# 5 Virtualization Management

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# Introduction to linux Virtualization Management
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**Corse Overview**
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Intro Virtual Machines
Migrating and running VM
Managing DOCKER
Create Virtualized VM

**Virtualization in Linux**
==========

Get professional Linux Certification like , LFCS or RHCSA

Clean build on Bare Metal

Lab Environment
```
Physical Host — CentOS7.2 MATE Desktop

Migration Labs - Server1 centOS7.2 physician host , Genome Desktop and Server2 centOS7.2 physician host , Genome Desktop

Toolkits
```
KVM and Libvirt
Install VMs

Libvirt and DNSMasq
Manage Networks
Manage VMs
Migrate VM’s

**Hardware Support for KVM**
==========

[root@server1 ~]# lscpu
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
**CPU(s): 1**
On-line CPU(s) list: 0
Thread(s) per core: 1
Core(s) per socket: 1
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 142
**Model name: Intel(R) Core(TM) i5-8210Y CPU @ 1.60GHz**
Stepping: 9
CPU MHz: 1608.000
BogoMIPS: 3216.00
**Hypervisor vendor: KVM**
Virtualization type: full
L1d cache: 32K
L1i cache: 32K
L2 cache: 256K
L3 cache: 4096K
NUMA node0 CPU(s): 0
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx rdtscp lm constant_tsc rep_good nopl xtopology nonstop_tsc pni pclmulqdq monitor ssse3 cx16 pcid sse4_1 sse4_2 x2apic movbe popcnt aes xsave avx rdrand hypervisor lahf_lm abm 3dnowprefetch fsgsbase avx2 invpcid rdseed clflushopt

[root@server1 ~]# cat /proc/cpuinfo

[root@server1 ~]# grep -E '(vmx|svm)' /proc/cpuinfo

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# Installing XRDP
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https://draculaservers.com/tutorials/install-xrdp-centos/

**Introduction to XRDP service**
==========

XRDP:
````````
GUI environment runs by X server.
Sync with Remote Desktop protocol
Allows windows client able to connect via GUI,
xrdp provides a fully functional RDP server compatible with a wide range of RDP clients, including FreeRDP and Microsoft RDP client.

Demo
``````
Install XRDP
Remotely. Connect from windows
Load locale specific keymaps files

````````````````````````````````````
Xrdp client ==> mstsc.exe
````````````````````````````````````

Public IP address

Xrdp port 3389 ==> 127.0.01 ==>> VNC PORT 5901 ==>> X Server
```

**Installing XRDP on Machine**
==========

[root@server1 ~]# yum list epel-release

[root@server1 ~]# yum install epel-release

[root@server1 ~]# yum repolist

[root@server1 ~]# yum list xrdp

[root@server1 ~]# yum install xrdp -y

[root@server1 xrdp]# yum install tigervnc-server

[root@server1 ~]# yum install tigervnc

[root@server1 ~]# yum info xrdp

[root@server1 ~]# yum history info
Failed to set locale, defaulting to C
Loaded plugins: fastestmirror, langpacks
**Transaction ID : 4**
Begin time : Mon Jul 20 14:25:33 2020
Begin rpmdb : 1364:77fdaf0b906998ba237cc8ae20236a553f561c1d
End time : 14:25:35 2020 (2 seconds)
End rpmdb : 1368:5540a54715ea0d877c6680652ba2838e15e92f49
User : root <root>
Return-Code : Success
Command Line : install tigervnc
Transaction performed with:
Installed rpm-4.11.3-32.el7.x86_64 @anaconda
Installed yum-3.4.3-158.el7.centos.noarch @anaconda
Installed yum-plugin-fastestmirror-1.1.31-45.el7.noarch @anaconda
Packages Altered:
```

```
   Dep-Install fltk-1.3.4-1.el7.x86_64           @base
   Dep-Install mesa-libGLU-9.0.0-4.el7.x86_64    @base
   Install     tigervnc-1.8.0-19.el7.x86_64      @base
   Dep-Install tigervnc-icons-1.8.0-19.el7.noarch @base


[root@server1 ~]# yum history undo 4
              // roll back last install package basis on transaction ID


[root@server1 ~]# cd /etc/xrdp/
```

**Configuring XRDP to Operate with SELinux and MATE desktop**

==========

```
[root@server1 ~]# getenforce
Enforcing
                                  // enforcing mode


[root@server1 ~]# cd /usr/sbin/

[root@server1 sbin]# ls

[root@server1 sbin]# ls -Z xrdp*
-rwxr-xr-x. root root system_u:object_r:bin_t:s0       xrdp
-rwxr-xr-x. root root system_u:object_r:bin_t:s0       xrdp-chansrv
-rwxr-xr-x. root root system_u:object_r:bin_t:s0       xrdp-sesman


[root@server1 sbin]# chcon -t bin_t xrdp xrdp-sesman

[root@server1 sbin]# systemctl start xrdp
[root@server1 sbin]# systemctl enable xrdp



[root@gluster3 xrdp]# firewall-cmd --permanent --add-port=3389/tcp
success
[root@gluster3 xrdp]# firewall-cmd --reload
success
```

```
[root@server1 sbin]# netstat -ltn
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 0.0.0.0:3389            0.0.0.0:*               LISTEN
tcp        0      0 0.0.0.0:111             0.0.0.0:*               LISTEN
tcp        0      0 192.168.122.1:53        0.0.0.0:*               LISTEN
```

```
[root@server1 xrdp]# netstat -antup | grep xrd
tcp        0      0 0.0.0.0:3389            0.0.0.0:*               LISTEN      11490/xrdp
tcp        0      0 127.0.0.1:3350          0.0.0.0:*               LISTEN      11489/xrdp-
sesman
```

```
[root@server1 ~]# cd /etc/xrdp/

[root@server1 xrdp]# vim startwm.sh                                  // sometimes no
files existed , not compulsory to be added
        (end on line add)

        fi
        #multi user MATE sesktop
        echo 'mate-session' > ~/.xsession
        chmod +x ~/.xsession


[root@server1 xrdp]# systemctl start xrdp

[root@server1 xrdp]# firewall-cmd --permanent --add-port=3389/tcp

[root@server1 xrdp]# firewall-cmd --reload
```

CONNECTIG VIA WINDOWS CLIENT
```
```

Run remote desktop connection via windows ==> need IP address and username and password

If you are using server mode , need to install
``````````````````````````````

**For mate**
``````````

yum install -y epel-release
yum groupinstall -y "MATE Desktop"
reboot


echo "mate-session" > ~/.Xclients
chmod a+x ~/.Xclients


**For gnome**
````````````

yum groupinstall "GNOME DESKTOP" -y
systemctl get-default
systemctl set-default graphical.target
systemctl isolate graphical.target

**Configure RDP Keymap**
==========
Try to use US key map

Check @ key

[root@server1 ~]# cd /etc/xrdp/
````````````

[root@server1 xrdp]# setxkbmap -layout gb

[root@server1 xrdp]# xrdp-genkeymap  km-0809.ini

[root@server1 ~]# bash

Now the key-mapping begins  Once disconnect , and connect back.. WALLA

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# Virtual Machine Networking
**********
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**Virtual networks**
==========

**Libvirt**
``````````

Used by virtual box
Same as in KVM too

**Demo**
```````

Default Network
Using virsh to manage virtualization

Remove default virtual network
Creating virtual network
Using btctl to display bridge connections

**BIG QUESTION**
``````````````

Where did **vib0** come from?

**The default Network**
==========
[root@server1 ~]# ip a
1: lo:
2: enp0s3
3: virbr0
4: virbr0-nic:

server with GUI gives extra virtual package to add, like vibr0
``````````````````

On **ip a**, it gives loopback and ethernet interface

But on adding libvirt , loopback creates
``````````````````````````````````````````````````

[root@server1 ~]# yum install libvirt

[root@server1 ~]# cd /etc/libvirt/

[root@server1 libvirt]# ls

[root@server1 libvirt]# cd qemu/networks/

[root@server1 networks]# ls
autostart  **default.xml**

[root@server1 networks]# systemctl start libvirtd.service

[root@server1 networks]# systemctl enable libvirtd.service
``````````````````````````````````````````````````

[root@server1 networks]# systemctl status libvirtd.service
● libvirtd.service - Virtualization daemon
   Loaded: loaded (/usr/lib/systemd/system/libvirtd.service; enabled; vendor preset: enabled)
   Active: **active (running)**

[root@server1 ~]# ip a                                    //virtual bridge created , virtual NIC
1: lo:
2: enp0s3
**3: virbr0**
**4: virbr0-nic:**

[root@server1 ~]# brctl show
bridge name    bridge id          STP enabled    interfaces
**virbr0**             8000.5254000207cf       yes          virbr0-nic

[root@server1 ~]# cd /etc/sysconfig/network-scripts/

[root@server1 network-scripts]# ls

**Making use of command virsh**
==========

[root@server1 ~]# cd /etc/libvirt/qemu/networks/

[root@server1 networks]# cat default.xml
<!--
WARNING: THIS IS AN AUTO-GENERATED FILE. CHANGES TO IT ARE LIKELY TO BE
OVERWRITTEN AND LOST. Changes to this xml configuration should be made using:
  virsh net-edit default
or other application using the libvirt API.
-->

<network>
  <name>default</name>

```
  <uuid>fb5d5101-1841-44bb-a165-343f98447262</uuid>
  <forward mode='nat'/>
  <bridge name='virbr0' stp='on' delay='0'/>
  <mac address='52:54:00:02:07:cf'/>
  <ip address='192.168.122.1' netmask='255.255.255.0'>
    <dhcp>
      <range start='192.168.122.2' end='192.168.122.254'/>
    </dhcp>
  </ip>
</network>



[root@server1 networks]# ip -4 a
3: virbr0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc
noqueue state DOWN group default qlen 1000
    inet 192.168.122.1/24 brd 192.168.122.255 scope global virbr0
       valid_lft forever preferred_lft forever




[root@server1 networks]# virsh list


[root@server1 networks]# virsh net-list
setlocale: No such file or directory
 Name                 State      Autostart     Persistent
----------------------------------------------------------
 default              active     yes           yes




[root@server1 networks]# less default.xml



[root@server1 networks]# virsh
setlocale: No such file or directory
Welcome to virsh, the virtualization interactive terminal.

Type:  'help' for help with commands
       'quit' to quit

virsh #
```

```
virsh # net-list
Name              State      Autostart     Persistent
----------------------------------------------------------
 default          active     yes           yes
```

```
virsh # net-destroy --network default
      virsh # net-destroy --network default
      Network default destroyed
```

```
[root@server1 ~]# ip a
1: lo:
2: enp0s3
```

```
[root@server1 networks]# virsh
```

```
      virsh # net-start default
      Network default started
```

```
[root@server1 ~]# ip a
1: lo:
2: enp0s3
3: virbr0
4: virbr0-nic:

[root@server1 ~]# virsh net-autostart default
```

**Removing the default network**

==========

```
[root@server1 ~]# systemctl status libvirtd
● libvirtd.service - Virtualization daemon
   Loaded: loaded (/usr/lib/systemd/system/libvirtd.service; enabled; vendor
preset: enabled)
   Active: active (running)
```

[root@server1 ~]# virsh net-destroy default

[root@server1 ~]# cd /etc/libvirt/qemu/networks/

[root@server1 networks]# cp default.xml
~ //making backup in home dir

[root@server1 networks]# virsh net-undefine default

[root@server1 networks]# ls
autostart

[root@server1 networks]# systemctl stop libvirtd.service

[root@server1 networks]# systemctl disable libvirtd.service

```
Starting now

[root@server1 networks]# virsh net-list
setlocale: No such file or directory
 Name State Autostart Persistent
----------------------------------------------------------

[root@server1 ~]# ip a
1: lo:
2: enp0s3
```

**Creating the virtual network**
==========

[root@server1 networks]# virsh net-list
setlocale: No such file or directory
 Name State Autostart Persistent
----------------------------------------------------------

```
[root@server1 networks]# virsh net-list --inactive
setlocale: No such file or directory
 Name                 State      Autostart     Persistent
----------------------------------------------------------
```

```
[root@server1 networks]# cp ~/default.xml .
[root@server1 networks]# ls
        autostart  default.xml
[root@server1 networks]# pwd
        /etc/libvirt/qemu/networks
```

```
[root@server1 networks]# virsh net-define default.xml
setlocale: No such file or directory
Network default defined from default.xml
```

```
[root@server1 networks]# virsh net-list --inactive
setlocale: No such file or directory
 Name                 State      Autostart     Persistent
----------------------------------------------------------
 default              inactive   no            yes
```

```
[root@server1 networks]# virsh net-list
setlocale: No such file or directory
 Name                 State      Autostart     Persistent
----------------------------------------------------------
```

```
[root@server1 ~]# ip a
```

1: lo:
2: enp0s3

[root@server1 networks]# brctl show
bridge name	bridge id		STP enabled	interfaces

[root@server1 networks]# virsh net-start default
setlocale: No such file or directory
Network default started

[root@server1 networks]# brctl show
bridge name	bridge id		STP enabled	interfaces
virbr0		8000.5254000207cf	yes		virbr0-nic

[root@server1 networks]# virsh net-list
setlocale: No such file or directory
 Name		State	Autostart	Persistent
----------------------------------------------------------
 default		**active**	**no**		**yes**

[root@server1 networks]# virsh net-autostart default

[root@server1 networks]# virsh net-list
setlocale: No such file or directory

```
 Name              State      Autostart     Persistent
----------------------------------------------------------
 default           active     yes           yes
```

```
[root@server1 networks]# virsh net-edit default

<network>
  <name>default</name>
  <uuid>fb5d5101-1841-44bb-a165-343f98447262</uuid>
  <forward mode='nat'/>
  <bridge name='virbr0' stp='on' delay='0'/>
  <mac address='52:54:00:02:07:cf'/>
  <ip address='192.168.56.1' netmask='255.255.255.0'>
    <dhcp>
      <range start='192.168.56.100' end='192.168.56.254'/>
    </dhcp>
  </ip>
</network>


[root@server1 networks]# ip a s vibr0                                    //no ip
changed , interface refresh needed
```

```
[root@server1 networks]# virsh net-destroy default
setlocale: No such file or directory
Network default destroyed

[root@server1 networks]# virsh net-start default
setlocale: No such file or directory
Network default started

[root@server1 networks]#
[root@server1 networks]#
[root@server1 networks]# ip a s virbr0
11: virbr0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc
noqueue state DOWN group default qlen 1000
    link/ether 52:54:00:02:07:cf brd ff:ff:ff:ff:ff:ff
    inet 192.168.56.1/24 brd 192.168.56.255 scope global virbr0
       valid_lft forever preferred_lft forever
```

``````````````````````````````````````````````````

Some more changes, custom define virtual bridge

[root@server1 networks]# cp default.xml hostonly.xml

[root@server1 networks]# vim hostonly.xml
<network>
  <name>host-only</name>
  <bridge name='**virbr1**' stp='on' delay='0'/>
  <mac address='52:54:00:02:**ca:fe**'/>
  <ip address='1**92.168.100.1'** netmask='255.255.255.0'>
    <dhcp>
      <range **start='192.168.100.101' end='192.168.100.200'/**>
    </dhcp>
  </ip>
</network>

[root@server1 networks]# virsh net-define hostonly.xml
setlocale: No such file or directory
Network host-only defined from hostonly.xml

[root@server1 networks]# virsh net-start host-only

[root@server1 networks]# virsh net-autostart host-only

[root@server1 networks]# brctl show
bridge name	bridge id		STP enabled	interfaces
virbr0		8000.5254000207cf	yes		virbr0-nic
**virbr1**		**8000.52540002cafe**	**yes**		**virbr1-nic**

[root@server1 networks]# ip a s virbr1
13: virbr1: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc noqueue state DOWN group default qlen 1000
``````````````````````````````````````````````````

link/ether 52:54:00:02:**ca:fe** brd ff:ff:ff:ff:ff:ff
inet **192.168.100.1/24** brd 192.168.100.255 scope global virbr1
valid_lft forever preferred_lft forever

**Old school using brctl**
==========

[root@server1 networks]# brctl addbr br0

[root@server1 networks]# brctl show br0
bridge name bridge id STP enabled interfaces
br0 8000.000000000000 no

[root@server1 networks]# brctl show
bridge name bridge id STP enabled interfaces
br0 8000.000000000000 **no**
virbr0 8000.5254000207cf yes virbr0-nic
virbr1 8000.52540002cafe yes virbr1-nic

[root@server1 networks]# brctl stp br0 on

[root@server1 networks]# brctl show
bridge name bridge id STP enabled interfaces
br0 8000.000000000000 **yes**

[root@server1 networks]# brctl delbr br0

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# Installing KVM

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**Abc**

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# Installing XRDP

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## Installing XRDP

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# Installing XRDP
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## Abc

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