My Music		
📕 My Picture:	<	4
File	ame: SharedDrive01.vdi	All virtual hard drive files (*.vm
		Open Cancel

Now you'll see the same vdi file in all machines:

General	Storage	8 ×
 System Display Storage Audio Network Serial Ports USB Shared Folders 	Storage Tree Controller: IDE Image: Controller: SATA Image: Controller: SATA Image: Controller: SATA Image:	Attributes Name: SATA Type: AHCI Port Count: 2
		OK Cancel <u>H</u> elp

Hit OK, and start the machines.

As always – make sure the right kernel version is initiated.



Configuring the drive and ASMLib

On one of the machines, in a terminal logged in as root (su -) execute: **fdisk** /dev/sdb hit "n", and enters until you get back to the command prompt.

Hit "w" to write the changes and exit fdisk.

On all machines, from a terminal running as root, run:

yum install oracleasm-support

Approve the installation by typing y

/etc/init.d/oracleasm configure

The user should be set to oracle

The group should be set to asm

On the last prompt hit y (the default), for the driver to scan for drives automatically.



On one of the machines, from a terminal connected as root run:

oracleasm createdisk DISK1 /dev/sdb1

Make sure no error return - if you did anything as described by here in this document -

you won't have any errors.

[root@rac01 ~]# oracleasm createdisk DISK1 /dev/sdb1 Writing disk header: done Instantiating disk: done

On all other machines, run from a terminal connected as root:

oracleasm scandisks

It should state as a response that DISK1 was found:

[root@rac02 ~]# oracleasm scandisks Reloading disk partitions: done Cleaning any stale ASM disks... Scanning system for ASM disks... Instantiating disk "DISK1"

Any output different than what shown here would require you to investigate and fix it. YOU MUST HAVE THIS SET UP CORRECTLY FOR CONTINUING. All nodes have to see DISK1 through the ASM.



Setting udev for the device

On one of the nodes, connect to a terminal as root and execute:

/usr/lib/udev/scsi_id -g -u -d /dev/sdb1

Note that /dev/sdb1 might have to change if you didn't follow by instructions as is. Copy the output – and replace it in all the code given below where appropriate. The output should look similar to:

1ATA_VBOX_HARDDISK_VBbaffce72-62c14e41

Therefore everywhere you see that appears – replace it with the output you've got.

On all machines, as root, execute:

```
vi /etc/udev/rules.d/99-oracle-asmdevices.rules
And insert into the file the following line:
KERNEL=="sd?1", SUBSYSTEM=="block",
PROGRAM=="/usr/lib/udev/scsi_id -g -u -d /dev/$parent",
RESULT=="<u>1ATA_VBOX_HARDDISK_VBbaffce72-62c14e41</u>",
SYMLINK+="DISK1", OWNER="oracle", GROUP="asm", MODE="0660"
Notice the "RESULT" section should be changed to the output you've received from
scsi id.
```

In some cases the scsi_id would return different id on different nodes – make sure on each node you use the local scsi id. I never seen different results, but I read it is possible...

Restart the machines. Execute: ls -l /dev/sdb1

if the owner of the device is oracle – you've done it correctly, otherwise – fix the problem (read the instructions given here again, and validate all the steps were completed successfully).



Grid Infrastructure installation

On the first node (rac01 in my configuration), in a terminal logged in as oracle, browse to the grid infrastructure directory, and run the runInstaller file: cd /media/sf_oracle/grid/

```
./runInstaller
```

On the first screen, select the first option, "Install and Configure Oracle Grid Infrastructure for a Cluster":



On the second screen, select the first option, "Configure a Standard cluster":





Огас	cle Grid Infrastructure 12 c Release 1 Installer - Step 3 of 16
Select Installation Type	
<u>Installation Option</u> <u> Cluster Type</u>	Typical Installation Perform a full grid infrastructure installation with basic configuration.
lnstallation Type	
<u>Cluster Configuration</u>	Allows advanced configuration options such as alternative storage choices, additional networking flexibility. integration with IPMI.
 Network Interface Usage 	
🔶 Storage Option	
 OCR Storage 	
 Voting Disk Storage 	
Hanagement Options	
Operating System Groups	
Installation Location	
Root script execution	
Prerequisite Checks	
y Summary	
unstall Product	
o Finish	
Help	< <u>B</u> ack <u>N</u> ext > Install Cancel

On the third screen, select the second option, "Advanced Installation":

On the 4th screen, select the language you want (you want English): Oracle Grid Infrastructure 12c Release 1 Installer - Step 4 of 18

		ORACLE 40	C
Select Product Languages		GRID INFRASTRUCTURE	C
Select Product Languages	Select the languages in which your Available languages: Arabic Bengali Brazilian Portuguese Bulgarian Canadian French Catalan Croatian Czech Danish Dutch Egyptian English (United Kingdom) Estonian Finnish French German Greek Hebrew Hungarian	Product will run. Selected languages: English Note: Selected languages: Selected lan	
Summary Install Product	liesten die		
Help		< <u>Back</u> Next > Install Cance	





On the 5th screen, deselect the "Configure GNS", and rename the "SCAN Name:" to rac-scan, as appears in the end of the hosts file (\etc\hosts):

Oracle Grid Infrastructure 12c Release 1 Installer - Step 5 of 18		
Grid Plug and Play Informa	ation	
Installation Option Cluster Type Product Languages Cluster Node Information Network Interface Usage Storage Option OCR Storage Voting Disk Storage Management Options Operating System Groups Installation Location Root script execution Prerequisite Checks Summary Install Product Finish	Single Client Ac the cluster as a <u>C</u> luster Nam e: <u>SCAN Nam e:</u> SC <u>AN Port:</u> Configure GL @ Configure GL @ Configure GL @ Create a GNS <u>V</u> IF <u>G</u> NS Su O <u>U</u> se Shaa GNS CH	cess Name (SCAN) allows clients to use one name in connection strings to connect to whole. Client connect requests to the SCAN name can be handled by any cluster node. rac-cluster rac-scan IS21 NS re nodes Virtual JPs as assigned by the Dynamic Networks ngw CNS PAddress: b Domain@ rac.ractest red CNS lent Data: Browse
Help		< <u>Back Next > Install</u> Cancel

On the 6th screen, hit the "add" for each machine you want the cluster to include, and fill in the information of this machine – the public name, and the vip, as appears in the hosts file, with its domain (for example: rac02.ractest and rac02-vip.ractest):

38

Ora	cle Grid Infrastructure	12c Release 1 Insta	ller – Step 6 of 18	
Cluster Node Information		O.		
Installation Option Cluster Type Installation Type	Provide the list of nodes t Virtual Hostname. Public H	to be managed by Oracle Gr Hostname	rid Infrastructure with their Pu Virtual Host	ublic Hostname and
Product Languages	Add Clus	ter Node Informatio	rac01-vib ractest	
<u>Crid Plug and Play</u> Cluster Node Inform <u>Network Interface Us</u> Storage Option OCR Storage Voting Disk Storage Management Option Operating System G Installation Location	ecify the name for the public i me manually, then you will be ublic <u>H</u> ostname: irtual Hostname:	host name. If you want to cc prompted for the virtual IP rac02.ractest rac02-vip.ractest	onfigure virtual host address.	
Root script execution Prerequisite Checks Summary Install Product Finish	SSH <u>c</u> onnectivity	Use Cluste	r Configuration File)	d <u>E</u> dit <u>R</u> emove
Help			< <u>B</u> ack <u>N</u> ext >	Install Cancel

Wait for a few seconds (if you won't the following process would fail), and hit the "SSH Connectivity..." button, a tab will appear at the bottom part of the screen. Select "Test" and wait for a confirmation message:



If the test fails – you did not configure the passwordless ssh correctly. Exit the installer, and fix it (you have to be able to ssh from each machine to all others machines, including the same one, without a password) from the terminal which will run the installer. DO NOT ASK ORACLE INSTALLATION TO CONFIGURE IT.

On the 7th screen, make sure the 192.168.56.0 subnet is assigned to the public network, and assign the 192.168.10.0 subnet only to the private network. Modify the private network to be used only for "Private" (NO asm..):

	cie ona innastructure 12t	Release 1 Installer – St	ep 7 of 18 🛛 💷
pecify Network Interface	Usage		GRID INFRASTRUCTURE
Linstallation Option	Private interfaces are used by C	Pracle Grid Infrastructure for in	ternode traffic.
Installation Type	Interface Name	Subnet	Use for
	enp0s3	192.168.56.0	Public 👻
Product Languages	enp0s8	192.168.10.0	Private 💌
Grid Plug and Play	enp0s9	10.0.4.0	Do Not Use 💌
Cluster Node Information			
Network Interface Usage	Note: If you intend to store Ora	cle Cluster Registry (OCR) and	voting disk files using Oracle Flex
OCKStorage			
 Voting Disk Storage Management Options Operating System Groups Installation Location Root script execution 			
Voting Disk Storage Management Options Operating System Groups Installation Location Contemporation System Checks			
 Voting Disk Storage Management Options Operating System Groups Installation Location Root script execution Prerequisite Checks Summary 			
Voting Disk Storage Management Options Operating System Groups Installation Location Root script execution Prerequisite Checks Summary Install Product			
Voting Disk Storage Management Options Operating System Groups Installation Location Root script execution Prerequisite Checks Summary Install Product Finish			



On the 8th screen, select the first option, "Use Standard ASM for Storage":

Oracle Grid Infrastructure 12c Release 1 Installer - Step 8 of 18		
Storage Option Information		
Cluster Type	You can place Oracle Cluster Registry (OCR) files and voting disk files on Oracle ASM storage, or on a file system. Oracle ASM can be configured on this cluster or can be an existing ASM on a storage server cluster.	
Froduct Languages Grid Plug and Play Cluster Node Information	Ouse grain and value for schage Choose this option to configure Local Oracle ASM in this cluster and store OCR and voting disk files on it. ASM instance will be configured on all nodes of the cluster. Use Oracle Flex <u>ASM</u> for storage Choose this option to configure OCR and voting disks on ASM storage. ASM instance will be	
<u>Network Interface Usage</u> Storage Option	configured on reduced number of cluster nodes.	
OCR Storage Voting Disk Storage Management Options	Choose this option to store OCR and Voting disk files on Oracle ASM Storage configured on a storage server cluster.	
Operating System Groups	O Use Shared File System Choose this option to configure OCR and voting disk files on an existing shared file system	
Root script execution Prerequisite Checks Summary		
V Install Product V Finish		
Help	< <u>Back</u> Next > Install Cancel	

On the 9th screen, select the only disk that appears there (while changing its Redundancy to "External"):

Orac	le Grid Infrastructure 12c Release 1 Installer – Step 9 of 18 🛛 💷 🗙
Create ASM Disk Group	
Installation Option Cluster Type Installation Type Product Languages Grid Plug and Play Cluster Node Information Network Interface Usage Storage Option	Select Disk Group characteristics and select disks Disk group name DATA Redundancy High Normal External Allocation Unit Size MB Add Disks O Candidate Disks All Disks
Create ASM Disk Group	Disk Path Size (in MB) Status
ASM Password Management Options Operating System Groups Installation Location Root script execution Prerequisite Checks	V //dev/sdb1 61439 Candidate
Finish	< Back Next > Install Cancel

If you didn't complete the udev configuration successfully the disk will not appear.



On the 10^{th} screen select the second option, "use same passwords for these accounts", and set the password to <code>Asmlpass</code> :

Oracle Grid Infrastructure 12c Release 1 Installer - Step 10 of 18		
Specify ASM Password		
Installation Option Cluster Type Installation Type	The new Oracle Automatic Storage Management SYSASM privileges for administration. Oracle rec user with SYSDBA privileges to monitor the ASM Specify the password for these user accounts.	(Oracle ASM) instance requires its own SYS user with commends that you create a less privileged ASMSNMP instance.
Product Languages Grid Plug and Play	OUse different passwords for these accounts	
Cluster Node Information Network Interface Usage Storage Option	Password <u>S</u> ¥S <u>A</u> SMSNMP	Confirm Password
Create ASM Disk Group ASM Pass word	Our Seame passwords for these accounts	
Management Options Operating System Groups	Specify <u>P</u> assword:	<u>C</u> onfirm Password:
Root script execution Prerequisite Checks		
Summary Install Product		
U Finish		C Back Next > Install Cancel

On the 11th screen, don't change anything – leave the second option selected, "Do not use Intelligent Platform Management Interface (IPMI)":

Orac	le Grid Infrastructure 12c Release 1 Installer - Step 11 of 19 🛛 💷 🗶
Failure Isolation Support	
	Choose one of the following Failure Isolation Support options. Use Intelligent Platform Management Interface (IPMI) To ensure successful Installation with IPMI enabled, ensure your IPMI drivers are properly installed and enabled. Uger Name : Password : © Do not use Intelligent Platform Management Interface (IPMI)
Help	< <u>B</u> ack <u>N</u> ext > <u>Install</u> Cancel



On the 12th screen, do not change anything – leave the checkbox unmarked for "Register with Enterprise Manager (EM) Cloud Control":

Orac	le Grid Infrastructure 12 c Release 1 Installer – Step 12 of 19 📃 💷 🗙
Specify Management Optic	
Installation Option Cluster Type Installation Type	You can configure to have this instance of Oracle Grid Infrastructure and Oracle Automatic Storage Management to be managed by Enterprise Manager Cloud Control. Specify the details of the Cloud Control configuration to perform the registration. Register with Enterprise Manager (EM) Cloud Con <u>t</u> rol
Product Languages Grid Plug and Play Cluster Node Information Network Interface Usage Storage Option Create ASM Disk Group ASM Password Failure Isolation	OMS host:
Management Options Operating System Groups Installation Location Root script execution Prerequisite Checks Summary Install Product Einish	
Help	< <u>Back</u> _install Cancel

On the 13th screen, assign the group asm to the first option, OSASM, the group oinstall to the second one (OSDBA for ASM), and asmop for the last one (OSOPER for ASM):

Ora	e Grid Infrastructure 12c Release 1 Installer – Step 13 of 19
Privileged Operating Sys	
Installation Option Cluster Type Installation Type Product Languages Grid Plug and Play Cluster Node Information Network Interface Usage Storage Option Create ASM Disk Group ASM Password Failure Isolation Management Options Operating System Groups Installation Location Root script execution Prerequisite Checks Summary	Select the name of the operating system group, that you want to use for operating system authentication to Oracle Automatic Storage Management. Oracle ASM Administrator (OSASM) Group Oracle ASM DBA (OSDBA for ASM) Group Oracle ASM Operator (OSOPER for ASM) Group (Optional)
Finish	<back next=""> Install Cancel</back>



On the 14 th scree	en, make sure the paths begin with /u01:
Oracle	e Grid Infrastructure 12c Release 1 Installer - Step 14 of 19 😐 🗙
Specify Installation Locatio	
Installation Option Cluster Type Installation Type Product Languages Crid Plug and Play Cluster Node Information Network Interface Usage Storage Option Create ASM Disk Group ASM Password Failure Isolation Management Options Operating System Groups Installation Location Root script execution Prerequisite Checks Summary Install Product Finish	Specify the Oracle Grid Infrastructure for a Cluster Oracle base. By default, Oracle Grid Infrastructure is installed in a path indicating the Oracle Grid Infrastructure release and grid infrastructure software owner. Oracle base: /u01/app/oracle Browse Specify a location for storing Oracle software files separate from configuration files in the Oracle base directory. This software directory is the Oracle Grid Infrastructure home directory. Software location: /u01/app/12.1.0/grid Browse
Help	< <u>Back</u> Next > Install Cancel

If it doesn't, make sure you didn't skip creating the directory and allowing the oracle user full permissions on it.

On the 15^{th} screen, don't touch a thing, the inventory path should begin with /u01:

Oracle Grid Infrastructure 12c Release 1 Installer - Step 15 of 20			
Create Inventory			
Installation Option Cluster Type Installation Type Product Languages Grid Plug and Play Cluster Node Information Network Interface Usage Storage Option Create ASM Disk Group ASM Password Failure Isolation Management Options Operating System Groups Installation Location Orceate Inventory Root script execution Prerequisite Checks Summary Install Product Finite	 You are starting your first installation on this host. Specify a directory for installation metadata files (for example, install log files). This directory is called the "inventory directory". The installer automatically sets up subdirectories for each product to contain inventory data. The subdirectory for each product typically requires 150 kilobytes of disk space. Inventory Directory: /u01/app/oralnventory Browse Members of the following operating system group (the primary group) will have write permission to the inventory directory (oralnventory). oralnventory Group Name: oinstall 		
Help	< <u>Back</u> Next > Install Cancel		



On the 16th screen, mark the checkmark ("Automatically run configuration scripts"), and select the first option ("Use root user credentials") – type the root password, oracle:

Ora	i Infrastructure 12c Release 1 Installer – Step 16 of 20	_ = = ×.
Root script execution cor		
T Installation Option	le configuring the software, certain operations have to be performed as "root" ave the Installer perform these operations automatically by specifying inputs f w.	user. You can choose or one of the options
Installation Type Product Languages	utomatically run configuration scripts ④ Use "root" user <u>c</u> redential	
 Grid Plug and Play Cluster Node Information 	Pass <u>w</u> ord : 💡 ••••••]
<u>Network Interface Usage</u> <u>Storage Option</u> <u>Create ASM Disk Group</u>	Program path : //usr/local/bin/sudo	Browse
ASM Password Failure Isolation	Password :]
<u>Management Options</u> <u>Operating System Groups</u>		
Installation Location Create Inventory		
Root script execution Prerequisite Checks Summary		
Install Product		
Help	< <u>Back</u>	Install Cancel

On the 17th screen, you'll see an output of prerequisites analysis.

If you see more than the warning and errors shown here – you've done something wrong. Fix it manually before continuing:

Oracle Grid Infrastructure 12c Release 1 Installer - Step 17 of 20 - 😐 🗴			
Perform Prerequisite Che			2 ^c
Installation Option Cluster Type Installation Type Product Languages Grid Plug and Play Cluster Node Information Network Interface Usage Storage Option Create ASM Disk Group ASM Password Failure Isolation Management Options Operating System Groups Installation Location Create Inventory Root script execution Prerequisite Checks Summary	Yerification Result Some of the minimum requirements for installation are not completed. Rev in the following table, and recheck the system. Check Again Exact Again Checks Checks Checks Device Checks for ASM Display Device Checks for ASM Display Device Checks for ASM Display Device Checks for ASM Display Device Checks for ASM Display Device Checks for ASM Display Device Checks for ASM Display Device Checks for ASM Display Disp	iew and fix the issues lists of the second s	sted pre All ple
Install Product	Check Failed on Nodes: [rac02, rac01]		
Help	< <u>B</u> ack <u>N</u> ext	> Install C	ancel

Mark the ignore all, and hit "next" (confirm you want to continue by hitting "yes").



Oracle Grid Infrastructure 12c Release 1 Installer - Step 18 of 20 ORACLE GRID INFRASTRUCTURE Ó. Summary Installation Option — Oracle Grid Infrastructure 12c Release 1 Installer Global Settings Cluster Type --- Disk Space: required 6.9 GB available 43.13 GB [Edit] Linstallation Type Install Option: Install and Configure Oracle Grid Infrastructure for a Cluster [Edit] Product Languages Oracle base for Oracle Grid Infrastructure: /u01/app/oracle [Edit] Grid Plug and Play - Grid home: /u01/app/12.1.0/grid [Edit] Cluster Node Information ---- Privileged Operating System Groups: oinstall (OSDBA), asmop (OSOPER), asm (OSASM) [Ed Network Interface Usage --- Root script execution configuration: Root user credential [Edit] Storage Option Inventory information Create ASM Disk Group ---- Inventory location: /u01/app/oralnventory [Edit] ASM Password ---- Central inventory (oralnventory) group: oinstall [Edit] Failure Isolation Management method: None [Edit] Management Options Grid Infrastructure Settings Operating System Groups - Cluster Type: Standard [<u>Edit</u>] Installation Location Cluster Name: rac-cluster [Edit] Create Inventory Nodes: [rac01, rac02] [Edit] Single Client Access Name (SCAN): rac-scan [Edit] Root script execution SCAN Port: 1521 [Edit] Prerequisite Checks Public Interface(s): enp0s3 [Edit] Summary 4 • Save Response File... <<u>Back</u> <u>N</u>ext > <u>Install</u> Cancel <u>H</u>elp

Choose Install:

And wait for the installation to finish. In the middle you'll have to hit "Yes" to confirm running scripts as root:

Ога	cle Grid Infrastructure 12c Release 1 Installer - Step 19 of 20	
Install Product		
Cluster Type	Progress 81% Oracle Grid Infrastructure 12c Release 1 Installer	
Grid Plug and Pla Cluster Node Inf Network Interfac Storage Option	Configuration scripts generated by the Installer need to be run as a privileged user (root). Installer will run these scripts using the privileged user credentials provided earlier. Are you sure you want to continue ?	Succeeded Succeeded Succeeded Succeeded
ASM Password Failure Isolation Management Options	Yes No Execute Root Scripts • Execute root script on all nodes	Succeeded Succeeded Succeeded In Progress Pending
 Operating System Groups Installation Location Create Inventory 	Configure Oracle Grid Infrastructure for a Cluster	Pending
Root script execution Prerequisite Checks Summary	ORACLE: Maximum Availability GRID INFEASTRUCTURE 12 ^C Maximum Availability Eliminate Downtime and Idle R	ans <u>Ketry Skip</u>
Help	< <u>Back</u> <u>Next></u>	Install Cancel



$\mathbf{VOTE} = \mathbf{y}$	où are expected to get ar er or.	•
	Oracle Grid Infrastructure 12c Release 1 Installer - Step	19 of 20 _ 🗆 🛪
Install Product		GRID INFRASTRUCTURE
Cluster Type	Progress-	
• Prod	Oracle Grid Infrastructure 12c Release 1 Installer	
Clus Clus Storz Crea ASM Cause - The Failu Action - Refe	[INS-20802] Oracle Cluster Verification Utility failed. QK Details plug-in failed in its perform method ar to the logs or contact Oracle Support Services.	Succeeded Succeeded Succeeded Succeeded Succeeded Failed Succeeded
Mana Log File Loca	ation	Succeeded
U Oper /u01/app/c U Insta U Crea	raInventory/logs/installActions2015-07-27_10-53-01PM.log	re Management R Succeeded tory Succeeded Succeeded Failed v
Root script execut Prerequisite Check Summary Install Product Finish	GRID INFRASTRUCTURE 12 ^C Consolidate or and Scalable L	Details Betry Skip Iting Fast, Reliable, ow-Cost Grids
Help	<u>ack</u>	Next > Install Cancel

NOTE – you are expected to get an error:

This error appears because we do not use a DNS for the SCAN addresses. YOU CAN IGNOR IT.

After hitting the OK on the error screen, hit "Next". You'd be asked to confirm it, hit "Yes":



Close the installer – You now have a happy and healthy CRS on your virtual machines.



Database Installation

Within a terminal that runs as oracle, execute: cd /media/sf_oracle/database/ ./runInstaller

On the first screen, unmark the checkbox for the email, hit next, and confirm this selection by choosing "yes":



On the second screen, choose the second option "Install database software only". This is for us not to use the general prebuilt DB, but to configure it ourselves:





On the 3rd screen, make sure the second option is selected – "Oracle Real Application Clusters database installation".

If it is disabled – something went wrong with the previous configurations and should be googled and fixed.

	Oracle Database 12c Release 1 Installer - Step 3 of 9
Grid Installation Options	
Configure Security Updates	Select the type of database installation you want to perform.
Grid Installation Options	 Oracle <u>Real Application Clusters database installation</u>
Typical Installation	YOracle RAC On <u>e</u> Node database installation
Prerequisite Checks	
Summary	
Install Product	
0 Finish	
Help	Sack Next > Install Cancel

On the 4^{th} screen, select the nodes you want the software to be installed on. It should be all the available nodes (in my case – 2):

	Oracle Database 12c Release 1 Installer - Step 4 of 10
Select List of Nodes	
Configure Security Updates, Installation Option Crid Installation Options Nodes Selection Typical Installation Prerequisite Checks Summary Install Product Finish	Select nodes (in addition to the local node) in the cluster where the installer should install Oracle RAC or Oracle RAC One. Node name 2 rac02 SSH gonnectivity Select all Deselect all
<u>H</u> elp	<u> </u>



On the 5th screen, Product language selection (not shown here), select English (which was hopefully already selected for you) and hit next.

On the 6th screen you have only one option, Oracle Enterprise Server, so hit next:



On the 7th screen, make sure all the locations begin with /u01 as done for the grid. If it is not already filled, there is a problem with the directory existence or permissions – fix it and continue:





On the 8th screen, make sure dba is the group for all the required options:

	Oracle Database 12c Release 1 Installer - Step 8 of 12
Privileged Operating Syste	m groups ORACLE 12 ^C
Configure Security Updates	SYS privileges are required to create a database using operating system (OS) authentication. Membership in OS Groups grants the corresponding SYS privilege, eg. membership in OSDBA grants the SYSDBA privilege.
Grid Installation Options	Database <u>A</u> dministrator (OSDBA) group:
 <u>Nodes Selection</u> 	Database Operator (OSOPER) group (Optional):
 Product Languages Database Edition 	Database Backup and <u>R</u> ecovery (OSBACKUPDBA) group:
Installation Location	Data <u>G</u> uard administrative (OSDGDBA) group: dba
Operating System Groups	Encryption <u>K</u> ey Management administrative (OSKMDBA) group: dba
Prerequisite Checks	
Sum mary	
Install Product	
o Finish	
Help	A section of the section of

On the 9th screen you'll get a report of the prerequisites checks.

Make sure you have exactly what shown here. If you have anything else in addition – you've done something wrong and it should be fixed.

Hit the "ignore all" as before:

(Dracle Database 12c Release 1 Installer - Step 9 of 12		_ = ×
Perform Prerequisite Check	s Contraction of the second se	DRACL	≝12 ^ℓ
Configure Security Updates Installation Option Grid Installation Options Nodes Selection Product Languages Database Edition Installation Location Operating System Groups Prerequisite Checks Summary Install Product Finish	Verification Result Some of the minimum requirements for installation are not completed. Rev in the following table, and recheck the system. Check Again Eix & Check Again Show Failed Image: All Node Checks Checks Checks Single Client Access Name (SCAN) Single Client Access Name (SCAN) Maximum locked memory check Maximum locked memory check Maximum locked memory check This task checks consistency of file /etc/resolv.conf file across nodes (mor Operation Failed on Nodes: [rac02, rac01]	iew and fix the ss v Status Ignored Ignored Ignored Ignored	E issues listed
Help	< <u>B</u> ack Next	> Instal	Cancel

You will have to confirm it, as before, after hitting the "Next".

On the 10th screen you confirm the installation. Hit Install, and the installation will start:

	Oracle Database 12c Release 1 Installer	- Step 11 of 12	_ = x
Install Product			
Configure Security Updates	Progress	95%	
Grid Install	Execute Configuration scripts		
Nodes Sele Product La Database E Installation Scripts to be e	configuration scripts need to be executed as the "ro Each script in the list below is followed by a list of no executed:	ot" user in each new odes.	Succeeded
Operating Number Scr	int Location	Nodes	Succeeded
Prerequisit Summary Install Pro	1/app/oracle/product/12.1.0/dbhome_1/root.sh	rac01,rac02	Succeeded Succeeded Succeeded Succeeded In Progress
Finish To execute th 1. Open a t 2. Log in at 3. Run the 4. Return to <u>H</u> elp	e configuration scripts: erminal window ; "root" scripts in each cluster node o this window and click "OK" to continue	ОК	etails Retry Skip
_	DATABASE		
Help		< <u>B</u> ack <u>N</u> ext	> Install Cancel

Through the installation you'll be asked to run root scripts:

Don't hit OK before running the scripts.

On both machines, login as root in a terminal and execute the following script file: /u01/app/oracle/product/12.1.0/dbhome_1/root.sh

The script requires you to hit "enter" once while it runs.

After running the script on both machines, select "OK", and close the installer.

Congratulations, you have the database software installed.

DBCA

After installing the software, it is time for creating the database instance.

Configure the ORACLE_HOME for the database. With my setting it should be: export ORACLE_HOME=/u01/app/oracle/product/12.1.0/dbhome_1 export PATH=\$ORACLE_HOME/bin:\$PATH

Start dbca: dbca

On the following screens – you can feel free to change the configuration I use by the features you want to, or don't want to, play with.

On the first screen, select the first option "Create Database":

On the second screen, choose the already chosen second option - "Advanced Mode":

Datab	se Configuration Assistant - Create Database - Step 2 of 14	_ 🗉 ×
Creation Mode		E 12 ^c
Patabase Operation Creation Mode Database Template Database Identification Management Options Database Options Initialization Parameters Creation Options Progress Page Finish		gowse irgwse it Wes *
Help	< <u>Back</u> <u>Pinish</u> Cancel	h Cancel

On the third screen – choose the second option – "Custom Database". Notice the configuration type – I use "Policy-Managed" since it is a new feature I want to explore – you should use the configuration you feel more comfortable using:

	Database Configuration Assistant – Create Database – Step 3 of 14 – 😐 🗙				
Data	base Template				
	atabase Operation	Select the type of da <u>D</u> atabase Type:	tabase you want to configure.		
D	atabase Template				
L D	atabase Identification	<u>C</u> onfiguration Type:	Policy-Managed		
I.	lanagement Options				
Ĭ		Templates that inclu	ide datafiles contain pre-created databases. They all	www.uto.create a new database	
Υ ̈́		in minutes, as oppo	sed to an hour or more. Use templates without datafi	ies only when necessary, such	
0 S1		as when you need to	o change attributes like block size, which cannot be a	tered after database creation.	
ΎÞ	atabase Options	Select a template for	r your database.		
i ir	nitialization Parameters	Select Tem	plate	Includes Datafiles	
¢ c	reation Options	Gene	eral Purpose or Transaction Processing	Yes	
o Pi	rerequisite Checks	Cust	om Database Warebouse	No	
o si			ina criotase		
D PI	rogress Page				
Ĭ	inish				
				Show Details	
_					
He	ip.		< <u>B</u> ack <u>N</u> e	xt > Einish Cancel	

On the next screen, screen 4, choose the Global database name.

I chose orcl .

In addition, you can chose if you want to configure it as a PDB (pluggable DB, a new feature) – Note it is a complex configuration that might give you a headache later. Since I'm exploring – I configured it and named it orclpdb, you don't have to:

Datab	pase Configuration Assistant - Create Database - Step 4 of 15
Database Identification	
Database Operation Creation Mode	Provide the identifier information required to access the database uniquely. An Oracle database is uniquely identified by a Global Database Name, typically of the form "name.domain".
 <u>Database Template</u> 	<u>C</u> lobal Database Name: orcl
Database Identification	
Database Placement	
Hanagement Options	
 Database Credentials 	✓ <u>C</u> reate As Container Database
Storage Locations	Creates a database container for consolidating multiple databases into a single database and
 Database Options 	enables database virtualization. A container database (CDB) can have zero or more pluggable databases (PDB).
Initialization Parameters	Create an Empty Container Database
Creation Options	Create a Container Database with one or more PD8s
Prerequisite Checks	Number of PDBs:
Summary	
 Progress Page 	PDB Name: 💡 orclpdb
5 Finish	
Help	< <u>Back</u> <u>N</u> ext> <u>F</u> inish Cancel

the name of each instance will be orcl_#, where # is a number of the instance.

Next, we configure a server pool (the screen explains well what it is..) I called mine myrac (This screen might not appear if you didn't choose to create a Container DB):

Datab	oase Configuration Assistant - Cr	eate Database - Step 5 of 15	_ 🗉 🗙
Database Placement		ORACLE DATABASE	12 ^c
Database Operation Creation Mode Database Template Database Identification Database Placement Management Options	Server Pools Server pool is a group of servers that co Select the Server pool from existing list © Greate New Server pool for this data Sgrver pool Name? myrac Use Existing Server pool for this data	ollectively work together to host database workload. or specify the detail of new Server pool to be used b base Cardinality 1000000000000000000000000000000000000	y database.
 Database Credentials Storage Locations Database Options Initialization Parameters Creation Options Prerequisite Checks Summary Progress Page Finish 		Larunany Laregory	
Help		< Back Next > Einish	Cancel

If you want the RAC to run on both nodes immediately after the installation is complete, change the cardinality to 2.

Anyway, since it is a new feature, later I will show how to change it.

Next, on the 6th screen, we decide if we want cluster verifications checks to run periodically, to connect to an EM server, or to configure an EM express – don't change the configuration that was set for you:

Next, select "Use the Same Administrative Password for All Accounts". I set the password to Oralpass for consistency with the previous chosen one:

Data	base Configuration Assistant -	Create Database - Step 7	of 15 _ 🗉
Database Credentials			
Database Operation Graption Mode	For security reasons, you must speci	ify passwords for the following us	er accounts in the new database.
Database Template	User Name	Password	Confirm Password
Database Identification	SYS SYSTEM		
Management Options	DBSNMP		
Database Credentials			
Arrage Locations Database Options Initialization Parameters Creation Options Prerequisite Checks Summary Progress Page Finish	 O Use the Same Administrative Pass Password: Confirm Password 	word for All Accounts	
Help		< Back	Next > Finish Cancel

On the 8th screen, leave the configurations to use ASM as is.

The only thing you'd might want to change is to not use "Fast Recovery Area" by unmarking the checkmark before it.

I'm in an exploration mood for this setup, therefore – I left this option on:

Data	base Configuration Assistant - Create Database - Step 8 of 15
Storage Locations	
Database Operation Creation Mode Database Template Database Identification Database Placement Management Options Database Credentials	Database files Storage Type: Automatic Storage Management (ASM) ▼ Use Database File Locations from Template Use Common Location for All Database Files File Location: +DATA Use Oracle-Managed Files Multiplex Redo Logs and Control Files
Storage Locations	Choose the recovery options for the database.
 <u>Database Options</u> 	Re <u>c</u> overy files Storage Type: Automatic Storage Management (ASM) 🔻
Initialization Parameters	Specify Fast Recovery Area
Creation Options	Fast Recovery Area: 💡 +DATA Browse
Ý Prerequisite Checks Ý Summary	Fasi Recovery Area Size: 4815 🜩 MB 👻
Progress Page	Enable Archiving Edit Archive Mode Parameters
5 Finish	File Loc <u>a</u> tion Variables
Help	< <u>Back</u> Next > Einish Cancel

On the next screen, you have no option to choose, therefore I didn't add a screenshot. You are installing all the features in this database. Hit next...

On the 10th screen, for your on good, unmark the two checkmarks. Unless you know what you're doing, or want to explore it specifically, Vault or Label Security are both are a headache...:

Databa	ase Configuration Assistant - Cr	eate Database - Step 10 of	16 _ = ×
Database Vault & Label Se	curity	<u> </u>	
Database Operation Creation Mode Database Template Database Identification Database Placement Management Options Database Credentials Storage Locations Database Options Database Options Patabase Options Prerequisite Checks Summary Progress Page Finish	Specify the Database Vault Owner and Configure Database Vault Database Vault Database Vault Owner: Password: Coceate a Separate Account Mana Account Manager: Pagsword: Select Label Security configuration opt Configure Label Security Configure with OID	Password Confirm Password: Confirm Password: Confirm Password: ions.	
Help	J	< <u>B</u> ack <u>N</u> ext >	<u>Finish</u> Cancel

On the 11th screen you set the database parameters.

I don't recommend changing the memory distribution on installation, but later, when you want to explore memory management particularly:

On the sizing menu, I usually increase the number of processes to 1500, just because 300 is very low... You can also change the DB default block size:

Databa	se Configuration Assistant – Create Database – Step 11 of 16
Initialization Parameters	
Database Operation Creation Mode Database Template Database Identification Database Identification Database Placement Management Options Database Credentials Storage Locations Database Options Database Vault & OLS Creation Options Prerequisite Checks Summary Progress Page Finish	Mgmory Sizing Character Sets Connection Mode A block is the smallest unit of storage for allocation and for I/O. It cannot be changed once the database is created. Block Size: 8192 Bytes Specify the maximum number of operating system user processes that can be simultaneously connected to this database. The value of this parameter includes the user processes and the Oracle background processes. Processes: 1,500 •
Elep Change the char Datab Initialization Parameters	All Initialization Parameters
Database Operation	Memory Sizing Character Sets Connection Mode
O Database Template Database Identification	Y Use the default The default character set for this database is based on the language setting of this operating system: WEBMSWIN1252.
Database Placement Management Options Database Credentials Storage Locations Database Options	Use Unicode (AL32UTF8) Setting character set to Unicode (AL32UTF8) enables you to store multiple language groups. Choose from the list of character sets Database Character Set: AL32UTF8 - Unicode UTF-8 Universal character set Show recommended character sets only
Database Vault & OLS	National Character Set: AL16UTF16 - Unicode UTF-16 Universal character set
Initialization Parameters <u>Creation Options</u>	Default Language: American
Prerequisite Checks Summary Progress Page Finish	Default Territor <u>y</u> : United States
	All Initialization Parameters
Help	< <u>Back</u> <u>N</u> ext > Einish Cancel

On the 12 th sc	reen, leave the option of "Create Database" selected:
Databa	ise Configuration Assistant - Create Database - Step 12 of 16
Creation Options	
Database Operation Creation Mode Database Template Database Template Database Placement Management Options Database Credentials Storage Locations Database Options Database Options Database Options Otatabase Placement Initialization Parameters Creation Options Prerequisite Checks Creation Database	Select the database creation options.
Progress Page Finish	
Help	< <u>Back</u> <u>Next</u> > <u>Einish</u> Cancel

Although usually I tend to "Customize Storage Locations..." and increase the file sizes to reasonable sizes for reducing installation time (less extents allocations that requires increasing the datafile sizes), this time we will just Hit "Next" and wait...

The prerequisites check should find the same issues as before, select the "Ignore All" (on this installation Oracle moved this option to the other side of the screen...) and hit next (here you won't be required to confirm):

Databa	se Configuration Assistant – Create Databas	e - Step 13 of 16	. 🗉 🗙
Prerequisite Checks		DATABASE	12 [°]
Database Operation Creation Mode Database Template Database Identification Database Placement Management Options Database Credentials Storage Locations Database Options Database Options Database Options Database Vault & OLS	Validation Results Validation Results Validation Database Validation Checks Cluster Validation Checks Storage Checks	Show All	eck Again
Initialization Parameters <u>Creation Options</u> Prerequisite Checks			
Progress Page Finish			•
Help		<back next=""> Einish</back>	Cancel

On the next screen - select "finish", and DBCA will start...

Wait patiently until you get the following screen with the following message:

Database Operation	Progress Database "orc!" creation in progress		
Creation Mode	90%		
Database Template			
Database Identification			
Database Placement			
Management Options	Steps	Status	
Databasa Guadantiala	Database Configuration Assistant : Warning	Finished	
Database Credentials		Finished	
Storage Locations	Since Database instance is not configured on	Finished	
Database Options	the local node, skipping Sample Schema	Finished	
Database Vault & OLS	configuration. Sample schema on local node	Finished	
Database vaun e oes	 can be configured only when database instance comes up on local node 	Finished	
Initialization Parameters		Finished	
Creation Options		Finished	
Prerequisite Checks		Finished	
· · · · · · · · · · · · · · · · · · ·	Completing Database Creation	Finished	_
	Creating Pluggable Databases	In Progress	

Hit OK (this screen might not appear if the node that runs the installer has an Oracle instance running – since I used cardinality of 1, only one instance was created, and the clusterware chose to run it on the other node).

You will get the following screen, hit the "close":

Databa	se Configuration Assistant - C	Create Database - Step 16	of 16 _ = ×
Finish			ORACLE 12C
Database Operation Creation Mode Database Template Database Identification Database Placement Management Options Database Credentials Storage Locations Database Options Database Options Database Vault & OLS Initialization Parameters Creation Options Prerequisite Checks Summary Progress Page Finish	Database creation complete. For /u01/app/oracle/cfgtoollogs/db Database Information: Global Database Name: System Identifier(SID) Prefix: Server Parameter File name: EM Database Express URL: Note: All database accounts exce Management button to view a con accounts. From the Password Mar Oracle strongly recommends char account.	details check the logfiles at: ca/orcl orcl +DATA/orcl/spfileorcl.ora https://rac-scan.ractest:5 pt SYS and SYSTEM are locked. nplete list of locked accounts or nagement window, unlock only t nging the default passwords imr	Solvem Select the Password to manage the database he accounts you will use. mediately after unlocking the Password Management
Help		< <u>B</u> ack	ext > Einish Close

Congrats! Oracle DB is installed on the RAC!

In my case, the database was configured to run only on one node.

It started on node number two.

When turning the node that runs the instance off, the instance automatically starts on an available node.

As mentioned before, the reason for that is the cardinality given in the DBCA.

For changing the cardinality, within a terminal, run **srvctl config srvpool**

This will output the server pools configured, make sure yours is myrac and run: **srvctl modify srvpool -g myrac -u 2**

In a few minutes you'll have a two node RAC.

Run

srvctl status database -d orcl

to see which instance runs on which node.

Post installation

Although these are not perfect configuration scripts, it will allow you to connect and manage the database instances.

Notice that with the new Oracle configurations – the instance id is not constant, therefore the script is a bit more complex than the hard coded old ones.

If you configured a Pluggable Database (PDB), in a terminal, logged in as Oracle, on both machines, run:

vi /u01/app/oracle/product/12.1.0/dbhome_1/network/admin/tnsnames.ora And append into the file the following few lines:

```
ORCLPDB =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = rac-scan)(PORT = 1521))
    (CONNECT_DATA =
        (SERVER = DEDICATED)
        (SERVICE_NAME = orclpdb)
    )
)
```

Afterwards, even if you did not configure a PDB, execute on both nodes:

```
vi .bashrc
And at the end of the file add the following few lines
#(c) ALL RIGHTS RESERVED TO ROEE EBENSTEIN
pmon=ora_pmon_
inst="$(ps -e | grep $pmon)"
ar=($inst)
arlen=${#ar[@]}
if [ "$arlen" -gt 2 ]
then
         inst=${ar[3]:${#pmon}}
        export ORACLE_SID=$inst
else
        export ORACLE_SID=NOTSET
fi
export GRID_HOME=/u01/app/12.1.0/grid
export ORACLE HOME=/u01/app/oracle/product/12.1.0/dbhome 1
export PATH=$ORACLE HOME/bin:$GRID HOME/bin:$PATH
If you configured a PDB you'd might also want to add this line to the .bashrc file
(read documentation about what it means...):
export TWO_TASK=orclpdb
Save and exit.
```

Starting at the next logon the environment will be set for you to connect to the DB

immediately if the instance have already started. If the instance have not started you will have to set the ORACLE_SID environment variable manually. You can check if the ORACLE_SID was configured by executing: echo \$ORACLE_SID

Notice that if you'd like to use the ASM, you'll have to run: export ORACLE_HOME= /u01/app/12.1.0/grid export PATH=\$ORACLE_HOME/bin:\$PATH export ORACLE_SID=+ASM1

While modifying the instance name to the right one (you can learn from the above script how to figure out your ASM instance name).

In addition, you would probably like to install flash through your browser, so you could browse to the configured EM at:

https://rac-scan.ractest:5500/em

🖻 EM Express - Databa × 🔾 💠					
) 🖬 🖉 🔒 https://rac-scan.ractest 5500/em/shell#/dbhome/show_regions				~ C Q t	test flash 🦻 👌 🔒 🏦
DRACLE Enterprise Manager Database Express 12c					tivla + 🛛 🔩 SYSTEM 🛛 Log Out
🖕 CRCL (12.1.0.2.0 CDB FAC) 🔑 Conliguision 👻 😋 Strage 👻 鼻 Security 👻 📷 Perform	nce 🗸				n 900an 🧧
Database Home					Paga Rohoshaci 5:14:59 PM GMT-0100 Auto Refresh 1 Minute V
States	- Performance				
Type PAC-2: Relationary top COD 11: POD-14 Wester 12: 20: 20: Encargonary Relation Determinance Accesser Meditore Names Lines ANR 64-56: Accesser Rillipped	4 4 2 4 4 4 4 4 4 4 4 4 4 4 4 5 7 7 4 5 7 7 7 7 7 7 7 7 7 7 7 7 7	M 4.30 PM 4.3	Active Sessions	445 PM 430 PM 455 I	77 5.00 PM 5.00 PM 5.10 PM 5.10 PM
	12%			Walt	2.5 GB Other SGA 2 GB Shared ID Pool
 Running Jobs 		erce(x)	8	User 10	1.5 08 - Jane Red
Instance Container Name Owner Name Elapsed Started	4%		2		1 GB
	SOL Monitor - Last Hour (20 max)				
Ne Running Jobs	Status Duration	Ty ID	User	Parallel Database Time	SQL Text
	🥥 🖡 1.0s	djatn1r6k20v	· · · · · · · · · · · · · · · · · · ·	₿2 " "2∎04s	SQL building XML for the jobs region select xmlelementi *jobs*
	🥑 💻 11.0 v	16c z 4x8y 72xdc	@CDB\$ROOT	11.8s	SELECT space_usage_kbytes FROM v\$sysaux_occupants WHERE occupant_n
	1.0s	diwelik twolicity	@CDB\$ROOT	2	select minitimeoutl from sys. "CDB_SUBSCR_REGISTRATIONS"
	0.15	b/2w01s8Ebk8u	@CDB\$900T	Q2 0.1s	insertinto wrh\$_tablespace (dbid, com_dbid, snap_id, ts#, tsname, c
	1.0s	Cilyhu3pm:jódw	@CDBBROOT	Q2 ■1.8s	insertinto wrhf_tablespace_stat (dbid, con_dbid, snap_id, instance_number

I recommend strongly installing a third machine, which could even be a windows one, and connect it only to the public network. This simulate a workstation client. Since the RAC machines might get busy and not as responsive as expected (after all, it's a VM), the user experience on these machines would usually be bad.

ENJOY, Roee Ebenstein evenro at yahoo dot com , for any questions or comments regarding this document ©

