RAC Attack - Oracle Cluster Database at Home/RAC Attack 12c/Print Book

RAC Attack - Oracle Cluster Database 12c at Home

Introduction

Overview

RAC Attack is a free curriculum and platform for hands-on learning labs related to Oracle RAC (cluster database), motivated by the belief that the best way to learn RAC is through lots of hands-on experience. The original contributors were Jeremy Schneider, Dan Norris and Parto Jalili. This curriculum has been used since 2008 by organizers of events, by instructors in classes and by individuals at home. Its goal is to help students learn about Oracle RAC cluster databases through guided examples.

RAC Attack differs in depth from other tutorials currently available.

- Every keystroke and mouse click is carefully documented here.
- The process is covered from the very beginning to the very end from the very first installation of the Virtual Hypervisor on your laptop to various experiments on your running cluster database... with everything in between.
- The labs in the main workbook have been tested thoroughly and repeatedly.

To learn about upcoming RAC Attack events or to organize one yourself, visit the Events page. You can use the shortcut http://racattack.org/events to access this page at any time.

12c Overview

The 12c version of RAC Attack was written collaboratively by many authors all around the world. A full list of contributors is available by clicking the "history" tab on any wiki page or at the end of the print book. Note that Seth Miller's contributions are undercounted; he wrote almost all of the original instructions up to the first node config but many of his initial edits were on a set of draft pages whose content was copied here. Ludovico Caldara and Bjoern Rost also made extraordinary contributions to the book as reflected in the contributor lists.

Additionally, credit goes to the many volunteer testers who reported issues with the first draft of instructions. Many of their names can be seen in the mailing list archives at http://racattack.org/list during August and September of 2013.

And most importantly, we can't give enough credit to the entire Oracle Openworld 2013 team. Especially Yury Velikanov who not only led the organization of officers and assignments but kept the energy and excitement level at stratospheric levels! Without the excitement of presenting at OpenWorld, we'd never have maintained such great momentum for finishing the first 12c revision so quickly!

Architecture

To better understand the RAC Installation, this picture illustrates the architecture that is implemented when following the book.

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------ 3 SCAN IP addresses

IP Addresses

In order to install a fully functional RAC, the following IP addresses are required:

- 2 public IPs, one for each node, for the primary OS network interface
- 2 public IPs, one for each node, for the Virtual IP
- 3 public IPs, one for each SCAN listener
- 2 private IPs, one for each node, for the cluster private interconnect

In the book, the public addresses belong to the network 192.178.78.0/24, and the private addresses belong to the network 172.16.100.0/24.

Technical choices

The book aims to provide instructions as simple as possible to get a basic RAC installation on your laptop. There are many, many advanced topologies and topics that are not covered here. If you are curious about technical possibilities, just ask a volunteer, he/she will be glad to explain you something more.

Hardware Requirements

This handbook will walk you through the process of creating a two-node Oracle RAC cluster on your own laptop or desktop computer.

Hardware Minimum Requirements

Most modern laptop and desktop computers should be powerful enough to run a two-node virtual RAC cluster. In a nutshell, these are the recommended minimums:

- Modern CPU (most of laptops produced after 2011 should be ok)
- 8Gb memory
- 40Gb of free disk space
 - 9Gb Software Staging

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- 29Gb 2VMs + 2 ASM disks
- Windows 64bit (XP, Vista or 7) (Linux & Mac have been tested aswell and differences to the Windows instructions are included in the book)

Software Components

Before starting you need to know what software will be installed. If attending an event, would be a good idea to download the software in advance to your laptop in order to avoid the download during the labs. The copyrighted software is not distributable so the volunteers will not be able to give you all the required software components. But organizers may have set up a proxy server to speed up downloads or provide at least the free software.

Windows 7 64 bit

This book covers Windows 7 64 bit as host even if all operating systems that can run VirtualBox 64bit can be used. 64 bits are mandatory since Oracle 12c for Linux 32bit is not available.

VirtualBox

This book uses VirtualBox as many Oracle specialists consider it as a mature and free virtualization solution, fully compatible with Oracle Software: https://www.virtualbox.org/. The VirtualBox versions from 4.2.12 up to 4.2.18 have been tested successfully with OEL6 and Oracle 12c.

Putty

One of the preferred SSH clients for Windows. You can download it here:

http://the.earth.li/~sgtatham/putty/latest/x86/putty.exe	
•••••••••••••••••••••••••••••••••••••••	

Vnc Viewer

The servers will be installed without X server, so you'll need VNC to get the graphics: http://www.realvnc.com/download/get/1295/

Oracle Software

Oracle Enterprise Linux 6.4

Can be downloaded from http://edelivery.oracle.com/linux/.

- 1. Login to: http://edelivery.oracle.com/linux with your Oracle Account
- 2. On the **Media Pack Search** page, select:

Product pack: Oracle Linux

Platform: x86 64 bit

Click GO

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Media Pack Search					
Select the	e Product Pack and Pla	atform and clic	k "Go".		
	Select a Product Pa	ck Oracle Lin	ux 💌		
	Platfor	m x86 64 bit	•		
		Go			
Results					
Select	Description	Release	Part Number	Updated	# Parts / Size
		*** No	search conducted *	***	
					Continue

3. Click on: Oracle Linux Release 6 Update 4 Media Pack for x86_64 (64 bit)

Results					
Select	<u>Description</u>	<u>Release</u> ▽	<u>Part Number</u>	<u>Updated</u>	# Parts / Size
۲	<u>Oracle Linux Release 6 Update 4 Media</u> Pack for x86_64 (64 bit)	6.4.0.0.0	B72264-01	MAY-23-2013	5 / 8.9G

4. Click on the download button at the first line:

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Oracle Linux Release 6 Update 4 Media Pack v1 for x86_64 (64 bit)

Readme View Digest				
Select	Name	Part Number	Size (Bytes)	
Download	Oracle Linux Release 6 Update 4 for x86_64 (64 Bit)	V37084-01	3.5G	
Download	Oracle Linux Release 6 Update 4 Boot iso image for x86_64 (64 bit)	V37088-01	197M	
Download	Oracle Linux Release 6 Update 4 UEK Boot ISO image for x86_64 (64 bit)	V37090-01	196M	
Download	Oracle Linux Release 6 Update 4 source DVD 1	V37086-01	3.1G	
Download	Oracle Linux Release 6 Update 4 source DVD 2	V37087-01	1.9G	
Total: 5				

5. Once the download of the file V37084-01.iso is finished, rename it to Oracle_Linux_6_64.iso to distinguish it easily from other Oracle files.

Oracle Grid Infrastructure and Database 12c (12.1.0.1)

Can be downloaded from http://edelivery.oracle.com/.

- 1. Login to: http://edelivery.oracle.com/ with your Oracle Account
- 2. On the Media Pack Search page, select:

Product pack: Oracle Database

Platform: Linux x86-64

Click GO

Media Pack Search		
Ø Instructions		
 Review the <u>License List</u> to Select the Product Pack a If there is only one result, and click "Continue". 	determine which Product Pack or Packs you need to download. nd Platform and click "Go". you will see the download page. If there are multiple results, select one	
Select a Product Pack	Oracle Database	
Platform	Linux x86-64	
	Go	

3. Click on: Oracle Database 12c Release 1 (12.1.0.1.0) Media Pack for Linux x86-64

Results					
Select	<u>Description</u>	Release ▽	<u>Part Number</u>	<u>Updated</u>	# Parts / Size
0	<u>Oracle Audit Vault and Database Firewall</u> 12.1.1 Media Pack for Linux x86-64	12.1.1.0.0	B73420-01	JUN-17-2013	3 / 5.2G
۲	Oracle Database 12c Release 1 (12.1.0.1.0) Media Pack for Linux x86-64	12.1.0.1.0	B73458-02	JUL-26-2013	24 / 23G
0	Oracle Audit Vault and Database Firewall 12.1.0 Media Pack for Linux x86-64	12.1.0.0.0	B71269-01	DEC-18-2012	3 / 6.4G
0	<u>Oracle Retail Data Model 11.3.2.0.0</u> <u>Media Pack</u>	11.3.2.0.0	B72133-01	FEB-11-2013	1/ 2.0G
0	<u>Oracle Airlines Data Model 11.3.1.0.0</u> Media Pack for Linux x86-64	11.3.1.0.0	B65618-01	DEC-15-2011	1 / 173M
\bigcirc	Oracle Communications Data Model	113100	R67443-01	MAY-29-2012	1 /

4. Click on the download button for the following four packs:

- Oracle Database 12c Release 1 (12.1.0.1.0) for Linux x86-64 (Part 1 of 2)
- Oracle Database 12c Release 1 (12.1.0.1.0) for Linux x86-64 (Part 2 of 2)
- Oracle Database 12c Release 1 Grid Infrastructure (12.1.0.1.0) for Linux x86-64 (Part 1 of 2)
- Oracle Database 12c Release 1 Grid Infrastructure (12.1.0.1.0) for Linux x86-64 (Part 2 of 2)

Oracle Database 12c Release 1 (12.1.0.1.0) Media Pack v2 for Linux x86-64

Readme View Digest

Select	Name	Part Number	Size (Bytes)
Download	Oracle Database 12c Release 1 (12.1.0.1.0) for Linux x86-64 (Part 1 of 2)	V38500-01 Part 1 of 2	1.3G
Download	Oracle Database 12c Release 1 (12.1.0.1.0) for Linux x86-64 (Part 2 of 2)	V38500-01 Part 2 of 2	1.1G
Download	Oracle Database 12c Release 1 Grid Infrastructure (12.1.0.1.0) for Linux x86-64 (Part 1 of 2)	V38501-01 Part 1 of 2	1.7G
Download	Oracle Database 12c Release 1 Grid Infrastructure (12.1.0.1.0) for Linux x86-64 (Part 2 of 2)	V38501-01 Part 2 of 2	192M

- 5. The following files are downloaded:
 - V38501-01 1of2.zip
 - V38501-01_2of2.zip
 - V38500-01_1of2.zip
 - V38500-01 2of2.zip

After uncompressing them, there will be two folders: "grid" and "database" containing the full installation.

Prepare Host

VirtualBox Setup

- 1. Run Oracle VM VirtualBox 4.2.16 Setup.
- 2. On the welcome page, click Next:

B Oracle VM VirtualBox 4.2.16	Setup 🐹
	Welcome to the Oracle VM VirtualBox 4.2.16 Setup Wizard The Setup Wizard will install Oracle VM VirtualBox 4.2.16 on your computer. Click Next to continue or Cancel to exit the Setup Wizard.
Version 4.2.16	Next > Cancel

3. Leave the default component selection, click Next:

B Oracle VM VirtualBox 4.2.16 Setup	x
Custom Setup Select the way you want features to be installed.	
Click on the icons in the tree below to change the way features will be installed.	
VirtualBox Application VirtualBox USB Support VirtualBox Networking VirtualBox Python 2.x Su VirtualBox Python 2.x Su VirtualBox Python 2.x Su VirtualBox Python 2.x Su VirtualBox Python 2.x Su	ur
Location: C:\Program Files\Oracle\VirtualBox\ Brow	se
Version 4.2.16 Disk Usage < Back Next > Cano	:el

4. Click Next:

B Oracle VM VirtualBox 4.2.16 Setup	x
Custom Setup	
Select the way you want features to be installed.	
New dame for the entire below	
Please choose from the options below:	
Create a shortcut on the desktop	
☑ Create a shortcut in the Quick Launch Bar	
Version 4.2.16	3

5. Unless you have pending downloads or batches over the network, click Yes:



6. Click Install:

1	岃 Oracle VM VirtualBox 4.2.16 Setup	x
	Ready to Install The Setup Wizard is ready to begin the Custom installation.	
	Click Install to begin the installation. If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.	
•		
	Version 4.2.16 < Back Install Cance	el

7. The installation is completed. Click **Finish** to open VirtualBox:

븅 Oracle VM VirtualBox 4.2.16 Setup		
	Oracle VM VirtualBox 4.2.16 installation is complete.	
	Click the Finish button to exit the Setup Wizard.	
	♥ Start Oracle VM VirtualBox 4.2.16 after installation	
Version 4.2.16	< Back Finish Cancel	

VirtualBox Network Configuration

- 1. Run VirtualBox Manager.
- 2. From the main screen, choose File > Preferences > Network.

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🎸 VirtualBox - Set	ttings
📃 General	Network
 Input Update Language Network Extensions Proxy 	Host-only Networks:
	Adapter: Manually configured DHCP Server: Enabled Lists all available host-only networks.
	OK Cancel Help

3. Double click on VirtualBox Host-Only Ethernet Adapter. Update the settings as shown and click Ok twice.

IPv4 Address: 192.168.78.1

IPv4 Network Mask: 255.255.255.0

ð	² Host-only	Network Details			8 23	S
	Adapter	DHCP Server				
		IPv4 Address:	192.168.78.1			
	IP	v4 Network Mask:	255.255.255.0			
		IPv6 Address:				
	IPv6 Netw	vork Mask Length:				
Ľ				OK	Cancel	
					Cancel	

Install Linux

Create VirtualBox VM

 On your computer, create a new folder racattack12c on a location of your choice that will contain all the virtual disks. At the end of the installation the files will look like this:

VirtualBox VMs 🕨 racattack12c			
Share with 🔻 🛛 Burn 🔹 New folder			
Name	Date modified	Туре	Size
¥ asm1.vdi	8/14/2013 20:41	Virtual Disk Image	5,242,904 KB
¥ asm2.vdi	8/14/2013 20:41	Virtual Disk Image	5,242,904 KB
¥ asm3.vdi	8/14/2013 20:41	Virtual Disk Image	5,242,904 KB
💗 asm4.vdi	8/14/2013 20:41	Virtual Disk Image	5,242,904 KB
💗 collabn1.vdi	8/14/2013 20:40	Virtual Disk Image	17,282,172 KB
💗 collabn2.vdi	8/14/2013 20:41	Virtual Disk Image	15,170,684 KB

2. In VirtualBox, from the main screen, click the New icon in the upper left hand corner.



3. Type in collabn1 for the Name of the VM. Choose Linux for the Type and Oracle (64 bit) for the Version and click Next.

Create	e Virtual Machine
Name	and operating system
Please of type of will be u	choose a descriptive name for the new virtual machine and select the operating system you intend to install on it. The name you choose used throughout VirtualBox to identify this machine.
<u>N</u> ame:	collabn1
<u>Type</u> :	Linux 🗸 🗸
Version:	Oracle (64 bit)
	Hide Description Next Cancel

Produced with a Trial Version of PDFer Annotator makewater Representation of the produced with a Trial Version of the product of the product

1536 MB

If your laptop only has 8G of RAM allocate 1536MB of RAM to each VM (not 3072MB).

4. Type **Stee** in the **Size** field and click **Next**.

	8		23
G Create Virtual Machine			
Memory size			
Select the amount of memory (RAM) in megabytes to be alloc virtual machine.	ated to	the	
The recommended memory size is 512 MB.			
Q		3072	ΜВ
4 MB 8192	MB		
Next	C	ancel	

5. Leave Create a virtual hard drive now selected and click Create.



6. Leave VDI (VirtualBox Disk Image) selected and click Next.

	8	23
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 unchanged.	d drive setting	e. If
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)		
Hide Description Next	Car	ncel

7. Leave Dynamically allocated selected and click Next.



8. Type in the full path or choose through the browse icon the Location for the disk file to be created.

It's better to use the common folder racattack12c previously created for all the virtual disks.

The file should be named collabn1.vdi.

Type in 30.00 GB in the Size field and click Create.



VirtualBox VM Settings

1. From the main screen, select the virtual machine collabn1 and click the Settings icon in the upper left hand corner.



2. Open the USB sub-menu. Uncheck the Enable USB Controller check box.

🥸 co	llabn1 - Settings	4	? <mark>×</mark>
	General	USB	
	System	Enable LISB Controller	
	Display		
0	Storage		
	Audio		8
0	Network		æ
	Serial Ports		12
	USB		ß
	Shared Folders	When checked, enables the virtual USB controller of this machine.	
		OK Cancel	Help

3. Open the **Storage** sub-menu. Delete the **Empty** disk under the **IDE Controller**.

🍪 collabn1 - Settings			ି <mark>×</mark>
General	Storage		
 System Display Storage Audio Network Serial Ports USB Shared Folders 	Storage Tree Controller: IDE Controller: SATA Collabn1.vdi Contains all storage controllers for this mach them.	Attributes Name: Type:	IDE PIIX4 Use host I/O cache tual images and host drives attached to
			OK Cancel Help

4. Click on **Remove** to confirm.



5. Click on the Add CD/DVD Device.

🍪 collabn1 - Settings	8	x
📃 General	Storage	
 System Display Storage Audio Network Serial Ports USB Shared Folders 	Storage Tree Controller: IDE Controller: SATA Controller: SATA	
	OK Cancel Help	

6. Click on the Choose disk.



7. Locate and open the Oracle_Linux_6_64.iso file.

🍪 collabn1 - Settings			ि <mark>×</mark>
 collabn1 - Settings General System Display Storage Audio Network Serial Ports USB Shared Folders 	Storage Storage Tree Controller: IDE Oracle_Linux_6_64.iso Controller: SATA Controller: SATA Collabn 1.vdi	Attributes <u>N</u> ame: <u>T</u> ype:	IDE PIIX4 V Vuse host I/O cache
	Contains all storage controllers for this maching them.	ne and the vir	rtual images and host drives attached to OK Cancel Help

8. Open the Network sub-menu. Under the Adapter 1 tab, change the Attached to: dropdown to Host-only Adapter.

collabn3 - Settings	୍ଷ <mark>- ×</mark>
📃 General	Network
SystemDisplay	Adapter 1 Adapter 2 Adapter 3 Adapter 4
Storage	Enable Network Adapter Attached to: Host-only Adapter
P Network	Name: VirtualBox Host-Only Ethernet Adapter
Serial Ports	Advanced
Shared Folders	
	Shows or hides additional network adapter options.
	OK Cancel Help

9. Choose the Adapter 2 tab. Check the box for Enable Network Adapter. Change the Attached to: dropdown to Internal Network and type the name rac-priv in the Name field.

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(i)	llabn1 - Settings	ि <mark>×</mark>
	General	Network
	System Display Storage Audio Network Serial Ports USB Shared Folders	Adapter 1 Adapter 2 Adapter 3 Adapter 4
		Enter the name of the internal network that this network card will be connected to. You can create a new internal network by choosing a name which is not used by any other network cards in this virtual machine or others.

10. Choose the Adapter 3 tab. Check the box for Enable Network Adapter. Change the Attached to: dropdown to NAT.

🍪 co	ollabn1 - Settings	8 ×
	General	Network
	Display	Adapter 1 Adapter 2 Adapter 3 Adapter 4
9	Storage	Enable Network Adapter
₽	Audio	Attached to: NAT
₽	Network	Name:
	Serial Ports	Advanced
Ø	USB	
	Shared Folders	
		Controls how this virtual adapter is attached to the real network of the Host OS.
		OK Cancel Help

11. Select the Shared Folders tab. Click Add Shared Folder.

Enter the path where you have downloaded the Oracle installation media and enter a name for your folder.

Check Auto-mount and click OK.

8) co	llabn1 - Settings		_	8	23
		General	Shared Folders			
	э.	System	Folders List			
	Ū	Display	Name Path	uto-Mount	Access	
	0	Storage	Machine Folders	ato-mount	Access	
	Þ	Audio				
	₽	Network	Add Share			
	٨	Serial Ports				
	Ø	USB	Folder Path: 🌗 F:\Softwaux_x86_64\12cR1 🔻			
		Shared Folders	Folder Name: 12cR1			
			Read-only			
			Auto-mount			
			OK Cancel			
			Select a securios caregory in one use on the renormand side and move the	e mouse over a	a settinas	
			item to get more information.			
				Cancel	Hala	
			UK	Cancer	нер	

12. Click on **Ok** to save the modifications.

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13. Review the summary of the new virtual machine.

🕸 Oracle VM VirtualBox Manager	
File Machine Help	
New Settings Start Discard	Details 💿 Snapshots (1)
🧕 General	Preview
Name: collabn1 Operating System: Oracle (64 bit)	
System	
Base Memory: 1500 MB Boot Order: CD/DVD-ROM, Hard Disk Acceleration: VT-x/AMD-V, Nested Paging, PAE/NX	collabn1
Display	
Video Memory: 12 MB Remote Desktop Server: Disabled	J
Storage	
Controller: IDE IDE Primary Master: [CD/DVD] Orade_Linux_6_64.iso (3.42 GB) Controller: SATA	
SATA Port 0: collabn1.vdi (Normal, 30.00 GB)	
🖗 Audio	
Disabled	
	h.

OS Installation

1. Click on **Start** to boot the virtual machine. If asked to select a start-up disk, choose **Oracle_Linux_6_64.iso** and click **Start** again.



2. The Oracle Linux install screen will automatically come up. Hit enter to begin the install.



3. Skip the CD testing by pressing the right arrow key and press enter.

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4. From this point on you can use the mouse to navigate. To unlock the mouse and keyboard from the VM, hit the right Ctrl key. Click Next.



5. Leave English (English) selected and click Next.

😰 collabn1 [Running] - Oracle VM VirtualBox	
Machine View Devices Help	
What language would you like to use during the installation process?	
Arabic (العربية)	<u>^</u>
Assamese (অসমীয়া)	
Bengali (वर्धना)	
Benaali(India) (বাংলা (ভারত))	
Bulgarian (Български)	
Catalan (Català)	=
Chinese(Simplified) (中文(简体))	
Chinese(Traditional)(中文(正體))	
Croatian (Hrvatski)	
Czech (Čeština)	
Danish (Dansk)	
Dutch (Nederlands)	
English (English)	
Estonian (eesti keel)	
Finnish (suomi)	
French (Français)	
German (Deutsch)	
Greek (Ελληνικά)	
Gujarati (grezidi)	
(עברית) (עברית)	
Hindi (हिन्दी)	
Hungarian (Magyar)	
Icelandic (Icelandic)	
lioko (lioko)	
Indonesian (indonesia)	~
	ick
	💟 🕜 💽 Right Ctrl 🔡

6. Leave U.S. English selected and click Next (unless you have another preferred keyboard layout).

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🦉 collabn1 [Running] - Oracle VM VirtualBox	
Machine View Devices Help	
Select the appropriate keyboard for the system.	
Italian	
Italian (IBM)	
Italian (it2)	
Japanese	
Korean	
Latin American	
Macedonian	
Norwegian	
Polish	
Portuguese	
Romanian	
Russian	
Serbian	
Serbian (latin)	
Slovak (qwerty)	
Slovenian	
Spanish	
Swedish	
Swiss French	
Swiss French (latin1)	=
Swiss German	
Swiss German (latin1)	
Turkish	
U.S. English	
U.S. International	
Ukrainian	
United Kingdom	
	◆ Back
	😫 💿 🗬 🗐 💟 🖉 🕅 Right Ctrl 🔄

7. Leave Basic Storage Devices selected and click Next.

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collabn1 [Running] - Oracle VM VirtualBox	
achine View Devices Help	
hat type of devices will your installation involve?	
Basic Storage Devices Installs or upgrades to typical types of storage devices. If you're not sure which option is right for you, this is probably it.	
Specialized Storage Devices Installs or upgrades to enterprise devices such as Storage Area Networks (SANs). This option will allow you to add FCoE / ISCSI / zFCP disks and to filter out devices the installer should ignore.	
	▲ Back
	😂 🕢 🖓 🗐 💟 🛛 🖉 Right Ct

8. Click Yes, discard any data for the warning box stating The storage device below may contain data.

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- 9. In the hostname field, type collabn1.racattack.
 - Click Configure Network in the bottom left corner.
 - Highlight System eth0 and click the Edit... button.
 - Click the **Connect automatically** checkbox.
 - Click the IPv4 Settings tab.
 - Click the Method: dropdown and select Manual.
 - Click Add and type 192.168.78.51 for the address.
 - Leave Netmask at 24.
 - In the DNS servers: box, type 192.168.78.51, 192.168.78.52.
 - In the Search domains: box, type racattack.
 - Click the Apply button.

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3 collabn1 [Running] - Oracle VM VirtualBox				
Machine View Devices Help				
Please name this computer. The hostname identifies the computer on network.	a			
Hostname: collabn1.racattack				
		Editing Syster	n eth0	
	Connection <u>n</u> ame: S	System eth0]
N	Connect automatic	ally		
Sy	Wired 802.1x Securi	ity IPv4 Setting	IPv6 Settings	
Sy	Method: Manual		\$	
	Addresses			
	Address	Netmask (Gateway Add	
	192.168.78.51	24	Delete	
	DNS servers:	192.168.78.51	, 192.168.78.52	
	Search domains:	racattack		
	D <u>H</u> CP client ID:			
	Require IPv4 a	ddressing for th	is connection to complete	
Configure Network			Authenticate to save this all users of this machine.	connection for
	Available to all use	ers	Cancel Apply	<u>♦ B</u> ack
				🕒 💿 🛃 🗐 💟 🖉 Right Ctrl

- 10. Highlight System eth1 and click the Edit... button.
 - Click the **Connect automatically** checkbox.
 - Click the **IPv4 Settings** tab.
 - Click the Method: dropdown and select Manual.
 - Click Add and type 172.16.100.51.
 - Change Netmask to 24.
 - Click the **Apply** button.

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🖉 collabn1 [Running] - Oracle VM VirtualBox		
Machine View Devices Help		
Please name this computer. The hostname identifies the computer o network.	n a	
Hostname: collabn1.racattack		
	Editing System eth1	
-	Connection name: System eth1	
	Connect automatically	
	Wired 802.1x Security IPv4 Settings IPv6 Settings	
	Method: Manual	
	Addresses	
	Address Netmask Gateway Add	
	Deiete	
	DNS servers:	
	Search domains:	
	DHCP client ID:	
Confirment National	Require IPv4 addressing for this connection to complete	
Conngure Network	Authenticate to save this connection for all users of this machine.	
		k 🏓 <u>N</u> ext
		🛛 🕜 💽 Right Ctrl 💡

- 11. Highlight System eth2 and click the Edit... button.
 - Click the **Connect automatically** checkbox.
 - Click the **IPv4 Settings** tab.
 - Click the Method: dropdown and select Automatic (DHCP) addresses only.
 - Click the **Apply** button.
 - Click Close to close the network configuration menu and click Next.

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1 collabn1 [Running] - Oracle VM VirtualBox		
Machine View Devices Help		
Please name this computer. The hostname identifies the computer on a network.		
Hostname: collabn1.racattack)	
	Editing System eth2	
C	onnection name: System eth2	
e 1	Connect automatically	
Na	Wired 802.1x Security IPv4 Settings IPv6 Settings	
Sy Sy		
Sy	Method: Automatic (DHCP) addresses only	•
	Addresses	
	Address Netmask Gateway	Add
		elete
	DNS servers:	
	Search domains:	
	DHCP client ID:	
	Require IPv4 addressing for this connection to c	omplete
Configure Network		tec
Configure Network	Authenticate to all users of this	save this connection for
5	Z Available to all users	Apply
		😂 💿 🗬 🛄 💟 [🧷 Right Ctrl 🖉

12. Leave the timezone settings as they are and click Next.



13. Enter the Root Password as racattack and click Next.

💯 collabn1 (Running] - Oracle VM VirtualBox		
Machine View D	Devices Help		
The root	account is used for administering		
the system	em. Enter a password for the root		
user.			
Root Password:			
Tuber Laborra.			
Confirm:	•••••		
		Back	Mext
		9 🕂 🗗 🔝	🕜 💽 Right Ctrl

14. Click Use Anyway when warned about the weak password.

🖉 collabn1 [Running	g] - Oracle VM VirtualBox		
Machine View D	Devices Help		
The root the syste user.	account is used for administering em. Enter a password for the root		
Root Password:	•••••		
<u>C</u> onfirm:	••••••		
		Weak Password	
		You have provided a weak password: it is	
		based on a dictionary word	
		Cancel Use Anyway	
		B ack	▶ <u>N</u> ext
		9 O F 🖬 🛛	🎯 💽 Right Ctrl

15. Click Use All Space for the installation type and click Next.

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🚰 collabn1 [Running] - Oracle VM VirtualBox	
Machine View Devices Help	
Which type of installation would you like?	
Use All Space Removes all partitions on the selected device(s). This includes partitions created by other operating systems.	
Tip: This option will remove data from the selected device(s). Make sure you have backups.	
Replace Existing Linux System(s) Removes only Linux partitions (created from a previous Linux Installation). This does not remove other partitions you may have on your storage device(s) (such as VFAT or FAT32). The This option will remove data from the celected device(c). Make sure you have backupe	
Tip: This option will remove data from the selected device(s). Make sure you have backups.	
Shrink Current System Shrinks existing partitions to create free space for the default layout.	
Use Free Space Retains your current data and partitions and uses only the unpartitioned space on the selected device (s), assuming you have enough free space available.	
Create Custom Layout Manually create your own custom layout on the selected device(s) using our partitioning tool.	
Encrypt system	
Review and modify partitioning layout	
•	Back
	🗐 💟 🛛 🔗 💽 Right Ctrl

16. Click Write changes to disk when warned about Writing storage configuration to disk.



17. Leave Basic Server as the default installation type. Click Next.

📴 collabn1 [Running] - Oracle VM VirtualBox	
Machine View Devices Help	
The default installation of Oracle Linux Server is a basic server install. You can optionally select a different set of software now.	
Basic Server	
O Database Server	
O Web Server	
 Identity Management Server 	
 Virtualization Host 	
 Desktop 	
 Software Development Workstation 	
O Minimal	
Please select any additional repositories that you want to use for software installation.	
High Availability	
Load Balancer	=
✓ Oracle Linux Server	
C. Basiliant Stanson	v
🖶 Add additional software repositories 🛛 🖗 Modify repository	
You can further customize the software selection now, or after install via the software management application.	
Customize later O Customize now	
	<u>♦ B</u> ack
	😂 💿 🗗 🛄 💟 🛛 🔗 CTRL DROITE 🚽

18. The operating system will take a while to install.



19. When the installation is complete, click **Reboot**.



- 20. The reboot no longer shows messages, just a progress bar.
 - You can see the progress by hitting **F8** while the server is booting.
 - The system should boot to a command line login prompt.

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Linux Post Installation

1. To connect to the new created virtual machine, create a connection in Putty for the new VM called **collabn1** with the **IP** Address of **192.168.78.51**.



negory.		
Session Logging Terminal Keyboard Bell Features Window Appearance Behaviour Translation Selection Olours Colours Data Proxy Telnet Rlogin SSH SSH Serial	Basic options for your PuTTY session	
	Specify the destination you want to connect to Host Name (or IP address) Port 192.168.78.51 22 Connection type: Baw Telnet Blogin @ SSH Serial	
	Load, save or delete a stored session Saved Sessions collabn1 Collabn1 Load Save Delete	
	Close window on exit:	
- 2. Open the **collabn1** connection by clicking **Open**.
 - Click Yes on the Security Alert dialog box.



3. Enter root at the login as: prompt and racattack at the password: prompt.



4. Turn off and disable the firewall IPTables.

<pre>[root@collabn1 ~]# service iptables stop iptables: Flushing firewall rules: iptables: Setting chains to policy ACCEPT: filter iptables: Unloading modules:</pre>	[OK] [OK]	
<pre>[root@collabn1 ~]# chkconfig iptables off</pre>		
[root@collabn1 ~]# chkconfiglist iptables iptables 0:off 1:off 2:off 3:off 4:off	5:off 6:off	

5. Disable SELinux. Open the config file and change the SELINUX variable from enforcing to disabled.

.....

[root@collabn1 ~]# vim /etc/selinux/config
This file controls the state of SELinux on the system.
SELINUX= can take one of these three values:
enforcing - SELinux security policy is enforced.
permissive - SELinux prints warnings instead of enforcing.

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```
# disabled - No SELinux policy is loaded.
SELINUX=disabled
# SELINUXTYPE= can take one of these two values:
# targeted - Targeted processes are protected,
# mls - Multi Level Security protection.
SELINUXTYPE=targeted
```

6. Verify that all the network interfaces are up.

7. Add the DVD as repository.

Add the DVD device to the server **Device -> CD/DVD Devices -> Oracle_Linux_6_4.iso**

Run the following commands:



8. Install the database preinstall package oracle-rdbms-server-11gR2-preinstall.

This package installs all the package requirements for Oracle 11g (but will work also for 12c), configures kernel parameters, creates oracle user and groups and sets the user limits.



9. Install additional RPMs that will be used to install and administer the servers.

[root@collabn1 ~]# rpm -ivh /media/Packages/kernel-uek-devel-\$(uname -r).rpm ... [root@collabn1 ~]# yum install -y tigervnc-server.x86_64 xclock man parted.x86_64 unzip.x86_64 xterm lsof bind xorg-x11-twm [root@collabn1 ~]# yum install -y tigervnc-server.x86_64 xclock man parted.x86_64 unzip.x86_64 xterm lsof bind xorg-x11-twm [root@collabn1 ~]# yum install -y tigervnc-server.x86_64 xclock man parted.x86_64 unzip.x86_64 xterm lsof bind xorg-x11-twm [root@collabn1 ~]# yum install -y tigervnc-server.x86_64 xclock man parted.x86_64 unzip.x86_64 xterm lsof bind xorg-x11-twm

Install 12 Package(s)	
Total download size: 22 M	
	!
Complete!	1

10. Uninstall NTP.

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[root@collabn1 ~]# yum remove -y ntp	
Removed: ntp.x86_64 0:4.2.4p8-3.el6	
Complete!	

11. Unmount the DVD before continuing with the next steps.

1	1
[root@collabni ~]# umount /media	1
i de la constante de	i
•••••••••••••••••••••••••••••••••••••••	

Install VirtualBox Addons

1. Make the VirtualBox guest additions available to the OS by clicking Devices->Install Guest Additions.



2. Mount the virtual CD-Rom created by VirtualBox.

,	
[root@collabn1 ~]# mount /dev/cdrom /media	÷
mount: block device /dev/sr0 is write-protected, mounting read-only	ł

3. Install the VirtualBox Guest Additions. The error related to the step **Installing the Window System drivers** is ok to ignore.

.....

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---------	--

	[root@collabn1 ~]# sh /media/VBoxLinuxAdditions.run				
Ì	Verifying archive integrity All good.				
ł	Uncompressing VirtualBox 4.2.14 Guest Additions for Linux.				
ł	VirtualBox Guest Additions installer				
Ì	Removing installed version 4.2.14 of VirtualBox Guest Addit	tio	ns		
1	Copying additional installer modules				
i	Installing additional modules				
1	Removing existing VirtualBox non-DKMS kernel modules	[OI	K]
	Building the VirtualBox Guest Additions kernel modules				
i	The headers for the current running kernel were not found.	Ιf	tł	ıe	following
1	module compilation fails then this could be the reason.				
1	The missing package can be probably installed with				
ł	<pre>yum install kernel-uek-devel-2.6.39-400.17.1.el6uek.x86_64</pre>				
1					
i	Building the main Guest Additions module	[Oł	K]
1	Building the shared folder support module	[Oł	K]
1	Building the OpenGL support module	[OI	K]
i	Doing non-kernel setup of the Guest Additions	[Oł	K]
1	You should restart your guest to make sure the new modules	ar	ea	act	ually used
1					
i	Installing the Window System drivers	[F	AII	LED]
ł	(Could not find the X.Org or XFree86 Window System.)				

4. Dismount the cdrom.

[root@collabn1 ~]# umount /media	

Configure Bind DNS

1. Enable BIND DNS to start at boot time.

[root@collabn1 ~]# Chkconiig named on	
·	

2. Change named directory permissions.

i de la construcción de la constru	!
[root@collabn1 ~]# touch /var/named/racattack	
[root@collabn1 ~]# chmod 664 /var/named/racattack	
<pre>[root@collabn1 ~]# chgrp named /var/named/racattack</pre>	
[root@collabn1 ~]# chmod g+w /var/named	
[root@collabn1 ~]# chmod g+w /var/named/racattack	
	i

3. Backup the **BIND** configuration file.

[root@collabn1 ~]# cp /etc/named.conf /etc/named.conf.org	

4. Run the following command or edit the /etc/named.conf file to change the named configuration manually.

```
sed -i -e 's/listen-on .*/listen-on port 53 { 192.168.78.51; };/' \
-e 's/allow-query .*/allow-query { 192.168.78.0\/24; localhost; };\n allow-transfer { 192.168.78.0\/24; };/' \
-e '$azone "racattack" {\n type master;\n file "racattack";\n};\n\nzone "in-addr.arpa" {\n type master;\n file "\n type master;\n file "
 /etc/named.conf
       ∢
```

In **bold** the lines that have been modified from the default.

```
_____
options {
     listen-on port 53 { 192.168.78.51; };
     listen-on-v6 port 53 { ::1; };
     directory "/var/named";
dump-file "/var/named/data/cache_dump.db";
     statistics-file "/var/named/data/named_stats.txt";
     memstatistics-file "/var/named/data/named_mem_stats.txt";
     allow-query
                 { 192.168.78.0/24; localhost; };
     allow-transfer { 192.168.78.0/24; };
     recursion yes;
     dnssec-enable yes;
```

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```
dnssec-validation yes;
       dnssec-lookaside auto;
       /* Path to ISC DLV key */
      bindkeys-file "/etc/named.iscdlv.key";
       managed-keys-directory "/var/named/dynamic";
};
logging {
       file "data/named.run";
              severity dynamic;
      };
};
zone "." IN {
      type hint;
      file "named.ca";
17
include "/etc/named.rfc1912.zones";
include "/etc/named.root.key";
zone "racattack" {
type master;
file "racattack";
};
zone "in-addr.arpa" {
type master;
file "in-addr.arpa";
};
i
```

5. Create the zone file for the **racattack** domain on **collabn1** by running the following command:

(Copy & Paste the whole box)

ocho	د مست عد								
@	IN SOA	collabn	1	hostmas	ter		((
					101		; :	ser	ial
					1D		;	r	efresh
					1H		;	r	etry
					1W		;	e	expire
					ЗH)	;	n	ninimum
		NS	collabn1	L					
		NS	collabn2	2					
local	host	A	127.0.0.	. 1					
colla	ubn1	A	192.168.	78.51					
colla	ubn1-vip	A	192.168.	78.61					
colla	abn1-priv	A	172.16.1	100.51					
colla	ubn2	A	192.168.	78.52					
colla	ubn2-vip	A	192.168.	78.62					
colla	ubn2-priv	A	172.16.1	100.52					
colla	abn-cluster	-scan	A	192.16	8.78	3.25	1		
colla	abn-cluster	-scan	A	192.16	8.78	.25	2		
colla	abn-cluster	-scan	A	192.16	8.78	.25	3'	\setminus	
> /vā	ar/named/ra	acattack							

6. Create the reverse zone file on collabn1.

(Copy & Paste the whole box)

```
_____
echo '$TTL 3H
0
       IN SOA collabn1.racattack.
                                    hostmaster.racattack.
                                                            (
                                  101 ; serial
                                  1D
                                        ; refresh
                                  1H
                                        ; retry
                                  1W
                                        ; expire
                                  3H )
                                        ; minimum
                    collabn1.racattack.
             NS
             NS
                    collabn2.racattack.
51.78.168.192
            PTR
                  collabn1.racattack.
61.78.168.192
             PTR
                    collabn1-vip.racattack.
51.100.16.172
             PTR
                    collabn1-priv.racattack.
52.78.168.192
             PTR
                    collabn2.racattack.
62.78.168.192
             PTR
                    collabn2-vip.racattack.
52.100.16.172
             PTR
                    collabn2-priv.racattack.
251.78.168.192
             PTR
                    collabn-cluster-scan.racattack.
252.78.168.192 PTR
                    collabn-cluster-scan.racattack.
```

253.78.168.192 PTR collabn-cluster-scan.racattack.' \ > /var/named/in-addr.arpa

7. Generate the **rndc.key** file.

[root@collabn1 ~]# rndc-confgen -a -r /dev/urandom
wrote key file "/etc/rndc.key"

chgrp named /etc/rndc.key chmod g+r /etc/rndc.key

8. Restart the named service.

	[root@collabn1 ~]# service named restart			
1	Stopping named:	[OK	(]
	Starting named:	[OK	
į				

9. Check that the parameter **PEERDNS** is set to **no** in /etc/sysconfig/networking/devices/ifcfg-eth2 (or /etc/sysconfig/network-scripts/ifcfg-eth2) to prevent the resolv.conf from being overwritten by the dhcp client:

1
DEVICE=eth2
TYPE=Ethernet
UUID=xxxxxxxx-xxxx-xxxx-xxxxxxxxxxx
ONBOOT=yes
NM_CONTROLLED=yes
BOOTPROTO=dhcp
HWADDR=xx:xx:xx:xx
DEFROUTE=yes
PEERDNS=no
PEERROUTES=yes
IPV4_FAILURE_FATAL=yes
IPV6INIT=no
NAME="System eth2"
USERCTL=no
1

10. If it was set to **yes** previously, restart the network and verify that the file /etc/resolv.conf contains now the correct nameservers:

[root@collabn1 ~]# service network restart			
Shutting down interface eth0:	[OK	
Shutting down interface eth1:	[OK	
Shutting down interface eth2:	[OK	
Shutting down loopback interface:	[OK	
Bringing up loopback interface:	[OK	
Bringing up interface eth0:	[OK	
Bringing up interface eth1:	[OK	
Bringing up interface eth2:			
Determining IP information for eth2 done.			
	[OK]

11. /etc/resolv.conf should contain:

```
[root@collabn1 ~]# cat /etc/resolv.conf
; generated by /sbin/dhclient-script
nameserver 192.168.78.51
nameserver 192.168.78.52
search racattack
```

12. Check that the master DNS on **collabn1** is working.

```
[root@collabn1 ~]# nslookup collabn-cluster-scan.racattack
Server: 192.168.78.51
Address: 192.168.78.51#53
Name: collabn-cluster-scan.racattack
Address: 192.168.78.251
```

Name: collabn-cluster-scan.racattack
Address: 192.168.78.252
Name: collabn-cluster-scan.racattack
Address: 192.168.78.253

Prepare Linux for Oracle

1. Modify the pam.d login file to use limits.

1		
•		
sed -i -	e '/session	required pam_selinux.so open/i\
session	required	\/lib64\/security\/pam_limits.so\
session	required	pam_limits.so' /etc/pam.d/login

2. Change the password for the **oracle** user to **racattack**.

```
[root@collabn1 ~]# 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.
```

3. Create and change the ownership of the directories for Clusterware and the Database installations.

```
[root@collabn1 ~]# mkdir -p /u01/app
[root@collabn1 ~]# chown oracle:oinstall /u01/app
```

4. Modify the Oracle user so that it belongs to the vboxsf group.

```
[root@collabn1 ~]# usermod -G oinstall,dba,vboxsf oracle
[root@collabn1 ~]# id oracle
uid=54321(oracle) gid=54321(oinstall) groups=54321(oinstall),54322(dba),54323(vboxsf)
```

Create Cluster

Create VirtualBox Shared Storage

1. Shutdown the server:

```
[root@collabn1 ~]# shutdown -h now
Broadcast message from root@collabn1.racattack
(/dev/pts/0) at 9:06 ...
The system is going down for halt NOW!
```

2. In the VirtualBox Manager, select the machine collabn1, click Settings -> Storage.

Select Controller SATA and click on the Add Hard Disk button:

🜍 Oracle VM VirtualBox Manager		X
<u>F</u> ile <u>M</u> achine <u>H</u> elp		
🔅 🙆 collabn1 - Settings	s Snar	shots
New Settings Collabri Collabri Poor Collabri System System Display Storage Audio Rework Serial Ports VSB Shared Folders	Storage Storage Tree Controller: IDE VBoxGuestAdditions.iso Controller: SATA Scollabn1.vdi Port Count: 1 Use host I/O cache Collabn1.vdi Collabn1.vdi </th <th>shots</th>	shots
		\leq
	ep network	-

Click on Create New Disk:



3. Leave VDI (VirtualBox Disk Image) selected and click Next.

	9	23
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 setting	e. If
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)		
Hide Description Next	Car	ncel

4. For the shared storage, select Fixed size and click Next.



5. Change the location of the file to the folder racattack12 previously created.

Enter asm1.vdi as disk name.

Enter 5.00Gb as disk size.

Click Create.

	? ×
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. <pre><pre><pre><pre><pre></pre></pre></pre></pre></pre>	dick on the
Select the size of the virtual hard drive in megabytes. This size is the limit on t file data that a virtual machine will be able to store on the hard drive.	he amount of 5.00 GB
4.00 MB 2.00 TB	
Create	Cancel

6. Now the disk is physically created with a size of 5Gb, so it can take more time to complete.

S Create Virtual	Hard Drive: Creating fixed medium storage unit 'C:\Users\luc\VirtualBox V.	×
1	Creating fixed medium storage unit 'C:\Users\uc\VirtualBox VMs\racattack12c\as 27 31 seconds remaining	m1.vdi' 7% 🗶

- 7. Repeat the steps to create three more disks:
 - asm2.vdi (5.00GB)
 - asm3.vdi (5.00GB)
 - asm4.vdi (5.00GB)
- 8. Finally, four virtual disks should have been created for asm.

Click OK.

🧐 collabn1 - Settings			S X
 General System Display Storage Audio Network Serial Ports USB Shared Folders 	Storage Storage Tree Controller: IDE VBoxGuestAdditions.iso Controller: SATA Controller: SATA Co	Attributes — Name: Type: Port Count:	SATA AHCI V 5 V Use host I/O cache
	Contains all storage controllers for this mach them.	ine and the virtual i	images and host drives attached to
		ОК	Cancel Help

9. Make all the asm devices sharable: from VirtualBox Manager, click File -> Virtual Media Manager.

🗿 Virtual Media	Manager		
Actions			
Copy Modify F	Cemove Release Refresh		
Name	A	Virtual Size	Actual Size
asm1.vdi		5.00 GB	5.00 GB
asm2.vdi		5.00 GB	5.00 GB
asm3.vdi		5.00 GB	5.00 GB
asm4.vdi		5.00 GB	5.00 GB
collabn1.vo	di	30.00 GB	2.83 GB
Type: Location: Format: Storage details: Attached to:	Normal C:\Users' ,VirtualBox VMs\racattack12c\asm1.vdi VDI Fixed size storage collabn1	C	lose Help

10. For each asm devices: right-click -> **Modify**:

Virtual	Media I	Manager	Inda Ba			
<u>A</u> ctions						
Copy M	ा odify ह	Cemove Rele	ase Refresh	y disks		
Name			*		Virtual Size	Actual Size
asn	n1.vdi	1		1	5.00 GB	5.00 GB
asn	n2. 🚱	<u>С</u> ору	Ctrl+C		5.00 GB	5.00 GB
asn	n3. 😭	Modify	Ctrl+Space		5.00 GB	5.00 GB
asn	n4. 🦳	Remove	Del		5.00 GB	5.00 GB
col	lab 📟	Re <u>l</u> ease	Ctrl+L		30.00 GB	2.83 GB
Type: Locatior Format: Storage Attache	n: : e details: ed to:	Normal C:\Users' VDI Fixed size sti collabn 1	,VirtualBox VMs\raca orage	ttack12c\asm1.vdi		
						llose Help

11. Select Shareable and click OK. Do it for the four asm devices.

Modify medium attributes
You are about to change the attributes of the virtual disk located in C: \Users\luc\VirtualBox VMs\racattack12c\asm1.vdi.
Please choose one of the following medium types and press OK to proceed or Cancel otherwise.
Choose medium type:
Normal
O Immutable
Writethrough
Shareable
Multi-attach
OK Cancel

12. Start the machine collabn1.

You should see now four more disks named /dev/sd*:

[root@collabn1 ~]# 1s -1 /dev/sd*
brw-rw----. 1 root disk 8, 0 Jul 28 10:16 /dev/sda
brw-rw----. 1 root disk 8, 1 Jul 28 10:16 /dev/sda1
brw-rw----. 1 root disk 8, 2 Jul 28 10:16 /dev/sda2
brw-rw----. 1 root disk 8, 16 Jul 28 10:16 /dev/sdb
brw-rw----. 1 root disk 8, 32 Jul 28 10:16 /dev/sdc
brw-rw----. 1 root disk 8, 48 Jul 28 10:16 /dev/sdd
brw-rw----. 1 root disk 8, 64 Jul 28 10:16 /dev/sde

Configure Storage Persistent Naming

1. Once the new disks are visible by the server, add a primary partition on each of them with **fdisk**.

[root@collabn1 ~]# **fdisk /dev/sdb** Device contains neither a valid DOS partition table, nor Sun, SGI or OSF disklabel

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```
Building a new DOS disklabel with disk identifier 0x97cc9f57.
Changes will remain in memory only, until you decide to write them.
After that, of course, the previous content won't be recoverable.
Warning: invalid flag 0x0000 of partition table 4 will be corrected by w(rite)
WARNING: DOS-compatible mode is deprecated. It's strongly recommended to
        switch off the mode (command 'c') and change display units to
        sectors (command 'u').
Command (m for help): n
Command action
 e
      extended
 р
     primary partition (1-4)
Partition number (1-4): 1
First cylinder (1-652, default 1): <enter>
Using default value 1
Last cylinder, +cylinders or +size{K,M,G} (1-652, default 652): <enter>
Using default value 652
Command (m for help): w
The partition table has been altered!
Calling ioctl() to re-read partition table.
Syncing disks.
```

2. Repeat the same step for sdc, sdd and sde.

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When finished, all disks have at least a partition:

[root@collabn1 ~]# ls -1 /dev/sd?1 orw-rw----. 1 root disk 8, 1 Jul 28 10:16 /dev/sda1 orw-rw----. 1 root disk 8, 17 Jul 28 10:23 /dev/sdb1 orw-rw----. 1 root disk 8, 33 Jul 28 10:27 /dev/sdc1 orw-rw----. 1 root disk 8, 49 Jul 28 10:27 /dev/sdd1 orw-rw----. 1 root disk 8, 65 Jul 28 10:27 /dev/sde1

3. Configure the option **-g** for the **scsi** id command to expect an UUID from the shared devices.

```
[root@collabn1 ~]# ls -l /etc/scsi_id.config
ls: cannot access /etc/scsi_id.config: No such file or directory
[root@collabn1 ~]# echo "options=-g" > /etc/scsi_id.config
```

4. Prepare the file /etc/udev/rules.d/99-oracle-asmdevices.rules by running the following script:

5. Once completed, the file should like the following (except for the scsi UUID).

Note: The lines beginning with "KERNEL" should not be splitted.

```
[root@collabn1 ~]# cat /etc/udev/rules.d/99-oracle-asmdevices.rules
KERNEL=="sd?l", BUS=="scsi", PROGRAM=="/sbin/scsi_id -g -u -d /dev/$parent", RESULT=="1ATA_VBOX_HARDDISK_VB2216c54a-825b4598
KERNEL=="sd?l", BUS=="scsi", PROGRAM=="/sbin/scsi_id -g -u -d /dev/$parent", RESULT=="1ATA_VBOX_HARDDISK_VB33d4d7f-d052e72c
KERNEL=="sd?l", BUS=="scsi", PROGRAM=="/sbin/scsi_id -g -u -d /dev/$parent", RESULT=="1ATA_VBOX_HARDDISK_VB33d4d7f-d052e72c
KERNEL=="sd?l", BUS=="scsi", PROGRAM=="/sbin/scsi_id -g -u -d /dev/$parent", RESULT=="1ATA_VBOX_HARDDISK_VB636da22f-87dc2f88
KERNEL=="sd?l", BUS=="scsi", PROGRAM=="/sbin/scsi_id -g -u -d /dev/$parent", RESULT=="1ATA_VBOX_HARDDISK_VB86aaf297-60dcda74
```

6. Reload the udev rules and restart udev:

[root@collabn1	~]# /sbin/partprobe /dev/sdb1 /dev/sdc1 /d	ev/sdd1 /dev/sde1
[root@collabn1	~] # /sbin/udevadm test /block/sdb/sdb1	
[root@collabn1	~] # /sbin/udevadm test /block/sdc/sdc1	
[root@collabn1	~]# /sbin/udevadm test /block/sdd/sdd1	
[root@collabn1	~]# /sbin/udevadm test /block/sde/sde1	
[root@collabn1	~] # /sbin/udevadm controlreload-rules	
[root@collabn1	~]# /sbin/start_udev	
Starting udev:	[OK]	
L		

7. The new disks are ready for use:

[root@collabn1 ~]# **1s -1 /dev/asm*** brw-rw----. 1 oracle dba 8, 17 Jul 30 16:17 /dev/asm-disk1 brw-rw----. 1 oracle dba 8, 33 Jul 30 16:17 /dev/asm-disk2 brw-rw----. 1 oracle dba 8, 49 Jul 30 16:17 /dev/asm-disk3 brw-rw----. 1 oracle dba 8, 65 Jul 30 16:17 /dev/asm-disk4

Clone VirtualBox VM

1. Shutdown the VM.

```
[root@collabn1 ~]# shutdown -h now
Broadcast message from root@collabn1.racattack
(/dev/pts/0) at 8:42 ...
The system is going down for halt NOW!
```

2. Clone the disk collabn1.vdi: from VirtualBox Manager, click File -> Virtual Media Manager.

Virtual Media I	Manager		
Copy Modify R	emove Release Refresh		
Name	A	Virtual Size	Actual Size
asm1.vdi		5.00 GB	5.00 GB
asm2.vdi		5.00 GB	5.00 GB
asm3.vdi		5.00 GB	5.00 GB
asm4.vdi		5.00 GB	5.00 GB
collabn1.vd	i	30.00 GB	2.83 GB
Type: Location: Format: Storage details: Attached to:	Normal C:\Users' ,VirtualBox VMs\racattack12c\asm1.vdi VDI Fixed size storage collabn1		
			lose Help

3. Right-click on the disk collabn1.vdi and click Copy...

Virtual Media N	Manager				
<u>A</u> ctions					
Copy Modify R	emove Release R	⋳∂∂∂∂∂∂∂∂∂∂∂∂∂∂∂∂∂∂∂∂∂∂∂∂∂∂∂∂∂∂∂∂∂∂∂			
Hard drives	 Optical disks 	💾 Floppy disks			
Name		*		Virtual Size	Actual Size
asm1.vdi				5.00 GB	5.00 GB
asm2.vdi				5.00 GB	5.00 GB
asm3.vdi				5.00 GB	5.00 GB
asm4.vdi				5.00 GB	5.00 GB
collabn1.vd				30.00 GB	2.89 GB
	🚱 <u>С</u> ору	Ctrl+C			
	😭 Modify	Ctrl+Space			
	Remove	Del			
	Release	Ctrl+L			
Type: Location: Format: Storage details: Attached to:	Normal C:\Users\uc\VirtualE VDI Dynamically allocated collabn 1	iox VMs\racattack1: d storage	c\collabn 1.vdi		
Conv an existing r	nedium				Close Help

4. Leave the file collabn1.vdi, click Next.

	8	X
Copy Virtual Hard Drive		
Hard drive to copy		
Please select the virtual hard drive file that you would like to copy if it is not selected. You can either choose one from the list or use the folder icon besign select one.	already Je the list	t to
collabn1.vdi (Normal, 30.00 GB)		- 💫
Hide Description Next	Ca	ncel

5. Leave **VDI** as file type. Click **Next**.

	8	23
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)		
HDD (Parallels Hard Disk)		
QED (QEMU enhanced disk)		
QCOW (QEMU Copy-On-Write)		
Hide Description Next	Can	icel

6. Leave Dinamically allocated. Click Next.

	Ş	23
Create Virtual Hard Drive		
Storage on physical hard drive		
Please choose whether the new virtual hard drive file should grow as it is us allocated) or if it should be created at its maximum size (fixed size).	sed <mark>(</mark> dynar	nically
A dynamically allocated hard drive file will only use space on your phys it fills up (up to a maximum fixed size), although it will not shrink again aut space on it is freed.	ical hard d tomatically	rive as when
A fixed size hard drive file may take longer to create on some systems bu to use.	t is often f	aster
Oynamically allocated		
Fixed size		
Next	Car	icel

 Type in the full path or choose through the browse icon the Location for the disk file to be created. Again, it's better to use the common folder racattack12c previously created for all the virtual disks. The file should be named collabn2.vdi. Click Copy.



8. Click Close to exit from the Virtual Media Manager.

Create Second VirtualBox VM

- 1. In VirtualBox, click New icon in the upper left corner to create the new VM.
- 2. Type in collabn2 for the Name of the VM. Choose Linux for the Type and Oracle (64 bit) for the Version and click Next.

Create	Virtual Machine
Name	and operating system
Please d type of will be u	hoose a descriptive name for the new virtual machine and select the operating system you intend to install on it. The name you choose sed throughout VirtualBox to identify this machine.
Name:	collabn2
Type:	Linux 🔹 🗗
Version:	Orade (64 bit)
	Hide Description Next Cancel

3. Type **3072** in the Size field and click Next.

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If your laptop only has 8G of RAM allocate 1536MB of RAM to each VM (not 3072MB).

4. Select Use an existing virtual hard drive file and use the folder icon to locate the file collabn2.vdi previously created.



Click Create to complete the creation of the second VM.

5. There are now two virtual machines; collabn2 being a clone of collabn1.

From the main screen, select the virtual machine collabn2 and click the Settings icon in the upper left hand corner.

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6. Open the USB sub-menu. Uncheck the Enable USB Controller check box.

🥸 со	llabn1 - Settings		? <mark>×</mark>
	General	USB	
	System Display	Enable USB Controller	
9	Storage	✓ Enable USB 2.0 (EHCI) Controller USB Device Filters	
	Audio Network		
	Serial Ports		
	USB Shared Folders		
			2
		When checked, enables the virtual USB controller of this machine.	
		OK	нер

7. Open the Network sub-menu. Under the Adapter 1 tab, change the Attached to: dropdown to Host-only Adapter.

col	llabn3 - Settings	२ <mark>×</mark>
	General	Network
<u></u>	System	
D	Display	Adapter 1 Adapter 2 Adapter 3 Adapter 4
0	Storage	Enable Network Adapter
₽	Audio	Attached to: Host-only Adapter 💌
₽	Network	Name: VirtualBox Host-Only Ethernet Adapter 🗸 🗸
٨	Serial Ports	Advanced
Ø	USB	
	Shared Folders	
		Shows or hides additional network adapter options.
		OK Cancel Help

8. Choose the Adapter 2 tab. Check the box for Enable Network Adapter. Change the Attached to: dropdown to Internal Network and type the name rac-priv in the Name field.

🔅 collabn1 - Sett	ings
📃 General	Network
 System Display 	Adapter 1 Adapter 2 Adapter 3 Adapter 4
Storage	Enable Network Adapter Attached to: Internal Network
Network	Name: rac-priv
 Serial Ports USB Shared Fold 	ers Advanced
	Enter the name of the internal network that this network card will be connected to. You can create a new internal network by choosing a name which is not used by any other network cards in this virtual machine or others.
	OK Cancel Help

9. Choose the Adapter 3 tab. Check the box for Enable Network Adapter. Change the Attached to: dropdown to NAT.

00 🤃	llabn1 - Settings	ि <mark>×</mark>
	General	Network
	System	
Q	Display	Adapter 1 Adapter 2 Adapter 3 Adapter 4
9	Storage	Enable Network Adapter
₽	Audio	Attached to: NAT
₽	Network	Name:
	Serial Ports	Advanced
Ø	USB	
	Shared Folders	
		Controls how this virtual adapter is attached to the real network of the Host OS.
		OK Cancel Help

10. Select the Shared Folders tab. Click Add Shared Folder.

Enter the path where you've downloaded the Oracle installation media and enter a name for your folder. Check **Auto-mount** and click **OK**.

] 🛃
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s
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elt s

11. Open the Storage sub-menu.

Click on Controller SATA and then on Add Disk:

🤨 collabn2	- Settings			8 x
📃 Gener	ral	Storage		
 Syster Displa Storag Audic Netwo Serial USB Share 	m ay ge ork Ports d Folders	Storage Tree Controller: IDE Controller: SATA Collabn2.vdi Contains all storage controllers for this m them.	Attributes Name: Type: Port Count: Add Hard Disk	SATA AHCI 1 Use host I/O cache
			ОК	Cancel Help

12. Click on Choose existing disk:



13. Select the disk **asm1.vdi** and click **Open**.

Organize 🔻 New folder			
Name	Date modified	Туре	Size
💗 asm1.vdi	8/5/2013 20:41	Virtual Disk Image	5,242,904 KB
💗 asm2.vdi	8/5/2013 20:41	Virtual Disk Image	5,242,904 KB
📦 asm3.vdi	8/5/2013 20:41	Virtual Disk Image	5,242,904 KB
💗 asm4.vdi	8/5/2013 20:41	Virtual Disk Image	5,242,904 KB
💗 collabn1.vdi	8/5/2013 20:41	Virtual Disk Image	3,032,188 KB
💗 collabn2.vdi	7/30/2013 23:39	Virtual Disk Image	3,032,188 KB

14. Repeat the operation to add all remaining asm disks.

😟 collabn2 - Settings			<u> </u>	
 General System Display Storage Audio Network Serial Ports USB Shared Folders 	Storage Tree Controller: IDE Controller: SATA Controller: SATA	Attributes — Name: Type: Port Count:	SATA AHCI 5 Use host I/O cache	
Image: Contract of the list on the left-hand side and move the mouse over a settings item to get more information. Image: Contract of the left-hand side and move the mouse over a settings Image: Contract of the left-hand side and move the mouse over a settings Image: Contract of the left-hand side and move the mouse over a settings Image: Contract of the left-hand side and move the mouse over a settings Image: Contract of the left-hand side and move the mouse over a settings Image: Contract of the left-hand side and move the mouse over a settings Image: Contract of the left-hand side and move the mouse over a settings Image: Contract of the left-hand side and move the mouse over a settings Image: Contract of the left-hand side and move the mouse over a settings Image: Contract of the left-hand side and move the mouse over a settings Image: Contract of the left-hand side and move the mouse over a settings Image: Contract of the left-hand side and move the mouse over a settings Image: Contract of the left-hand side and move the mouse over a settings Image: Contract of the left-hand side and move the mouse over a settings Image: Contract of the left-hand side and move the mouse over a settings Image: Contract of the left-hand side and move the mouse over a settings Image: Contract of the left-hand side and move the mouse over a settings Image: Contract of the left-hand side and move				

15. Click on **Ok** to save the modifications.

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16. Review the summary of the new virtual machine.

🚳 Oracle VM VirtualBox Manager	
File Machine Help	
New Settings Start Discard	Details 🙆 Snapshots
🧕 General	Preview
Name: collabn2 Operating System: Oracle (64 bit)	
System	
Base Memory: 3072 MB Boot Order: Floppy, CD/DVD-ROM, Hard Disk Acceleration: VT-x/AMD-V, Nested Paging, PAE/NX	collabn2
Uisplay	
Video Memory: 12 MB Remote Desktop Server: Disabled	
Storage	
Controller: IDE IDE Secondary Master: [CD/DVD] Empty Controller: SATA	
SATA Port 0: collabn2.vdi (Normal, 30.00 GB) SATA Port 1: asm1.vdi (Shareable, 5.00 GB) SATA Port 2: asm2.vdi (Shareable, 5.00 GB) SATA Port 3: asm3.vdi (Shareable, 5.00 GB)	
SAIA PORT 4: asm4. vdi (Shareable, S.UU GB)	
	-
Host Driver: Windows DirectSound	

Configure Second Linux VM

1. The network won't be available yet because we reinitialized the network adapters so the following changes will need to be done in the VM. Log in as **root/racattack**. Type the command **system-config-network**. **Device configuration** is already highlighted. Press **Enter**.



2. eth0 (eth0) - Ethernet is already highlighted. Press Enter.



3. Go down to the Static IP line. Change the IP to 192.168.78.52. Go down to Ok and press Enter.

Machine View Devices Help Name Device Use DHCP Static IP Netmask Default gateway IP Primary DNS Server Secondary DNS Server ISC. 168.78.51 ISC. 168.78.52 ISC. 168.	💯 collabn2 [Ru	nning] - Orac	le VM VirtualBox			
Nameeth0Deviceeth0Use DHCP[]Static IP192.168.78.52Netmask192.168.78.51Default gateway IP192.168.78.51Primary DNS Server192.168.78.52OkCancel	Machine Vie	w Devices	Help			
			Network Co Name Device Use DHCP Static IP Netmask Default gateway IP Primary DNS Server Secondary DNS Server	nfiguration eth0 eth0 [] 192.168.78.52 192.168.78.51 192.168.78.52 		
<pre><tab>/<alt-tab> between elements <space> selects <f12> next screen</f12></space></alt-tab></tab></pre>	<tab>/<f< th=""><th>lt-Tab></th><th>between elements </th><th><space> selects</space></th><th> <f12> r</f12></th><th>ext screen</th></f<></tab>	lt-Tab>	between elements	<space> selects</space>	<f12> r</f12>	ext screen

4. Select eth1 (eth1) - Ethernet and press Enter. Go down to the Static IP line. Change the IP to 172.16.100.52. Go down to Ok and press Enter.

🦉 collabn	2 (Runni	ing] - Orac	le VM VirtualBox	- 0 X
Machine	View	Devices	Help	
]	Network Configuration	
			Nameeth1Deviceeth1Use DHCP[]Static IP172.16.100.52NetmaskDefault gateway IPPrimary DNS ServerSecondary DNS Server	
			Ok Cancel	
<tab)< th=""><th>-/<alt< th=""><th>t-Tab></th><th>between elements <space> selects <f12> ne. ☺ ⊙ ₽ ☐ ☑ Ø</f12></space></th><th>xt screen CTRL DROITE 🔏</th></alt<></th></tab)<>	-/ <alt< th=""><th>t-Tab></th><th>between elements <space> selects <f12> ne. ☺ ⊙ ₽ ☐ ☑ Ø</f12></space></th><th>xt screen CTRL DROITE 🔏</th></alt<>	t-Tab>	between elements <space> selects <f12> ne. ☺ ⊙ ₽ ☐ ☑ Ø</f12></space>	xt screen CTRL DROITE 🔏

5. Tab down to **Save** and press **Enter**.



6. Arrow down to DNS configuration and press Enter.

10 collabn2 [Running] - Oracle VM VirtualBox	
Collabn2 [Running] - Oracle VM VirtualBox Machine View Devices Help Select Action Device configuration DNS configuration Save&Quit Quit	
<tab>/<alt-tab> between elements <space> selects <f12> n</f12></space></alt-tab></tab>	ext_screem ⊗ ♥ Right Ctrl

7. In the Hostname field, change to collabn2.racattack. Tab down to Ok and press Enter.



8. Tab down to Save&Quit and press Enter.

🕎 collabn2 [Running] - Oracle VM VirtualBox		23
Machine View Devices Help Select Action Device configuration DNS configuration Save&Quit		
<tab>/<alt-tab> between elements <space> selects <f12> m ③ ⑤ ም 💷 💟</f12></space></alt-tab></tab>	ext scre	een tCtrl

- 9. Remove the udev network rules file. It will be regenerated on the next reboot with the new MAC addresses.
 [root@collabn2 ~]# rm -f /etc/udev/rules.d/70-persistent-net.rules
- 10. Remove the HWADDR and UUID lines in the network adapter configuration files.

[root@collabn2 ~]# sed -i -e '/HWADDR/d' -e '/UUID/d' /etc/sysconfig/network-scripts/ifcfg-eth[0-2]

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Perform the following edit # vim /etc/sysconfig/network-scripts/ifcfg-eth2 and change PEERDNS=no

11. Reboot the collabn2 VM by typing reboot.

Start the **collabn1** VM as well and start Putty sessions for both.

🕎 collabn2 [Running] - Oracle VM VirtualBox					_ 0	x
Machine View Devices Help						
	Postanting Stanning and	а 4 - - Г	οv	٦		
	Nestartingstopping ce	ruml	UN	J		
Can't connect to default. Skipp: Stonning atd:	ing.	г	nк	1		
Stopping cups:		Ľ	OK]		
Stopping abrt daemon:						
		ا 🕢 名	7	0 (🛐 🐻 Ric	aht Ctrl

12. Verify that all the network interfaces are up.

```
[root@collabn2 ~]# ip 1
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 16436 qdisc noqueue state UNKNOWN
    link/loopback 00:00:00:00:00 brd 00:00:00:00:00
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP qlen 1000
    link/ether 08:00:27:c9:39:d3 brd ff:ff:ff:ff:ff
3: eth1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP qlen 1000
    link/ether 08:00:27:33:bd:a8 brd ff:ff:ff:ff:ff
4: eth2: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP qlen 1000
    link/ether 08:00:27:5f:61:29 brd ff:ff:ff:ff:ff
```

13. Verify that all the **ASM devices** are visible.

[root@collabn2 ~]# ls -1 /dev/asm*
prw-rw----. 1 oracle dba 8, 17 Aug 5 15:40 /dev/asm-disk1
brw-rw----. 1 oracle dba 8, 33 Aug 5 15:40 /dev/asm-disk2
prw-rw----. 1 oracle dba 8, 49 Aug 5 15:40 /dev/asm-disk3
prw-rw----. 1 oracle dba 8, 65 Aug 5 15:40 /dev/asm-disk4

Complete DNS Setup

- 1. Open a session on collabn2.
- 2. Stop the DNS service.

```
[root@collabn2 ~]# service named stop
Stopping named: . [ OK ]
```

3. Remove the actual DNS files.

[root@collabn2 ~] # rm -f /var/named/racattack /var/named/in-addr.arpa	
1	i

4. Modify the file /etc/named.conf by using the following command:

```
sed -i -e 's/listen-on .*/listen-on port 53 { 192.168.78.52; };/' \
-e 's/type master;/type slave;\n masters {192.168.78.51; };/' \
/etc/named.conf
```

so that at the end it looks like this one:

```
options {
       listen-on port 53 { 192.168.78.52; };
        listen-on-v6 port 53 { ::1; };
       directory "/var/named";
dump-file "/var/named/data/cache_dump.db";
        statistics-file "/var/named/data/named_stats.txt";
        memstatistics-file "/var/named/data/named_mem_stats.txt";
       allow-query { 192.168.78.0/24; localhost; };
allow-transfer { 192.168.78.0/24; };
       recursion yes;
        dnssec-enable yes;
        dnssec-validation yes;
       dnssec-lookaside auto;
        /* Path to ISC DLV key */
       bindkeys-file "/etc/named.iscdlv.key";
       managed-keys-directory "/var/named/dynamic";
};
logging {
       channel default_debug {
               file "data/named.run";
                severity dynamic;
       };
};
zone "." IN {
       type hint;
       file "named.ca";
};
include "/etc/named.rfc1912.zones";
include "/etc/named.root.key";
zone "racattack" {
 type slave;
 masters { 192.168.78.51; };
file "racattack";
17
zone "in-addr.arpa" {
 type slave;
 masters { 192.168.78.51; };
file "in-addr.arpa";
};
```

5. Start the named service.

[root@collabn2 ~] # service named start	
Starting named:	[OK]

6. Check that both the master on collabn1 and slave on collabn2 DNS servers are working.

Run all the following statements to verify the correct configuration of both DNS servers:

[root@collabn2 ~]# dig @collabn1 collabn1.racattack
[root@collabn2 ~]# dig @collabn1 collabn2.racattack
[root@collabn2 ~]# dig @collabn1 collabn1-vip.racattack
[root@collabn2 ~]# dig @collabn1 collabn2-vip.racattack
[root@collabn2 ~]# dig @collabn1 collabn1-priv.racattack
[root@collabn2 ~]# dig @collabn1 collabn2-priv.racattack
[root@collabn2 ~]# dig @collabn1 collabn-cluster-scan.racattack

1		- 1
	oot@collabn2 ~]# dig @collabn2 collabn1.racattack	i
1	oot@collabn2 ~]# dig @collabn2 collabn2.racattack	
	oot@collabn2 ~]# dig @collabn2 collabn1-vip.racattack	
	oot@collabn2 ~]# dig @collabn2 collabn2-vip.racattack	
1	oot@collabn2 ~]# dig @collabn2 collabn1-priv.racattack	- 1
1	oot@collabn2 ~]# dig @collabn2 collabn2-priv.racattack	
	oot@collabn2 ~]# dig @collabn2 collabn-cluster-scan.racattack	

VNC Server Setup

1. Configure VNC Server with the oracle account (passwords won't be displayed):

```
[root@collabn1 ~]# su - oracle
[oracle@collabn1 ~]$ vncserver :1
You will require a password to access your desktops.
Password: racattack
Verify: racattack
Xauth: creating new authority file /home/oracle/.Xauthority
New 'collabnl.racattack:1 (oracle)' desktop is collabnl.racattack:1
Creating default startup script /home/oracle/.vnc/xstartup
Starting applications specified in /home/oracle/.vnc/xstartup
Log file is /home/oracle/.vnc/collabnl.racattack:1.log
```

2. Open a vncviewer on your laptop and fill the ip address of collabn1 followed by :1.



3. Enter the password **racattack** when prompted:



4. The graphical interface is ready for the Grid Infrastructure Installation.



Install Grid Infrastructure

Prepare for GI Install

1. Verify that the VirtualBox Shared folder containing the installation media is mounted correctly and that Oracle has access to it:

```
[root@collabn1 ~]# su - oracle
[oracle@collabn1 ~]$ df -k
Filesvstem
                  1K-blocks
                               Used Available Use% Mounted on
/dev/mapper/vg_collabn1-lv_root
               27407400 2798080 23217092 11% /
                  1544640
                    1544640 0 1544640 0% /dev/shm
495844 55641 414603 12% /boot
tmpfs
/dev/sda1
.
12cR1
                  976728060 863308936 113419124 89% /media/sf_12cR1
[oracle@collabn1 ~]$ ls -1 /media/sf_12cR1
total 6295549
rwxrwx---. 1 root vboxsf 1361028723 Jun 27 16:21 linuxamd64_12c_database_1of2.zip
-rwxrwx---. 1 root vboxsf 1116527103 Jun 27 16:12 linuxamd64_12c_database_2of2.zip
-rwxrwx---. 1 root vboxsf 1750478910 Jun 27 16:27 linuxamd64_12c_grid_1of2.zip
-rwxrwx---. 1 root vboxsf 201673595 Jun 27 15:23 linuxamd64_12c_grid_2of2.zip
L_____
```

 You can decide to unzip it from your laptop (using Windows native functionalities, WinZip, 7-Zip or other tools or directly from the server.

[oracle@collabn1 ~]\$ cd /media/sf_l2cR1 [oracle@collabn1 sf_l2cR1]\$ unzip linuxamd64_l2c_database_lof2.zip Archive: linuxamd64_l2c_database_lof2.zip creating: database/ inflating: database/welcome.html OK creating: database/response/ OK inflating: database/response/db_install.rsp OK inflating: database/response/dbca.rsp OK inflating: database/response/dbca.rsp OK creating: database/shsetup/ OK

```
inflating: database/sshsetup/sshUserSetup.sh OK
creating: database/rpm/ OK
inflating: database/rpm/cvuqdisk-1.0.9-1.rpm OK
[...]
[oracle@collabn1 sf_12cR1]$ unzip linuxamd64_12c_database_2of2.zip
[...]
[oracle@collabn1 sf_12cR1]$ unzip linuxamd64_12c_grid_1of2.zip
[...]
[oracle@collabn1 sf_12cR1]$ unzip linuxamd64_12c_grid_2of2.zip
[...]
```

3. big>Once the package decompression is completed, you'll end up with two directories, grid and database containing the installation files.

```
[oracle@collabn1 sf_12cR1]$ 1s -1
total 6295549
drwxrwx---. 1 root vboxsf 0 Jul 3 06:38 database
drwxrwx---. 1 root vboxsf 0 Jun 10 08:15 grid
rwxrwx---. 1 root vboxsf 1361028723 Jun 27 16:21 linuxamd64_12c_database_1of2.zip
rwxrwx---. 1 root vboxsf 1116527103 Jun 27 16:12 linuxamd64_12c_database_2of2.zip
rwxrwx---. 1 root vboxsf 1750478910 Jun 27 16:27 linuxamd64_12c_grid_1of2.zip
rwxrwx---. 1 root vboxsf 201673595 Jun 27 15:23 linuxamd64_12c_grid_2of2.zip
```

4. Install the *cvuqdisk* package as **root**:

5. Do the same on node collabn2:

Install Grid Infrastructure

1. From the VNC remote session, run the installation of Grid Infrastructure as oracle:

```
[oracle@collabn1 ~]$ /media/sf_12cR1/grid/runInstaller
Starting Oracle Universal Installer...
Checking Temp space: must be greater than 120 MB. Actual 22670 MB Passed
Checking swap space: must be greater than 150 MB. Actual 3023 MB Passed
Checking monitor: must be configured to display at least 256 colors. Actual 16777216 Passed
Preparing to launch Oracle Universal Installer from /tmp/OraInstall2013-08-06_04-25-00PM. Please wait ...[oracle@collabn1 ~]$
[oracle@collabn1 ~]$
```

2. The Installation starts displaying a Splash Screen:



3. Leave Skip software updates and click Next:

Download Software Updates			
 Software Updates Installation Option Cluster Type Installation Type Cluster Configuration Install Locations Prerequisite Checks Summary Install Product Finish 	Download software updates for this installation. Software updates consist of recommended updates to the installer system requirement checks, PatchSet Updates (PSUS), and other recommended patches. Select one of the following options: Use My Oracle Support credentials for download My Oracle Support user name: My Oracle Support password: Proxy Settings Test Connection Ouse pre-gownloaded software updates Location: Browse Image: Skip software updates		

4. Leave Install and Configure Oracle Grid Infrastructure for a Cluster and click Next:

Oracle Grid Infrastruct	ture - Setting up Grid Infrastructure - Step 2 of 10
Select Installation Option	
Software Updates Installation Option Cluster Type Installation Type Cluster Configuration	 Install and Configure Oracle Grid Infrastructure for a <u>C</u>luster Install and Configure Oracle Grid Infrastructure for a <u>S</u>tandalone Server <u>Upgrade Oracle Grid Infrastructure or Oracle Automatic Storage Management</u> Install Oracle Grid Infrastructure Software Only.
Install Locations Prerequisite Checks Summary Install Product Finish	
Help	<back next=""> Install Cancel</back>

5. Leave Configure a Standard Cluster and click Next:

Software Updates Installation Option Cluster Type	hoose the type of cluster required.) Configure a <u>S</u> tandard cluster
Cluster Configuration Install Locations Prerequisite Checks Summary Install Product Finish	Choose this option to configure a group of servers into a single cluster.) Configure a Elex cluster Flex clusters are highly scalable clusters in which servers can be assigned specific roles to satisfy database or application functions.

6. Leave **Typical Installation** and click **Next**:

Oracle Grid Infrastruc	Dracle Grid Infrastructure - Setting up Grid Infrastructure - Step 4 of 10		
Select Installation Type			
Software Updates Installation Option Cluster Type Installation Type Cluster Configuration Install Locations Prerequisite Checks Summary Install Product Finish	 ⊙ Typical Installation Perform a full grid infrastructure installation with basic configuration. ○ Advanced Installation Allows advanced configuration options such as alternative storage choices, additional networking flexibility, integration with IPMI. 		
Help	<pre></pre>		

7. In the SCAN Name box, enter collabn-cluster-scan.racattack

In the central box, only the first node is displayed. Click Add... and enter the network names of the second node:

- Public Hostname: collabn2.racattack
- Virtual Hostname: collabn2-vip.racattack

Specify Cluster Configuration					
emove					
ancel					
e F					

8. Click SSH connectivity...

Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 5 of 10					
Specify Cluster Configuration					
Software Updates Installation Option Cluster Type Installation Type Cluster Configuration	Specify basic configuration information for the griv <u>S</u> CAN Name: collabn-cluster-scan.racattack Public Hostname collabn1.racattack collabn2.racattack	d infrastructure. Virtual Hostname collabn1-vip.racattack collabn2-vip.racattack			
Install Locations Prerequisite Checks Summary Install Product Finish					
	SSH <u>c</u> onnectivity	uster Configuration File <u>A</u> dd <u>E</u> dit <u>R</u> emove			
Help		< <u>Back</u> <u>N</u> ext > Install Cancel			
9. Enter racattack as the password of oracle user and click Setup.

Oracle Grid Infrastruct	ture - Setting up Grid Infrastructure - Step 5 of 10
Specify Cluster Configurati	on CRACLE 12 ^C
Software Updates Installation Option Cluster Type Installation Type Cluster Configuration Prerequisite Checks Summary Install Product Finish	Specify basic configuration information for the grid infrastructure. SCAN Name: Collabn-cluster-scan.racattack Public Hostname Virtual Hostname collabn1.racattack collabn1.racattack collabn2.racattack SSH gonnectivity User Cluster Configuration File Add Edit Remove QS Username: oracle OS Password: ensue private and public keys existing in the user home Test Identify network interfaces
<u>H</u> elp	< <u>Back</u> Next > Install Cancel

10. The setup of SSH equivalency is initiated.

	Oracle Grid Infrastru	cture – Setting up Grid Infrastructure –	Step 5 of 10	민
Spe	cify Cluster Configura	tion		
	Software Updates Installation Option Cluster Type Installation Type Cluster Configuration Install Locations Prerequisite Checks Summary Install Product Finish	Specify basic configuration information for the g SCAN Name: collabn-cluster-scan.racattack Public Hostname collabn1.racattack collabn2.racattack Establishing SSH connectivity between nodes. This may take several minutes Reuse private and public keys existing in the	n the selected s. Please wait	Virtual Hostname racattack racattack ion File Add Edit Remove : ••••••• Iest Setup Identify network interfaces
	Help		< Back	Next > Install Cancel

11. Click **OK** when it's completed.

Oracle Grid Infrastruct	ture – Setting up Grid Infrastructure – Ste	ap 5 of 10
Specify Cluster Configurati	on and a second s	
Software Updates Installation Option Cluster Tune	Specify basic configuration information for the grid i <u>SCAN Name:</u> collabn-cluster-scan.racattack	infrastructure.
	Public Hostname	Virtual Hostname
Installation Type	collabn1.racattack	collabn1-vip.racattack
Cluster configuration Install Locations Prerequisite Checks Summary Install Product Finish OK		
		Ţest Setup
Help		< <u>Back</u> Next > Install Cancel

12. Click on Identify Network Interfaces...

Check that the correct addresses are set:

- eth0 is marked as Public
- eth1 is marked as Private
- eth2 is marked as Do Not Use

Click OK to close the Identify Network Interfaces window.

Finally, click Next

Identify Network Int	erfaces		
Private interfaces are used by O	racle Grid Infrastructure for interr	node traffic.	
Interface Name	Subnet	Use for	
ethO	192.168.78.0	Public	•
eth1	172.16.100.0	Private	•
eth2	10.0.4.0	Do Not Use	-
			Concol
			Cancer

13. Some prerequisite validation is done at this step. It can require some minutes to complete.

Oracle Grie	d Infrastructu	re – Settin	ng up G	Grid Infr	astructu	re - Step	5 of 10			
Specify Cluster	Configuration	n			C.	ő.	À			12 ^c
Software Updat Installation Opt Cluster Type Installation Typ Cluster Config Cluster Config Cluster Config Install Location Prerequisite Ch Summary Install Product Finish	es ion e uration s ecks	Specify basic <u>S</u> CAN Name: collabn1.raca collabn2.raca	configu collabr Pu attack attack Ver	rifying setup	rmation for can.racatta ime o for install ys existing	the grid infi ck cc cc cc cc cc cc cc cc cc cc cc cc	rastructure ollabn1-vip ollabn2-vip	Virtual Ho uracattack inracattack	istname	t Setup
Help							< <u>B</u> ack	: <u>N</u> ext >		Cancel

14. Since the SCAN Name chosen is too long (more than 15 chars.) Oracle proposes a different name as the Cluster Name. Click **Yes**.

	Oracle Grid Infrastruct	ture – Setting up Grid Infrastructure – St	ep 5 of 10
Spe	cify Cluster Configurati	on	
Ť	Software Updates	Specify basic configuration information for the grid	infrastructure.
	Cluster Type	Public Hostname	Virtual Hostname
	Installation Type Cluster Configuration	collabn1.racattack collabn2.racattack	collabn1-vip.racattack collabn2-vip.racattack
	Install Locations Prerequisite Checks	acle Grid Infrastructure	
	Summary Install Product	[INS-40713] Installer will use "collabn-cluster" a Are you sure you want to continue ?	s cluster name. Id <u>E</u> dit <u>R</u> emove
		Ţŧs	<u>No</u> etails
			Test Setup
			I <u>d</u> entify network interfaces
E	ielp		< <u>Back</u> Next > Install Cancel

15. Leave the default Oracle Base and Software Location.

In the Cluster Registry Storage Type combo box, select Oracle Automatic Storage Management Enter racattack as the SYSASM password.

Select **dba** as OSASM group.

Click Next.

Oracle Grid Infrastruct	ture – Setting up Grid Infrast	ructure - Step 6 of 10
Specify Install Locations		
Software Updates Installation Option Cluster Type	Specify locations for Oracle base, wh (OCR), and which operating system Oracle Automatic Storage Managem	here to install the software, where to place the Oracle Cluster Registry group should be given the administrative privileges (SYSASM) for ent.
Installation Type	Oracle Ba <u>s</u> e:	/u01/app/oracle
<u>Cluster Configuration</u>	Software Location:	/u01/app/12.1.0/grid
Real Install Locations		
Prerequisite Checks	Cluster Registry Storage <u>T</u> ype:	Oracle Automatic Storage Management
y Summary	<u>Cluster Registry Location:</u>	Browse
Install Product	S <u>Y</u> SASM Password:	•••••
5 Finish	Confirm <u>P</u> assword:	•••••
	OSASM <u>a</u> roup:	dba 👻
	<u>M</u> essages:	
	▲ SYSASM Password:[INS-30011] Th ▲ recommended standards.	e SYS password entered does not conform to the Oracle
Help		< <u>Back Next > Install</u> Cancel

16. racattack is a weak password and Oracle raise an alert. Click Yes to continue:



17. Leave **DATA** as Disk Group Name.

Select External redundancy (it is safe to do this in a RAC Attack event!).

The Candidate Disks list is empty. Click on Change Discovery Path...

Enter /dev/asm* in the Disk Discovery Path text field.

Click Ok.

Oracle Grid Infrastruc	sture - Setting up Grid Infrastructure - Step 7 of 13	
Create ASM Disk Group		1 2 °
Software Updates Installation Option Cluster Type Installation Type Cluster Configuration Cluster Configuration Create ASM Disk Group Create Inventory Root script execution Prerequisite Checks Summary Install Product Finish	Select Disk Group characteristics and select disks Disk group name DATA Redundancy High Normal External Allocation Unit Size MB Add Disks O_Gandidate Disks All Disks Disk Path Size (in MB) Sta Change Disk Discovery Path Changing the Disk Discovery Path will affect ALL Disk Groups Disk Discovery Path Change Disk Discovery Path	atus Path
Help	< <u>Back</u> <u>Next</u> > <u>Install</u>	Cancel

18. Check two disks that will be immediately allocated to the new disk group.

Click Next

Oracle Grid Infrastruc	ture - Setting up Grid Infrastructure - Step 7 of 13	
Software Updates Installation Option Cluster Type Installation Type Cluster Configuration Cluster Configuration Create ASM Disk Group Create Inventory Root script execution Prerequisite Checks Summary Install Product Finish	Select Disk Group characteristics and select disks Disk group name DATA Redundancy High Normal External Allocation Unit Size MB Add Disks I MB Add Disks Disk Path Image: Value v	Size (in MB) Status 5114 Candidate 5114 Candidate 5114 Candidate 5114 Candidate
Help	<pre> < Back</pre>	Change Discovery <u>P</u> ath

19. Leave the default Inventory Directory. Click Next.

Oracle Grid Infrastruc	cture - Setting up Grid Infrastructure - Step 8 of 13
Create Inventory	
Software Updates Installation Option Cluster Type Installation Type Cluster Configuration Install Locations Create ASM Disk Group Create Inventory Root script execution Prerequisite Checks Sum mary Install Product Finish	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 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> <u>N</u> ext > <u>Install</u> Cancel

20. Check Automatically run configuration script and then Use "root" user credentials.

Enter **racattack** as the password of *root* and click **Next**.

Oracle Grid Infrastruct	ture – Setting up Grid :	Infrastructure – Step 9 of 13		
Root script execution confi	guration			2 ^c
Software Updates Installation Option Cluster Type Installation Type Cluster Configuration Cluster Locations	While configuring the softw to have the Installer perform below. Automatically run config Use "root" user great Password :	vare, certain operations have to be perfor m these operations automatically by spec guration scripts dential	med as "root" user. You can choo ifying inputs for one of the optio)se ns
	Use <u>s</u> udo Pro <u>g</u> ram path : [User name : [Passw <u>o</u> rd : [/usr/local/bin/sudo oracle	Brow	se
5 Finish				

21. It takes some time to complete the prerequisite checks.

Oracle Grid Infrastruct	cure - Setting up Grid Infrastructure - Step 10 of 13
Perform Prerequisite Check	S ORACLE: GRID INFRASTRUCTURE 12 ^C
Software Updates Installation Option Cluster Type Installation Type Cluster Configuration Install Locations Create ASM Disk Group Create Inventory Root script execution Prerequisite Checks Summary Install Product Finish	Verifying that the target environment meets minimum installation and configuration requirements for products you have selected. This can take time. Please wait. 84% Checking VIP Subnet configuration check
Help	<pre>< Back Next > Install Cancel</pre>

- 22. If everything is correct, you will notice two checks that have failed:
 - Physical Memory
 - Device Checks for ASM

Check "Ignore All" and click Next.

💿 Oracle Grid Infrastruct	ure - Setting up Grid Infrastructure - Step 10 of 13		
Perform Prerequisite Check			TURE 12'
Software Updates Installation Option Cluster Type Installation Type Cluster Configuration Install Locations Create ASM Disk Group Create Inventory Root script execution Prerequisite Checks Summary Install Product Finish	Yerification Result Some of the minimum requirements for installation are not completed. Review the following table, and recheck the system. Check Again Eix & Check Again Show Failed Image: All Nodes Checks Image: Checks Checks Image: Checks for ASM Some Checks for ASM Image: Checks for ASM This is a pre-check to verify if the specified devices meet the requirements for Oracle Universal Storage Manager Configuration Assistant. (more details) Check Failed on Nodes: [collabn2. collabn1]	vand fix the Status Ignored Ignored	issues listed in Ignore All Fixable No No No
Help	< <u>Back</u> Next>	• <u>I</u> nsta	II Cancel

23. Click Yes to confirm that you want to skip some prerequisites.

Oracle	e Grid Infrastructure
1	[INS-13016] You have chosen to ignore some of the prerequisites for this installation. This may impact product configuration.
	Are you sure you want to continue ?
	<u>Y</u> es <u>No</u> etails

24. The summary page appears. Optionally, click **Save Response File** and choose a location to have the response file saved for this installation session.

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Oracle Grid Inf	rastructure - Setting up Grid Infrastructure - Step 11 of 13	
Summary		2 ^c
Cluster Type	Oracle base for Oracle Gru Initiastructure, 7001/app/oracle [coll] Save Response File Location: Image: Coll of the second seco	
Cluster Configuration Install Locations Create ASM Disk Grou Create Inventory Root script execution Prerequisite Checks	C oradiag_oracle	
Finish	File Name: RA_grid.rsp File Type: *.rsp Save Cancel	
Help	Storage Redundancy: EXTERNAL [<u>Edit</u>] Disks Selected: /dev/asm-disk1,/dev/asm-disk2 [<u>Edit</u>] Save Response < Back Next > Install (File

25. Review the summary and click Install to start the installation.

Oracle Grid Infrastru	cture - Setting up Grid Infrastructure - Step 11 of 13
Summary	GRID INFRASTRUCTURE 12
Software Updates Installation Option Cluster Type Installation Type Cluster Configuration Install Locations Create ASM Disk Group Create Inventory Root script execution Prerequisite Checks Summary Install Product Finish	 Oracle base for Oracle Grunningstructure: y001/appyoracle [Edit] Grid home: /u01/app/12.1.0/grid [Edit] Source Location: /media/sf_12cR1/grid/install//stage/products.xml Privileged Operating System Groups: dba (OSDBA), dba (OSOPER), dba (OSASM) [Edit] Root script execution configuration: Root user credential [Edit] Inventory information Inventory location: /u01/app/oralnventory [Edit] Central inventory (oralnventory) group: oinstall [Edit] Cituster Type: Standard [Edit] Cluster Type: Standard [Edit] Cluster Type: Standard [Edit] Sondes: [collabn1, collabn-cluster [Edit] Nodes: [collabn1, collabn-cluster [Edit] SocAN Port: 1521 [Edit] Sorage Information Storage Type: Oracle ASM [Edit] Storage Type: Oracle ASM [Edit] Storage Redundancy: ExTERNAL [Edit] Storage Redundancy: ExTERNAL [Edit] Storage Redundancy: ExTERNAL [Edit]
Help	< <u>B</u> ack <u>N</u> ext > <u>Install</u> Cancel

26. The installation starts. It may take more than an hour, depending on your laptop hardware.

stall Product		
Software Updates Installation Option Cluster Type Installation Type Cluster Configuration Install Locations Create ASM Disk Group Create Inventory	Progress 7% Processing Cluster Ready Services Files 12.1.0.1.0 Status Install Grid Infrastructure for a Cluster Prepare Copy files Link binaries Link binaries	In Progress Succeeded Pending Pending
 Root script execution Prerequisite Checks Summary Install Product Finish 	Setup Perform remote operations Update Inventory Execute Root Scripts Configure Oracle Grid Infrastructure for a Cluster	Pending Pending Pending Pending Pending
	ORACLE 12 ^C Better Business Cont GRID INFRASTRUCTURE 12 ^C Application Continuity and	2etails Retry S inuity Transaction Guard

27. After a while, the installation asks a confirmation before running some scripts as root. Click Yes to continue.

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Oracle Grid Inf	rastructure - Setting up Grid Infrastructure - Step 12 of 13	21
Install Product		
Software Updates Installation Option Cluster Type Installation Type	Progress- 79% Completed 'Prepare for configuration steps'	
Cluster Configuratio	Oracle Grid Infrastructure	Succeeded
Create ASM Disk Gro Create Inventory Root script executio	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.	Succeeded Succeeded Succeeded Succeeded Succeeded
O Prerequisite Checks Summary	Are you sure you want to continue ?	Succeeded In Progress Pending
Finish		Pending
	CRACLE 12 ^C Storage Management GRID INFRASTRUCTURE 12 ^C Manage More Data, Compress and Access Data Faster	; Data,
Help	< <u>B</u> ack Next>	Install Cancel

28. The installation continues, again, it may take longtime to complete. Once it's finished, click on Close to exit.

inish	
 Software Updates Installation Option Cluster Type Installation Type Cluster Configuration Install Locations Create ASM Disk Group Create Inventory Root script execution Prerequisite Checks Summary Install Product Finish 	The installation of Oracle Grid Infrastructure for a Cluster was successful.

Check Cluster Status After GI Install

1. Once your Grid Infrastructure installation is finished, you can get the status of the cluster components:

[oracle@col	labn1 ~]\$ c	rsctl stat	: res -t	
Name	 Target	State	Server	State details
Local Resou	rces			
ora.DATA.dg				
-	ONLINE	ONLINE	collabn1	STABLE
1	ONLINE	ONLINE	collabn2	STABLE
ora.LISTENE	R.lsnr			
Ì	ONLINE	ONLINE	collabn1	STABLE
	ONLINE	ONLINE	collabn2	STABLE
ora.asm	0.007 7.007	0.117 T.115		
	ONLINE	ONLINE	collabni collabn2	Started, STABLE
ora net1 ne	twork	ONTINE	COLLADIIZ	Statted, STADLE
ora.necr.ne	ONLINE	ONLINE	collabn1	STABLE
i	ONLINE	ONLINE	collabn2	STABLE
ora.ons				
1	ONLINE	ONLINE	collabn1	STABLE
-	ONLINE	ONLINE	collabn2	STABLE
Cluster Res	ources			
ora.LISTENE	R SCAN1.lsn	ır		
1	- ONLINE	ONLINE	collabn2	STABLE
ora.LISTENE	R_SCAN2.lsn	ır		
1	ONLINE	ONLINE	collabn1	STABLE
ora.LISTENE	R_SCAN3.lsn	.r		
1	ONLINE	ONLINE	collabn1	STABLE
ora.collabn	1.vip			
1	ONLINE	ONLINE	collabn1	STABLE
ora.collabn	2.vip	0.117 T.115		
1	ONLINE	ONLINE	COllabn2	STABLE
ora.cvu	ONI THE	ONI THE	11-1-1	
ora ocli	ONLINE	ONLINE	COLLADILL	STABLE
1	OFFLINE	OFFLINE		STARLE
ora scanl v	in	OTTEINE		01110110
1	ONLINE	ONLINE	collabn2	STABLE
ora.scan2.v	ip			
1	ONLINE	ONLINE	collabn1	STABLE
ora.scan3.v	ip			
1	ONLINE	ONLINE	collabn1	STABLE
i				

2. **Optional step**: in order to increase the resistance of your nodes to the huge latency of a Virtualbox environment, you can increase the timeout of CRS before it causes a fencing (restart) of the node.

You'll need to stop the second node while applying the configuration to the first node.

```
_____
[oracle@collabn1 ~]$ ssh collabn2
[oracle@collabn2 ~]$ su -
Password:
[root@collabn2 ~]# . oraenv
ORACLE_SID = [root] ? +ASM2
The Oracle base has been set to /u01/app/oracle
[root@collabn2 ~]# crsctl stop crs
CRS-2791: Starting shutdown of Oracle High Availability Services-managed resources on 'collabn2'
CRS-2673: Attempting to stop 'ora.crsd' on 'collabn2'
CRS-2790: Starting shutdown of Cluster Ready Services-managed resources on 'collabn2'
CRS-2673: Attempting to stop 'ora.DATA.dg' on 'collabn2'
CRS-2677: Stop of 'ora.gipcd' on 'collabn2' succeeded
CRS-2793: Shutdown of Oracle High Availability Services-managed resources on 'collabn2' has completed
CRS-4133: Oracle High Availability Services has been stopped.
[root@collabn2 ~]# exit
logout
[oracle@collabn2 ~]$ exit
logout
Connection to collabn2 closed.
[oracle@collabn1 ~]$ su -
Password:
[root@collabn1 ~]# . oraenv
ORACLE_SID = [root] ? +ASM1
The Oracle base has been set to /u01/app/oracle
[root@collabn1 ~]# crsctl get css misscount
CRS-4678: Successful get misscount 30 for Cluster Synchronization Services.
[root@collabn1 ~]# crsctl set css misscount 90
CRS-4684: Successful set of parameter misscount to 90 for Cluster Synchronization Services.
[root@collabn1 ~]# crsctl get css disktimeout
```

```
CRS-4678: Successful get disktimeout 200 for Cluster Synchronization Services.
[root@collabn1 ~]# crsctl set css disktimeout 600
CRS-4684: Successful set of parameter disktimeout to 600 for Cluster Synchronization Services.
[root@collabn2 ~]# sh collabn2
root@collabn2 *]# spassword:
Last login: Tue Aug 6 16:19:56 2013 from 192.168.78.51
[root@collabn2 ~]# . oraenv
ORACLE_SID = [root] ? +ASM2
The Oracle base has been set to /u01/app/oracle
[root@collabn2 ~]# crsctl start crs
CRS-4123: Oracle High Availability Services has been started.
```

The start command returns the prompt in few seconds. However it can take minutes before the whole stack is started entirely.

ASM Configuration

1. From a VNC session, run the ASM Configuration Assistant:

```
[oracle@collabn1 ~] . oraenv
ORACLE_SID = [oracle] ? +ASM1
The Oracle base has been set to /u01/app/oracle
[oracle@collabn1 ~]$ asmca
```

2. The asmca opens on the Disk Groups tab, showing the DATA diskgroup created by the installer. Click on Create.

ASM Configuration	Assistant: Configure	ASM: Disk Gro	oups			
	ASM Instances Disk G You can choose to create groups with 11.2 ASM cor Tip: To perform operation Disk Groups	roups Volume a new disk group mpatibility. ns on a disk group	s ASM Cluste o or add disks to p, right mouse cl	r File Systems an existing disk gro ick on the row.	oup. To create dynam	ic volumes, you need disk
	Disk Group Name	Size (GB)	Free (GB)	Usable (GB)	Redundancy	State
	DATA	9.99	9.70	9.70	EXTERN	MOUNTED(2 of 2)
	Create Mount All	Dismount All				
Help						Exit

3. Enter **FRA** as the disk group name.

Choose external (none) redundancy.

Check one disk to create a 5Gb diskgroup.

Click OK.

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k Group Name FRA					
Redundancy					
edundancy is achieved by storing liferent failure grouns, and high re	multiple copies of the dat edundancy from at least t	a on different fa hree different fa	ilure groups ilure groups	. Normal redu	ndancy needs disks from at least ty
			indre groups.		
🔾 Hign 🔿 Normai 💿 External (N	ione)				
Select Member Disks					
🕑 Show Eligible 🔘 Show All					
uorum failure groups are used to	store upting files in orter	dod clustors or	d do not con	tain anu ucar.	data. They require 4 CM compatibili
juorum failure groups are used to f 11.2 or higher.	store voting files in exter	ided clusters ar	ia ao not con	tain any user	data. They require ASM compatibili
-	1				1
E Dist. Dash	I I	Distant Alexandre		A	
Disk Path	Header Status	Disk Name	Size (MB)	Quorum	
Disk Path /dev/asm-disk3 /dev/asm-disk4	CANDIDATE CANDIDATE	Disk Name	Size (MB) 5114 5114	Quorum	_
Disk Path /dev/asm-disk3 /dev/asm-disk4	CANDIDATE CANDIDATE	Disk Name	Size (MB) 5114 5114	Quorum	
Disk Path Jev/asm-disk3 /dev/asm-disk4	Header Status CANDIDATE CANDIDATE	Disk Name	Size (MB) 5114 5114	Quorum	
□ Disk Path ✓ /dev/asm-disk3 □ /dev/asm-disk4	Header Status CANDIDATE CANDIDATE	Disk Name	Size (MB) 5114 5114	Quorum	
□ Disk Path ✓ /dev/asm-disk3 □ /dev/asm-disk4	Header Status CANDIDATE CANDIDATE	Disk Name	Size (MB) 5114 5114	Quorum	
Disk Path Josk Path	Header Status CANDIDATE CANDIDATE	Disk Name	Size (MB) 5114 5114	Quorum	1/write nermissions on the disks
Disk Path Josk Path Josk Path Josk Jasm-disk3 Josk Jasm-disk4 ote: If you do not see the disks wh he Disk Discovery Path limits set o	Header Status CANDIDATE CANDIDATE ich you believe are availal f disks considered for dis	Disk Name	Size (MB) 5114 5114 5114	Quorum	d/write permissions on the disks.
Disk Path /dev/asm-disk3 /dev/asm-disk4 /dev/asm-disk4 lote: If you do not see the disks where the bisk Discovery Path limits set of the bisk Discovery	Header Status CANDIDATE CANDIDATE ich you believe are availal f disks considered for dis	Disk Name	Size (MB) 5114 5114 5114	Quorum	d/write permissions on the disks.
Disk Path Jobe Path Jobe Path Jobe Path Jobe Path Disk Discovery Path Discovery Path D	Header Status CANDIDATE CANDIDATE ich you believe are availal f disks considered for dis	Disk Name	Size (MB) 5114 5114 5114	Quorum	d/write permissions on the disks. Change Disk Discovery Pat

4. The diskgroup is being created.



5. The diskgroup is created.



6. Click on the Volumes tab, then on Create.

Enter**SHARED** as the volume name.

Choose the diskgroup DATA.

The size will be irrelevant in our labs, so enter 1.

Click OK.

ASM Configuration	Assistant: Con	figure ASM: Volumes	
	ASM Instances	Disk Groups Volumes A	SM Cluster File Systems
	ASM volumes are Oracle Diagnostic Volume first. Tip: To perform o Volumes	typically formatted with ASM Cli files, Application configuration perations on a volume, right mo	uster File System (ACFS). ACFS can be used to store files such as Executables, files, etc. To create an ASM Cluster File System, you need to create an ASM puse click on the row.
	Volume	Create Volume	
		Disk Group Name	
		Disk Group Free Space (GB) Disk Group Usable Space (GB)	9.70 9.70
		Sho	1 G Bytes V
	Create Enal	ble All Disable All	
Help			Exit

7. The volume is created.

Volum	Volume: Creation				
i	Volume SHARED created successfully.				
		ОК			

8. Select the ASM Cluster File Systems tab.

Click Create.

ASM Configuration	Assistant: Configur	re ASM: ASM Clus	ter File Systems				
	ASM Instances Disk ASM Cluster File System files, etc. To use ACFS, Tip: The table shows bo shown. To perform ope ASM Cluster File Sys	k Groups Volume: n (ACFS) can be used you need to create a oth mounted and dis erations on an ASM (tems	ASM Cluster File System: to store files such as Execu n ASM Volume first. mounted file systems. For di Cluster File System, right mou	s tables, Oracle smounted file ise click on th	e Diagnostic file e systems, the la ne row.	s, Application	configuratior
	Mount Point	State	Volume Device	Size (GB)	Volume	Disk Group	Used %
000	Note: Some ACFS com generate the comman Create Show Mou	mands can be execu d that can be execut unt All Command	ted as privileged/root user c ed as privileged/root user m Show Dismount All Comman	nly. If you ch anually. d Security	oose any of the and Encryption	ese operations	, ASMCA will
Help							Ex

9. Select Cluster File System.

Mountpoint: /**shared** Check **Automount**. User Name: **oracle** Group Name: **dba** Volume: **SHARED**

Click OK.

Create AS	M Cluster File System	
· · ·		
Creating the ASM home or datafile:	I Cluster File System creates the on-disk structure. Use Cluster File System for Oracle Database s. Node Local File System can be used to store Oracle Diagnostic Files, Application Files etc.	
Tip: Choose an e	xisting volume device or create a newvolume by choosing Create Volume in the Volumes tab.	
Type of ACFS	Cluster File System	•
Mount Point	/shared Browse	
Auto Mount		
Mount Options		
User Name	oracle	
Group Name	dba	
Description	Ceneral purpose shared filesystem	
Select Volume	SHARED - /dev/asm/shared-336 - 1.0G	-
	OK Show Command Cancel Help	

10. To complete the filesystem creation, run this script as root.

ASM Cluster File System: Run ACFS Script	
ACFS Script Location //u01/app/oracle/cfgtoollogs/asmca/scripts/acfs_script.sh	
ASM Cluster File System created on /dev/asm/shared-336 successfully. Run the generated ACFS registration so /u01/app/oracle/cfgtoollogs/asmca/scripts/acfs_script.sh as privileged user to register the ACFS with Grid Infrastructure and to mount the ACFS. The ACFS registration script needs to be run only on this node: collabn1. Close	ript

[root@collabn1 ~]# /u01/app/oracle/cfgtoollogs/asmca/scripts/acfs_script.sh ACFS file system /shared is mounted on nodes collabn1

ACFS file system /shared is mounted on nodes collabn2

11. Finally, the filesystem is mounted on both nodes.

[root@collabn1 ~]# d	lf -k					
Filesystem	1K-blocks	Used	Available	Use%	Mounted on	
/dev/mapper/vg colla	abn1-lv root	E .				
	27407400	8778184	17236988	34%	/	
tmpfs	1544640	653576	891064	43%	/dev/shm	
/dev/sda1	495844	55641	414603	12%	/boot	
12cR1	976728060	863308972	113419088	89%	/media/sf 12cR1	
/dev/asm/shared-336	1048576	80176	968400	8%	/shared	
[root@collabn2 ~1# d	if -k					
Filosystom	1K-blocks	Usod	Availablo	IIco%	Mounted on	
L'itesyscem	IN DIOCKS	- Useu	Available	0383	Mouncea On	
/dev/mapper/vg_colla	IDUIT-TA-LOOL	-				
	27407400	8883544	17131628	35%	/	
tmpfs	1544640	653576	891064	43%	/dev/shm	
/dev/sda1	495844	55641	414603	12%	/boot	
/dev/asm/shared-336	1048576	80176	968400	8%	/shared	
<u>.</u>						

Install Database Software

1. In a VNC session, run the installer as oracle user.

```
[oracle@collabn1 ~]$ /media/sf_12cR1/database/runInstaller
Starting Oracle Universal Installer...
Checking Temp space: must be greater than 500 MB. Actual 16829 MB Passed
Checking swap space: must be greater than 150 MB. Actual 3023 MB Passed
Checking monitor: must be configured to display at least 256 colors. Actual 16777216 Passed
Preparing to launch Oracle Universal Installer from /tmp/OraInstall2013-08-08_06-27-48PM. Please wait ...
```

2. The splash screen appears.



3. Uncheck I wish to receive security updates via My Oracle Support and click Next.

Oracle Database 12c Release 1 Installer - Installing database - Step 1 of 10			
Configure Segurity Update	s		$\frac{\text{ORACLE}}{\text{Database}} 12^{\mathcal{C}}$
Configure Security Updates	Provide your email address to be and initiate configuration manage	e informed of security issues, install the p ger. <u>View details</u> .	roduct
Software Updates Installation Option Grid Installation Options Install Type Typical Installation Prerequisite Checks Summary Install Product Finish	Email:	Easier for you if you use your My Oracle address/username. lates via My Oracle Support.	Support email
Help		< <u>B</u> ack	lext > Install Cancel

4. Click Yes to confirm that you don't want to be informed about security updates.



5. Select Skip software updates and click Next.

	Oracle Database 12c Release 1 Installer - Installing database - Step 2 of 10				
Do	Download Software Updates				
ų V	Configure Security Updates	Download software updates for this installation. Software updates consist of recommended updates to the installer system requirement checks, PatchSet Updates (PSUs), and other recommended patches.			
	Software Updates	Select one of the following options:			
	Installation Option Grid Installation Options	○ Use My Oracle Support credentials for download			
۱ J	Install Type	My Oracle Support <u>u</u> ser name:			
ļ	Typical Installation	My Oracle Support password:			
0	Prerequisite Checks	Proxy Settings Test Connection			
0	Summary				
¢	Install Product	Use pre-downloaded software updates			
6	Finish	Location: Browse			
		Skip software updates			
	Help	< <u>Back</u> Next > Install Cancel			

6. Select Install database software only and click Next.

Oracle Database 12c Rel	lease 1 Installer – Installing database – Step 3 of 10		巴
Select Installation Option		ORACLE DATABASE	12 ^c
Configure Security Updates Software Updates Installation Option Crid Installation Options Install Type Typical Installation Prerequisite Checks Summary Install Product Finish	Select any of the following install options.		
Help	sack back	lext >Install	Cancel

7. Select Oracle Real Application Clusters database installation and click Next.



8. Verify that all nodes are selected and click Next.

Oracle Natabase 12c Rel	ease 1 Installer - Installing database - Step 5 of 11
Select List of Nodes	
Configure Security Updates	Select nodes (in addition to the local node) in the cluster where the installer should install Oracle RAC or Oracle RAC One.
Software Updates	Node name
hstallation Option	☑ 1 collabn1
Grid Installation Options	✓ 2 collabn2
Nodes Selection	
🗼 Install Type	
 Typical Installation 	
Prerequisite Checks	
ý Summary	
 Install Product 	
O Finish	
	SSH <u>c</u> onnectivity <u>Select all</u> <u>D</u> eselect all
Help	< <u>B</u> ack <u>N</u> ext > <u>Install</u> Cancel

9. Click Next to accept the default language selection.

lect Product Languages	DATABASE 12
Configure Security Updates Select the languages in which you Software Updates Available languages: Installation Option Arabic Grid Installation Options Bengali Nodes Selection Brazilian Portuguese Product Languages Craadian French Operating System Groups Croatian Prerequisite Checks English (United Kingdom) Summary Install Product Finish Greek Hebrew Hungarian Indonesian Greek Hebrew Hungarian Indonesian Greek	ur product will run. Selected languages: English () () () () () () () () () () () () ()

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10. Select Enterprise Edition and click Next.



11. If you have previously created the ACFS 1Gb filesystem, you'll need to specify another location now.

Oracle Base: /u01/app/oracle

Software location: /u01/app/oracle/product/12.1.0/dbhome_1

Click Next.

	Oracle Database 12c Rel	lease 1 Installer – Installing database – Step 8 of 13
Spe	cify Installation Locatio	
	Configure Security Updates Software Updates Installation Option Grid Installation Options Nodes Selection Product Languages Database Edition	Specify a path to place all Oracle software and configuration-related files installed by this installation owner. This location is the Oracle base directory for the installation owner. Oracle base: /u01/app/oracle Specify a location for storing Oracle database software files separate from database configuration files in the Oracle base directory. This software directory is the Oracle database home directory. Specify a location for storing Oracle database software files separate from database configuration files in the Oracle base directory. This software directory is the Oracle database home directory. Software location /u01/app/oracle/product/12.1.0/dbhome_1
	Installation Location	
	Operating System Groups	
	Prerequisite Checks	
\	Summary	
Ý	Install Product	
<u></u>	Finish	
	Help	< <u>Back</u> Next > Install Cancel

12. Leave dba for all groups except for the OSOPER group (leave it empty) and click Next.

Oracle Database 12c Release 1 Installer - Installing database - Step 9 of 13			
Privileged Operating System	n groups		
Configure Security Updates Software Updates Installation Option Grid Installation Options Nodes Selection Product Languages Database Edition Installation Location Operating System Groups Prerequisite Checks Summary Install Product Finish	SYS privileges are required to create a database using operatin in OS Groups grants the corresponding SYS privilege, eg. men privilege. Database Administrator (OSDBA) group: Database Operator (OSOPER) group (Optional): Database Backup and Recovery (OSBACKUPDBA) group: Data Guard administrative (OSDGDBA) group: Encryption Key Management administrative (OSKMDBA) group	Indext of the system (OS) authentication. Membership in OSDBA grants the SYSDBA	
Help	<	Back Next > Install Cancel	

13. The installer checks all prerequisites.

Oracle Database 12c Re	lease 1 Installer - Installing database - Step 10 of 13
Perform Prerequisite Chec	
 Configure Security Updates Software Updates Installation Option Grid Installation Options Nodes Selection Product Languages Database Edition Installation Location Operating System Groups Prerequisite Checks Summary Install Product Finish 	Verifying that the target environment meets minimum installation and configuration requirements for products you have selected. This can take time. Please wait. 0% Checking Node Connectivity
Help	< <u>B</u> ack <u>N</u> ext > <u>I</u> nstall Cancel

14. Review the installation summary, optionally save a response file, and click Install.



15. The installation can take half an hour on common laptop configurations.

tall Product		
Configure Security Updates	Progress	· · · · · · · · · · · · · · · · · · ·
Software Updates	11%	
Installation Option	Extracting files to '/u01/app/oracle/product/12.1.0/dbhome_1	
Crid Installation Ontions		
Grid Installation Options		
Nodes Selection	Status	
Product Languages	Oracle Database installation	In Progress
Database Edition	• Prepare	Succeeded
Database Lanton	 Copy files 	In Progress
Installation Location	Link binaries	Pending
Operating System Groups	Setup	Pending
Prerequisite Checks	Perform remote operations	Pending
Frerequisite Checks	Update Inventory	Pending
Summary	Execute Root Scripts	Pending
Install Product		
Finish		
		<u>D</u> etails <u>R</u> etry
	DATABASE	

16. right before completing, the installer ask to run a script on both nodes as root. Don't click OK.

Ехе	cute Configuration scripts	
The following configuration scripts need to be executed as the "root" user in each new cluster node. Each script in the list below is followed by a list of nodes.		
<u>S</u> cripts to	be executed:	
Number	Script Location	Nodes
1	/u01/app/oracle/product/12.1.0/dbhome_1/root.sh	collabn1,collabn2
•		
To execute the configuration scripts: 1. Open a terminal window 2. Log in as "root" 3. Run the scripts in each cluster node 4. Return to this window and click "OK" to continue		
<u>H</u> e	łp	ОК

17. Execute the script on both nodes as root.

```
[root@collabn1 ~]# /u01/app/oracle/product/12.1.0/dbhome_1/root.sh
Performing root user operation for Oracle 12c
The following environment variables are set as:
   ORACLE_OWNER= oracle
   ORACLE_HOME= /u01/app/oracle/product/12.1.0/dbhome_1
Enter the full pathname of the local bin directory: [/usr/local/bin]:
The contents of "dbhome" have not changed. No need to overwrite.
The contents of "oraenv" have not changed. No need to overwrite.
The contents of "coraenv" have not changed. No need to overwrite.
Entries will be added to the /etc/oratab file as needed by
Database Configuration Assistant when a database is created
Finished running generic part of root script.
Now product-specific root actions will be performed.
[root@collabn1 ~]# ssh collabn2
root@collabn2's password:
Last login: Thu Aug 8 16:54:49 2013 from 192.168.78.1
[root@collabn2 ~]# /u01/app/oracle/product/12.1.0/dbhome_1/root.sh
Performing root user operation for Oracle 12c
The following environment variables are set as:
  ORACLE OWNER= oracle
  ORACLE_HOME= /u01/app/oracle/product/12.1.0/dbhome_1
1
                                                        _____
 _____
Enter the full pathname of the local bin directory: [/usr/local/bin]:
The contents of "dbhome" have not changed. No need to overwrite.
The contents of "oraenv" have not changed. No need to overwrite.
The contents of "coraenv" have not changed. No need to overwrite.
Entries will be added to the /etc/oratab file as needed by
Database Configuration Assistant when a database is created
Finished running generic part of root script.
Now product-specific root actions will be performed.
i
```

18. Click OK on the previous window, then click Close to exit the Installer.

Oracle Database 12c Re	lease 1 Installer – Installing database – Step 13 of 13	巴
Finish 🔭		
Configure Security Updates Software Updates Installation Option Grid Installation Options Nodes Selection Product Languages Database Edition Installation Location Operating System Groups Prerequisite Checks Summary Install Product	The installation of Oracle Database was successful.	
Finish		

Create Database

1. Run the Database Configuration Assistant: _____ [oracle@collabn1 ~]\$ /u01/app/oracle/product/12.1.0/dbhome_1/bin/dbca

2. The splash screen appears.



3. Select Create Database and click Next.

	Database Configuration	Assistant - Welcome - Step 1 of 5
Da	tabase Operation	
CCCE	Database Operation <u>Creation Mode</u> Pre Requisite Checks Sum mary Progress Page	Select the operation that you want to perform:
	Help	< Back Next > Finish Cancel

4. Select Create a database with default configuration.

Global Database Name: **RAC.racattack**

Storage Type: Automatic Storage Management (ASM)

Database Files Location: +DATA

Fast Recovery Area: +FRA

Database Character Set: AL32UTF8 - Unicode UTF-8 Universal character set

Administrative password: racattack

Check Create As Container Database

Pluggable Database Name: PDB (*)

Click Next.

Database Configuration Assistant - Create Database - Step 2 of 5		
Creation Mode		
Database Operation Creation Mode Pre Requisite Checks Summary Progress Page	 ⊆reate a database with default conglobal Database Name: ∑torage Type: <u>D</u>atabase Files Location: Fast Recovery Area: Database Character Set: Admjnistrative Password : Confirm Password: Create As Container Database Pluggable Database Name: Advanced Mode Messages: Administrative Password : The password is andards. A password should have contain at least one upper case of the set one upper caset of the set one upper case of the set one upp	nfiguration RAC.racattack Automatic Storage Management (ASM) +DATA Browse +FRA Browse AL32UTF8 - Unicode UTF-8 Universal character set ••••••• ••••••• •sse PDB ssyword entered does not conform to the Oracle recommended we minimum of 8 characters in length. In addition, the password must haracter, one lower case character and one digit.
Help		< <u>B</u> ack <u>N</u> ext > <u>Einish</u> Cancel

- 5. A warning is shown because the password is weak. Click Yes to continue.
- The prerequisite checks may fail due to space requirements. It's safe to ignore by checking Ignore all. Click Next.

Database Configuration	Assistant - Create Database - Step 3 of 5	巴
Pre Requisite Checks		
Database Operation <u>Creation Mode</u> Pre Requisite Checks <u>Summary</u>	Validation Results	Check Again
Progress Page	Database Validation Checks Cluster Validation Checks Storage Checks Shared storage check Disk space check File validity check	
	+FRA does not have enough space. Required space is 5025 MB , available space is 50 +DATA has enough space. Required space is 3545 MB , available space is 8902 MB.	018 MB.
<u>H</u> elp	< <u>Back</u>	inish Cancel

7. Review the summary page and click **Finish**.

Database Configuration Assistant - Create Database - Step 4 of 5		
Summary		
<u>Database Operation</u>	Database Configuration Assistant: Summary	
	Create Database – Summary	
Summary	Database Configuration Summary	
• Hogressrage	Global Database Name: RAC.racattack	
	Database Configuration Type: Admin-Managed Cluster Database	
	Node List: collabn1,collabn2	
	SID List: RAC1,RAC2	
	Liteate As Lontainer Database (165	
	Pluggable Database Name: PDB	
	Storage Type: Automatic Storage Management (ASM)	
	Memory Configuration Type: Automatic Shared Memory Management	
	Template Name: General Purpose or Transaction Processing	
	Database Configuration Details Database Components	
	Component Selected	
	Oracle JVM true	
	Oracle Text true	
	Oracle Multimedia true	
Help	< <u>Back</u> Next > Einish Cancel	

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8. The database creation is finished. Click Exit, then Close.



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