

**Xen - Networking**

**Step 0 : Xen???????**

**Step 1 : ??????**

**Step 2 : network-bridge**

**Step 3 : network-nat**

**Step 4 : network-route**

**Step 5 : ????**

**Step 0 : Xen???????**

????????????????????,???????????? 3 ? 1.network-bridge , 2.network-nat ? 3.network-route ??????????????????

?????????(Logical NICs <-> Physical NICs).

??? Xen ?? VMware ?????????,???????? 3 ?????? Guest OS ??????????????????.?????? RHEL5 Xen ??????????.????  
 ? Xen ??????????????????.??? Dom0 ? ifconfig ??????????????????,?? Dom0 ???? Hypervisor ?????? DomU ?????  
 ??????????????.

```
[root@benjr ~]#ifconfig
eth0 Link encap:Ethernet HWaddr 00:02:B3:9D:87:65
... ? ...
lo Link encap:Local Loopback
... ? ...
peth0 Link encap:Ethernet HWaddr FE:FF:FF:FF:FF:FF
... ? ...
vif0.0 Link encap:Ethernet HWaddr FE:FF:FF:FF:FF:FF
... ? ...
vif1.0 Link encap:Ethernet HWaddr FE:FF:FF:FF:FF:FF
... ? ...
virbr0 Link encap:Ethernet HWaddr 00:00:00:00:00:00
... ? ...
xenbr0 Link encap:Ethernet HWaddr FE:FF:FF:FF:FF:FF
... ? ...
```

??? Linux ?????????? eth0,eth1...,??? Xen ??????????????????(?? Dom0 ?????????). ?????? eth0, lo, peth0, vif0.0,

vif1.0, virbr0, xenbr0. ????????,???????????????????? Xen ??????????????.??????????????.

????????????????????,???????????? RHEL5 ??? network-bridge ??,???????? eth0, peth0, vif0.0, vif1.0 ??, ??????  
lo ? Loop device ?????????? 127.0.0.1 ?? virbr0 ??? QEMU ??? Bridge NAT ????????? QEMU-Bridge  
NAT <http://benjr.tw/?q=node/520> .

**Step 1 : ??????**

Xen ?????????????,?????? Physical ?(peth0,peth1...)????????? Logical ???(eth0,eth1...)??(vif<id#>.0,vif<id#>.1.),  
????????????? pethx,?????????????!!!!????????????????.

????????? Guest OS ??????????. ?????????????????? ?????????????????? Guest OS ?????????.

**#???? domU**

**[root@benjr ~]# xm list**

Name	Id	Mem(MB)	VCPUs	State	Time(s)
Domain-0	0	7619	4	r----	43213.6
rhel4	1	512	1	-b---	9601

?????:

1.???? Dom0,??DomU ???? eth0,eth1...????????????????.

2.? Dom0 ?????? vif<id#>.0,vif<id#>.1...?????,?? Dom0 ??? Hypervisor ?????? DomU ?????????????????.

3.?????????, vif<id#>.x ?? id ?? DomU ? id ????? Dom0 ??? eth0 ??? vif0.0, eth1 ??? vif0.1 ??????(??????????  
??),?? vif1.0 ??? Dom U(ID=1) ? eth0 ?????? #xm list ? DomU ??? id ?!!

???????? Dom0(RHEL5) ??? Guest OS(RHEL4),?????????? 2 ?????? 2 ? Xen Bridge,????????????,?? Xen ???  
??????????.

Peth0 -> ??????(Physical NIC)

Peth1 -> ??????(Physical NIC)

Dom0 -> eth0 -> vif0.0

Dom0 -> eth1 -> vif0.1

Dom1(RHEL4) -> eth0 -> vif1.0

Dom1(RHEL4) -> eth1 -> vif1.1



7.bridge xenbr0, peth0, eth0 ? vif0.0 ?????.

note: Dom0???????????? DomU ??????.

? RHEL5 Xen ?????????? Bridge(xenbri0) ????,???????????????????????? Bridge.????????????,????????????  
Dom0(eth0) -> vif0.0 -> xenbr0 -> peth0.

???????????????????????????? /etc/xen/xend-config.sxp ?????????????????????????????????.

```
[root@benjr ~]# vi /etc/xen/xend-config.sxp
...
#(network-script network-bridge)
(network-script my-network-script)
...
#???????????????? script ??(my-network-script).???????? my-network-script ??????????????.
[root@benjr ~]# vi /etc/xen/scripts/my-network-script
#!/bin/sh
/etc/xen/scripts/network-bridge start vifnum=0 netdev=eth0 bridge=xenbr0
/etc/xen/scripts/network-bridge start vifnum=1 netdev=eth1 bridge=xenbr1
[root@benjr ~]# chmod a+x /etc/xen/scripts/my-network-script
#????????????.
```

????????????? Bridge ??????.????? Network bridge

```
[root@benjr ~]#/etc/xen/scripts/network-bridge start vifnum=1 bridge=xenbr1 netdev=eth1
vifnum=1 ;??????,????? 8 ? loopback ??????,????? 0.????????? loopback ???32? nloopbacks=<N>
bridge=xenbr1 ;?? Network Bridge ??? xenbr1,???? xenbr${vifnum}.
netdev=eth1 ;?? Network Bridge xenbr1 ????? eth1 ?????????? eth${vifnum}
```

?? DomU ?????? vif-bridge ??script ???.

? domU ???, xend (running in dom0) ?????? vif-bridge script, ??????????:

1.? vif<id#>.0 ?????? xenbr0

2.?? vif<id#>.0 .

??? scripts ??? /etc/xen/scripts. ? Bridge ?? Xen ??????????,????? NAT's Networking ? Routed Networking ? ???????.

### Step 3 : network-nat

RHEL5 Xen ????????? bridge ??,???????????????????? network-nat ?? network-route ,????????? NAT ???,????????? NAT ,NAT ?????? network address translation,??????? Private IP ??? Public IP ,Private IP ??????????,????????? Internet ???,? 10.0.0.0(subnet mask : 10.255.255.255) ,172.16.0.0(subnet mask : 172.31.255.255) ?? 192.168.0.0(subnet mask : 192.168.255.255) ?? Public IP ?? Internet ???????,?? NAT ?????????????????? Private IP ?????????? Internet ???,???????????????????? Guest OS ???,??????????????????.

???????? Dom0(RHEL 5) Xen ????????? /etc/xen/xend-conf.sxp ????? bridge ?? NAT ??.

```
[root@benjr ~]# vi /etc/xen/xend-config.sxp
(network-script network-nat)
(network-script network-bridge)
(network-script network-route)
(vif-script vif-nat)
(vif-script vif-bridge)
(vif-script vif-route)
```

??? (network-script network-bridge) ,(vif-script vif-bridge) ? "#" (??????).????? Guest OS ?????? NAT ???,??? ?????? Guest OS ??????.????? xen ???????.

```
[root@benjr ~]# /etc/init.d/xend restart
```

?? Guest OS ?????,????????????? GuesOS : RHEL4 ID=1,????????? RHEL4

```
[root@benjr ~]# vi /etc/xen/rhel4
name = "rhel4"
uuid = "cf67710d-b756-086b-8cde-be61d2faca1b"
maxmem = 512
memory = 512
```

```

vcpus = 1
bootloader = "/usr/bin/pygrub"
on_poweroff = "destroy"
on_reboot = "restart"
on_crash = "restart"
vfb = [ "type=vnc,vncunused=1,keymap=en-us" ]
disk = [ "phy:/dev/sda5,xvda,w" ]
vif = [ "mac=00:16:3e:27:95:c0,ip=10.0.0.1" ]

```

- **name**  
??? VM ???,????????? VM ?????????.
- **uuid**  
???????(Universally Unique Identifier,UUID),????????? uuid ????? VM.
- **maxmem**  
????????????? Guest VM ?????????,????????????????????,????????????????? VM ?????.
- **memory**  
?? VM ?????????????.
- **vcpus**  
? VM ?????? CPU ??.
- **bootloader**  
/usr/bin/pygrub ? VM ???? Bootloader ?????? VM ? kernel/initrd ????,??? GRUB,Xen ?????  
paravirtualized ???,????? VMware ?? full virtualization ????? BIOS ??? pygrub ?????? PXEBoot ???.
- **on\_poweroff/reboot/crash**  
???? poweroff/reboot/crash VM ?????????,??? poweroff ?? destory ????? poweroff ??? VM ?????????  
?????????,? reboot/crash ??? VM ?????.
- **vfb**  
Xen ??? VM ???? VNC ?????,????? vfb(virtual framebuffer device) ?????????????? Keyboard/Mouse.
- **disk**  
??? VM ?????????????? partition ???? image ???.
- **vif**  
????????????? vif(virtual network devices).????????????????? vif = [ "mac=00:16:3e:27:95:c0,ip=10.0.0.1" ]  
??? mac ?????????? IP,??? VM OS ???? IP ??.

?? DomU ? Guest OS (RHEL4) ? IP ??????? Dom0 ???????.

```

# Xen Virtual Ethernet
[root@DomU ~]# vi /etc/sysconfig/network-scripts/ifcfg-eth0
DEVICE=eth0
ONBOOT=yes
BOOTPROTO=static

```

```
IPADDR=10.0.0.1
NETMASK=255.255.255.0
GATEWAY=10.0.0.128
```

??? DomU ??????????

```
[root@DomU ~]#service network restart
```

? DOMU(RHEL4) ???,??DOM0 ?????????? xen bridge(xenbr0) ???,?? vif1.0(Guest OS:RHEL4 ID=1) ?? IP ????,??  
 ?? Guest OS ???? default gateway.?? default gateway ? 10.0.0.128 ,???? DomU ? Guest OS ????,? Dom0 ?????????  
 ?? vif(Dom ID).0 ????????? default gateway ? 10.0.0.128 ?????????? 10.0.0.129.??????,??? DomU ? Guest OS ?????  
 ????? default gateway ??? . ????????? NAT ??? Dom0 ?????????? NAT ,??? Guest OS(DomU) ???? NAT ???  
 private IP ???.

1. ?? domU ????????????? Private ????
2. ?? domU ????????????? dom0 ? NAT ??????????
3. ????? NAT ?? domU ????????????? private ????,???????????? DomU ??????.???? Dom0 ? default gateway.

??? Dom 0 ????????????????????? "ifconfig" ????????? vif1.0 ????? IP ? 10.0.0.128

```
[root@benjr ~]# ifconfig vif1.0
```

```
vif1.0 Link encap:Ethernet HWaddr FE:FF:FF:FF:FF:FF
  inet addr:10.0.0.128 Bcast:0.0.0.0 Mask:255.255.255.255
  inet6 addr: fe80::fcff:ffff:feff:ffff/64 Scope:Link
  UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
  RX packets:98 errors:0 dropped:0 overruns:0 frame:0
  TX packets:73 errors:0 dropped:0 overruns:0 carrier:0
  collisions:0 txqueuelen:32
  RX bytes:11014 (10.7 KiB) TX bytes:9404 (9.1 KiB)
```

?? "iptables -L" ????????? iptables ??????? 10.0.0.1 ???.

```
[root@benjr ~]# iptables -L
```



```

Chain INPUT (policy ACCEPT)
target prot opt source destination
ACCEPT udp -- anywhere anywhere udp dpt:domain
ACCEPT tcp -- anywhere anywhere tcp dpt:domain
ACCEPT udp -- anywhere anywhere udp dpt:bootps
ACCEPT tcp -- anywhere anywhere tcp dpt:bootps
Chain FORWARD (policy ACCEPT)
target prot opt source destination
ACCEPT all -- anywhere 192.168.122.0/24 state RELATED,ESTABLISHED
ACCEPT all -- 192.168.122.0/24 anywhere
ACCEPT all -- anywhere anywhere
REJECT all -- anywhere anywhere reject-with icmp-port-unreachable
REJECT all -- anywhere anywhere reject-with icmp-port-unreachable
ACCEPT all -- 10.0.0.1 anywhere PHYSDEV match --physdev-in vif1.0
ACCEPT udp -- anywhere anywhere PHYSDEV match --physdev-in vif1.0 udp
spt:bootpc dpt:bootps

Chain OUTPUT (policy ACCEPT)
target prot opt source destination

```

???? "route" ?????????? 10.0.0.1 (VM:RHEL4) ???? vif1.0

```

[root@benjr ~]# route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
10.0.0.1 * 255.255.255.255 UH 0 0 0 vif1.0
192.168.122.0 * 255.255.255.0 U 0 0 0 virbr0
192.8.1.0 * 255.255.255.0 U 0 0 0 eth0
169.254.0.0 * 255.255.0.0 U 0 0 0 eth0

```

????? VM ?????? dhcp ???? ip,?????????????.

[http://www.nikhef.nl/pub/projects/grid/gridwiki/index.php/Xen\\_3.2,\\_CentO...](http://www.nikhef.nl/pub/projects/grid/gridwiki/index.php/Xen_3.2,_CentO...)

#### Step 4 : network-route

???

#### Step 5 : ?????

<http://wiki.xensource.com/xenwiki/XenNetworking>

[http://wiki.kartbuilding.net/index.php/Xen\\_Networking](http://wiki.kartbuilding.net/index.php/Xen_Networking)