Introduction to Xen(2)

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Schedule

- Monday: Introduction
- Tuesday: Xen
- Wednesday: Xen
- Thursday: Docker
- Friday: Conclusion/homework solution

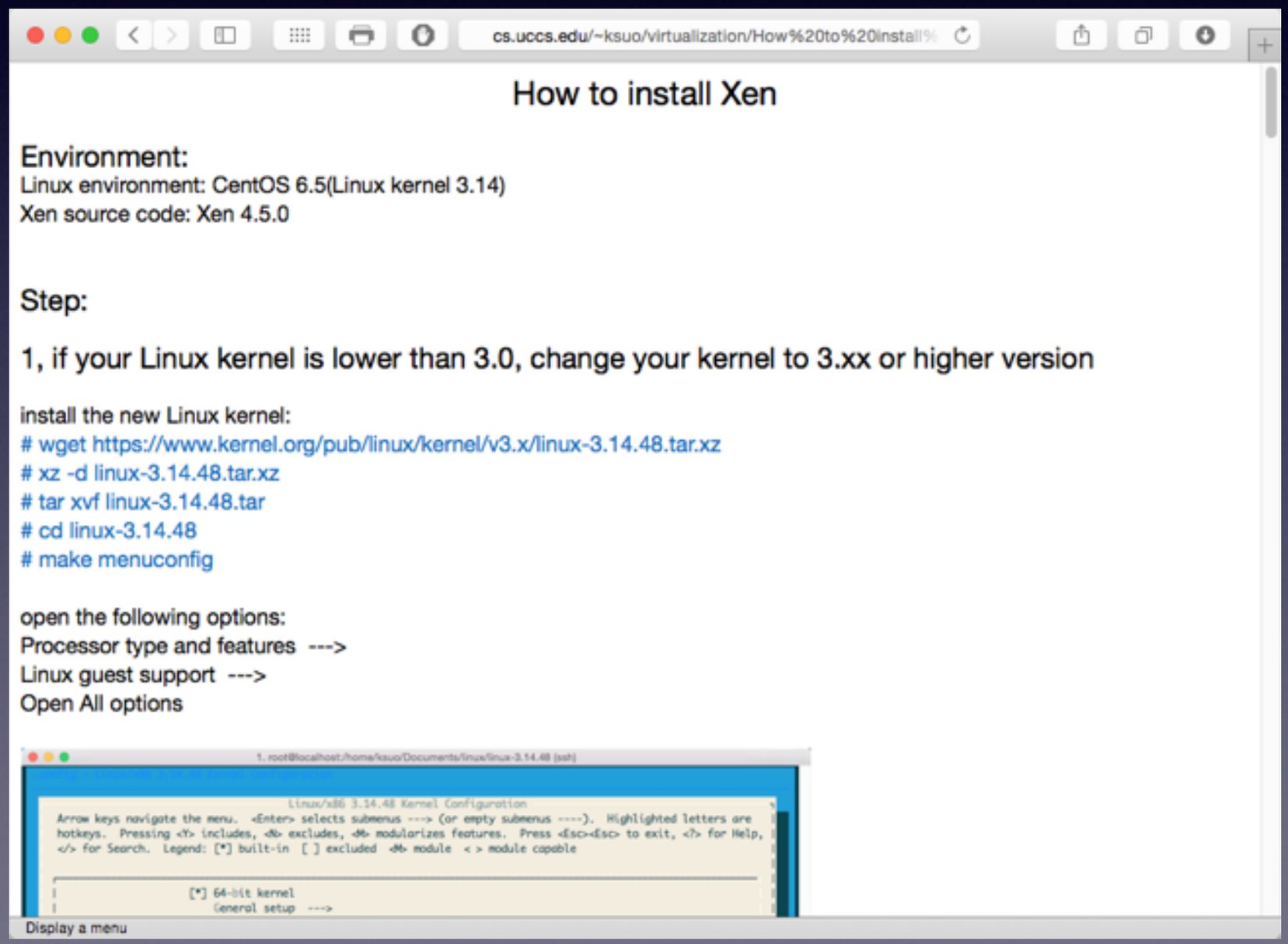
Topic Today

- How to install Xen ?
- How to build VMs on Xen ?
- How Xen connects to the outside ?

How to install Xen ?

How to install Xen ?

http://cs.uccs.edu/~ksuo/virtualization/



How to build VMs on Xen ?

How to build VMs on Xen ?

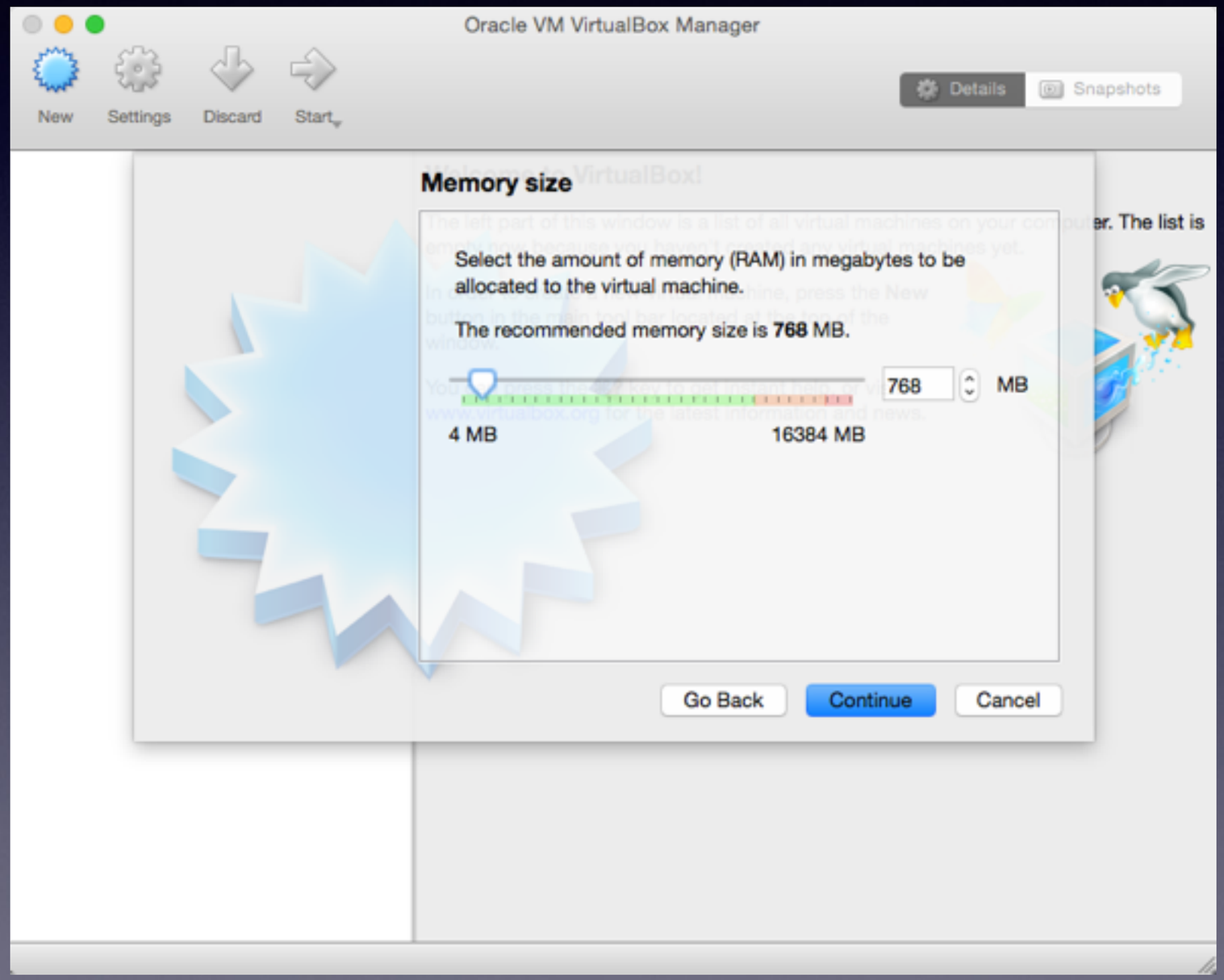
- (1) build a config file
- (2) install virtual machine
- (3) use this virtual machine

if cloned

- ~~(1) build a config file~~
- ~~(2) install virtual machine~~
- (3) clone and use this virtual machine

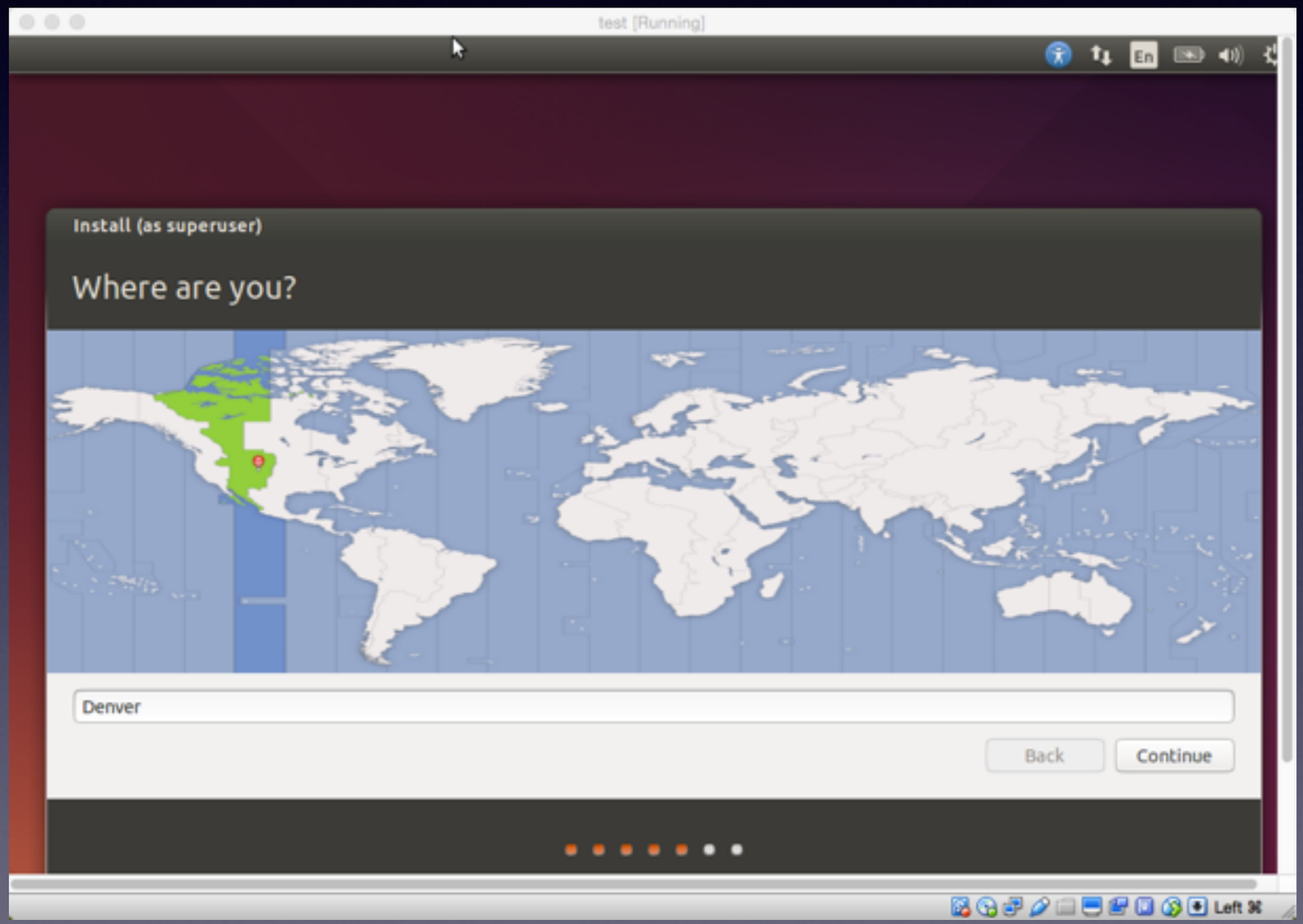
How to build VMs on Xen ?

- build a config file



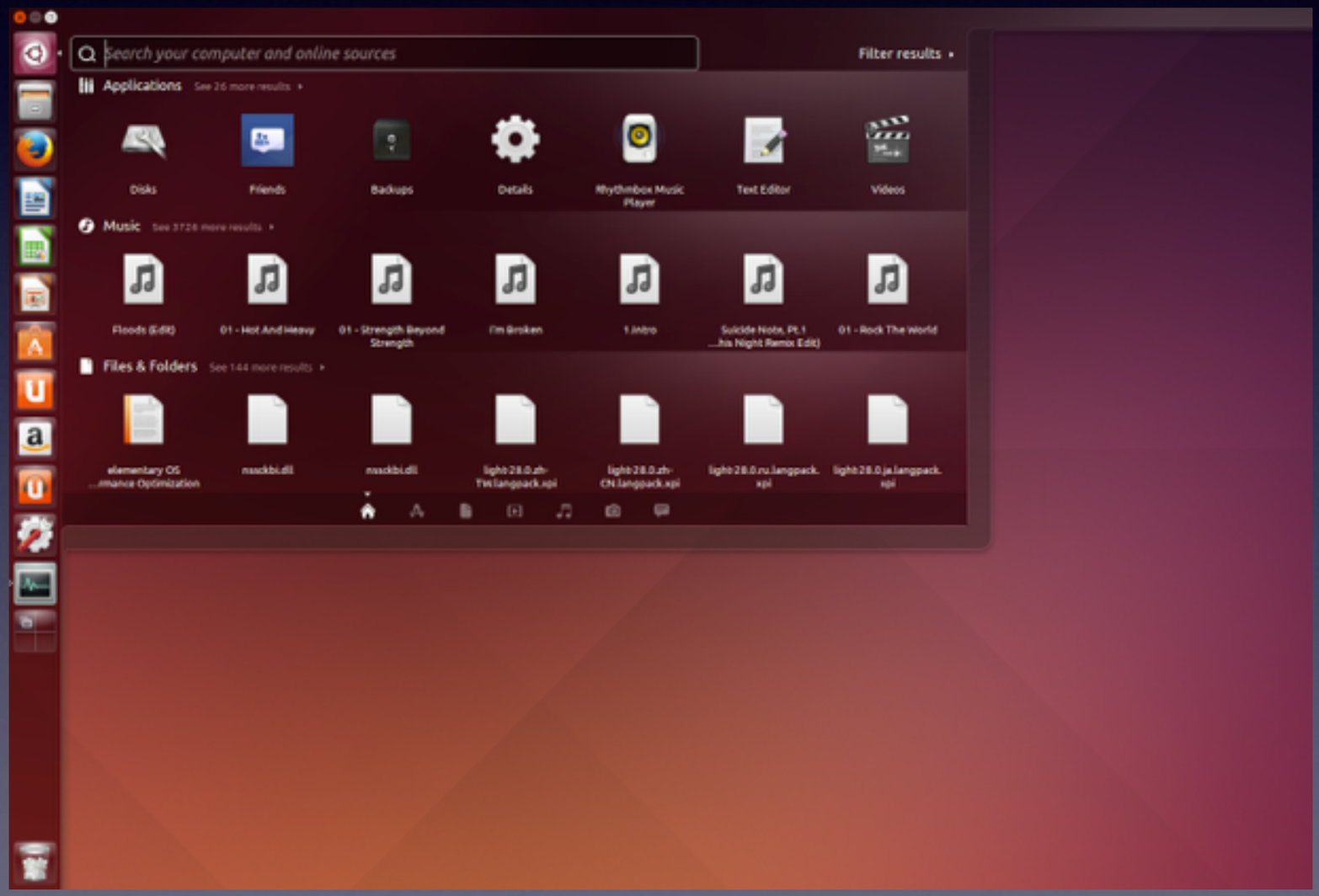
How to build VMs on Xen ?

- install virtual machine



How to build VMs on Xen ?

- use this virtual machine



How to build VMs on Xen ?

- (1) build a config file
- (2) install virtual machine
- (3) use this virtual machine

How to build VMs on Xen ?

Poor Performance
Scope for Improvement
Optimal Performance

P = Paravirtualized
VS = Software Virtualized (QEMU)
VH = Hardware Virtualized

Shortcut	Mode	With	Disk and Network	Interrupts & Timers	Emulated Motherboard, Legacy Boot	Privileged Instructions, Page Tables
HVM / Fully Virtualized	HVM		VS	VS	VS	VH
HVM + PV drivers	HVM	PV Drivers	P	VS	VS	VH
PVHVM	HVM	PVHVM Drivers	P	P	VS	VH
PV	PV		P	P	P	P

How to build VMs on Xen ?

- (1) build a config file

1. vim centos65_pv_3.cfg (ssh)

root@localhost:/etc/xen/sc... vim (ssh)

```
1 name = "centos65_3.pv"
2 vcpus = 1
3 memory = 4096
4 vif = [ 'mac=00:16:3e:54:02:03, bridge=xenbr0' ]
5 # disk = [ 'file:/home/ksuo/Documents/dom-U/centos65_pv_3.img, xvda, w', 'file:/home/ksuo/Documents/dom-U/isofiles/CentOS-6.5-x86_64-bin-DVD1.iso, xvdc:cdrom, r' ]
6 disk = [ 'file:/home/ksuo/Documents/dom-U/centos65_pv_3.img, xvda, w']
7
8
9 # Kernel image to boot
10 # kernel = "/home/ksuo/Documents/dom-U/isofiles/vmlinuz"
11 bootloader = "/usr/local/bin/pygrub"
12
13
14 # Optional
15 # ramdisk = "/home/ksuo/Documents/dom-U/isofiles/initrd.img"
16
17
18 # Kernel command line options
19 extra = "root=/dev/xvda"
20
21
22 # open vncviewer
23 vfb=[ "type=vnc, vncpass=123456" ]
```

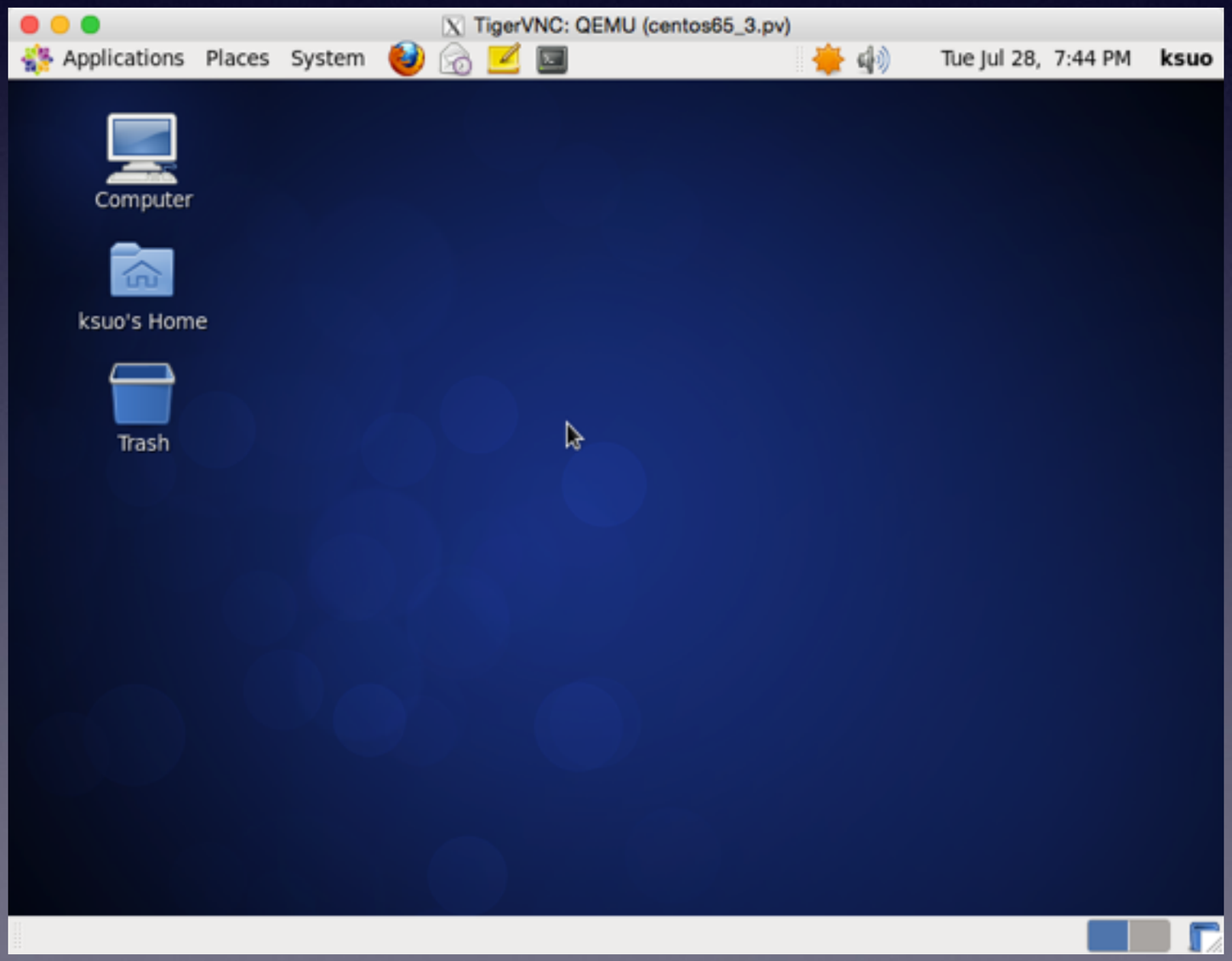
NORMAL centos65_pv_3.cfg unix < utf-8 < cfg 21% 5:163

How to build VMs on Xen ?

- (2) install virtual machine

How to build VMs on Xen ?

- (3) use this virtual machine



Demo: install VM on Xen

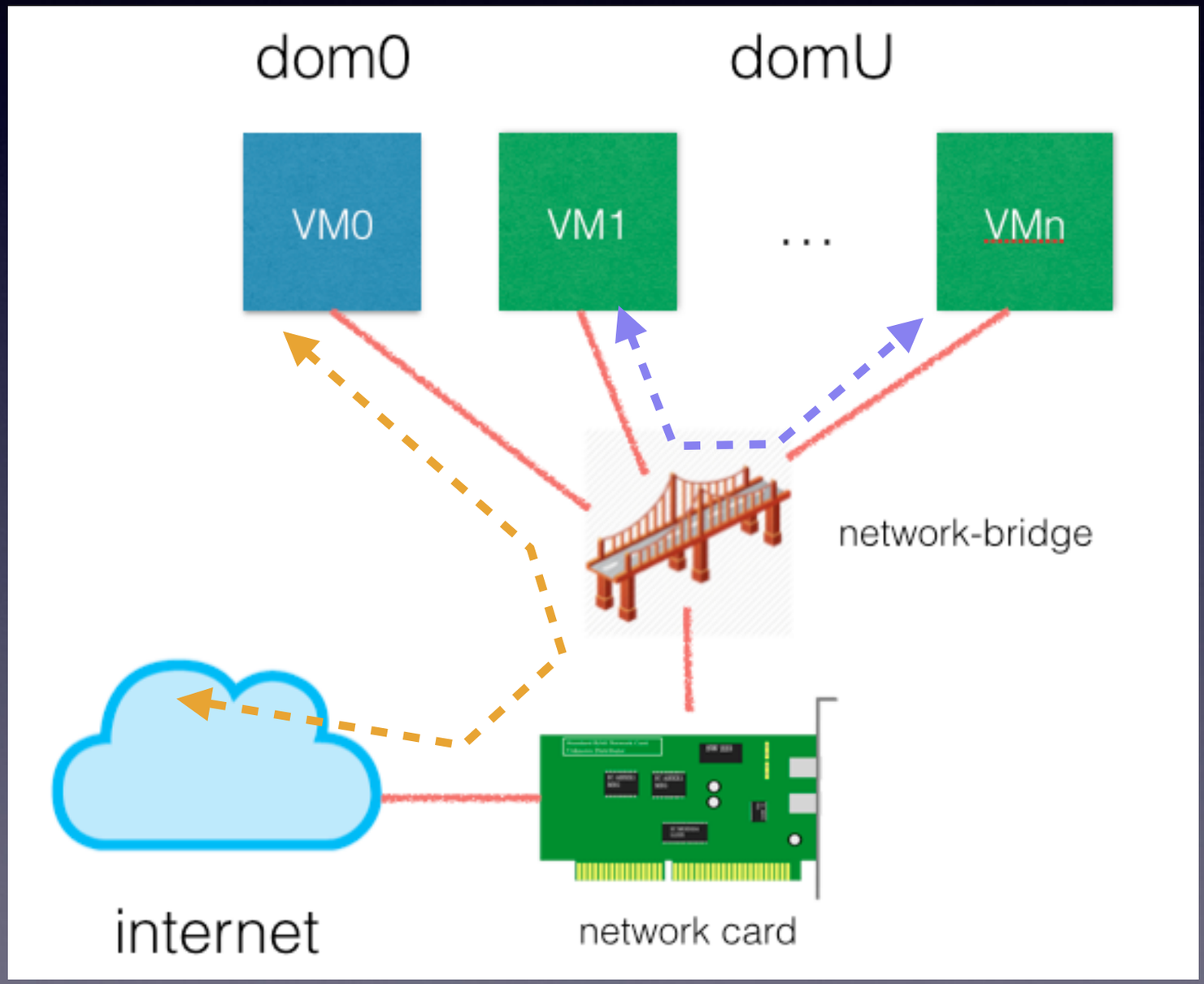
How Xen connects to outside ?

How Xen connect to outside ?

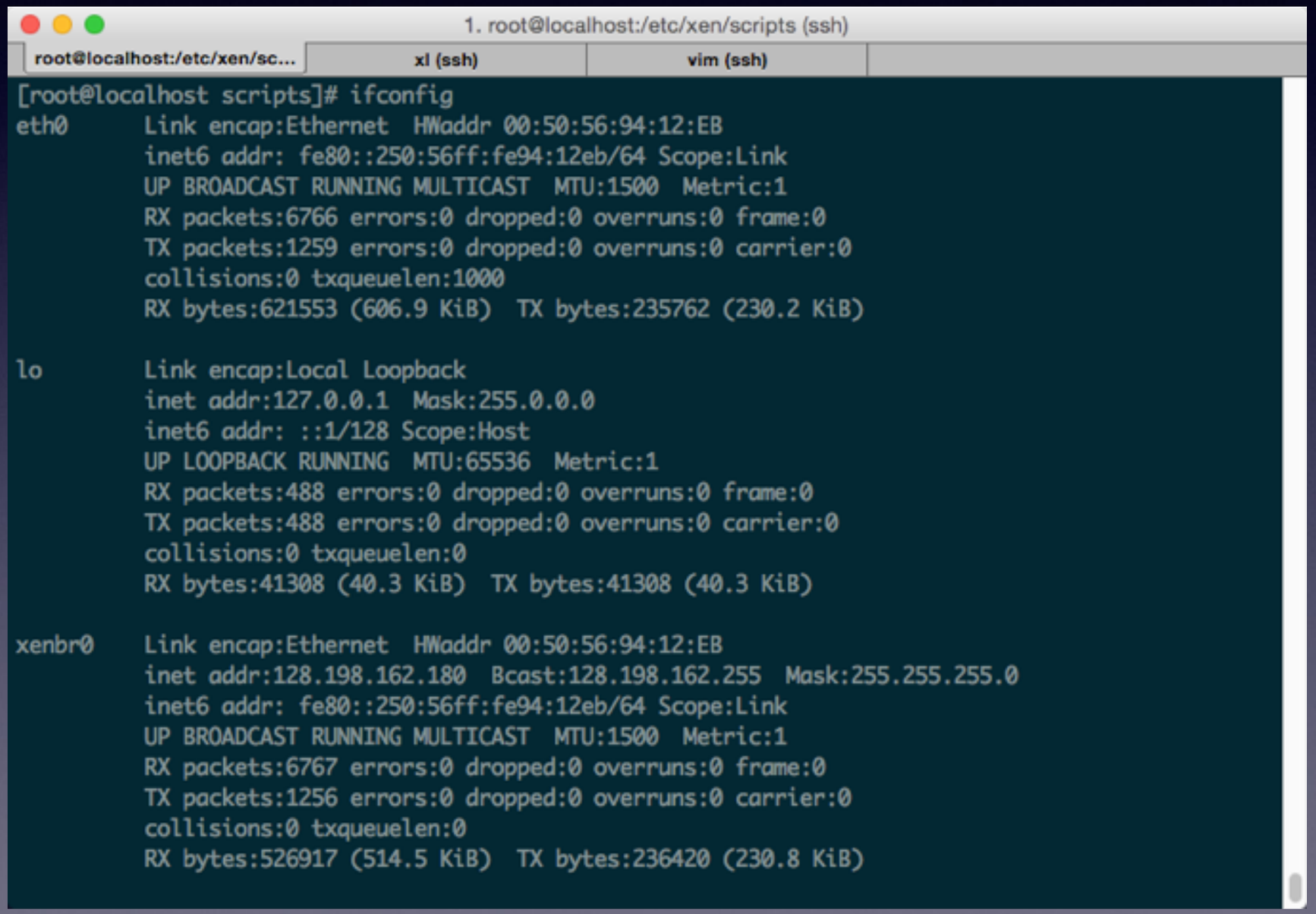
- Network-bridge (default)
- NAT
- Router

How Xen connect to outside ?

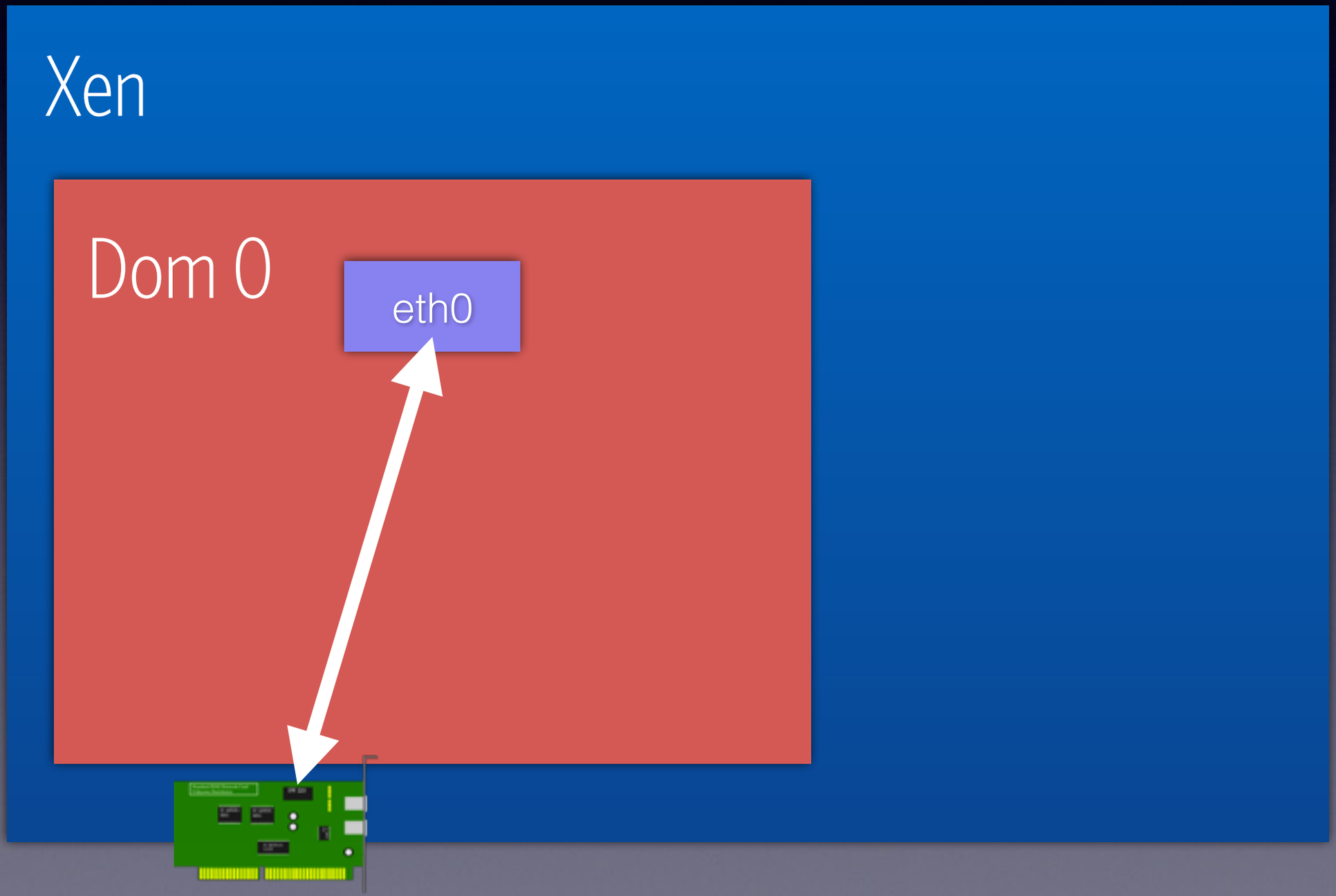
Network-bridge



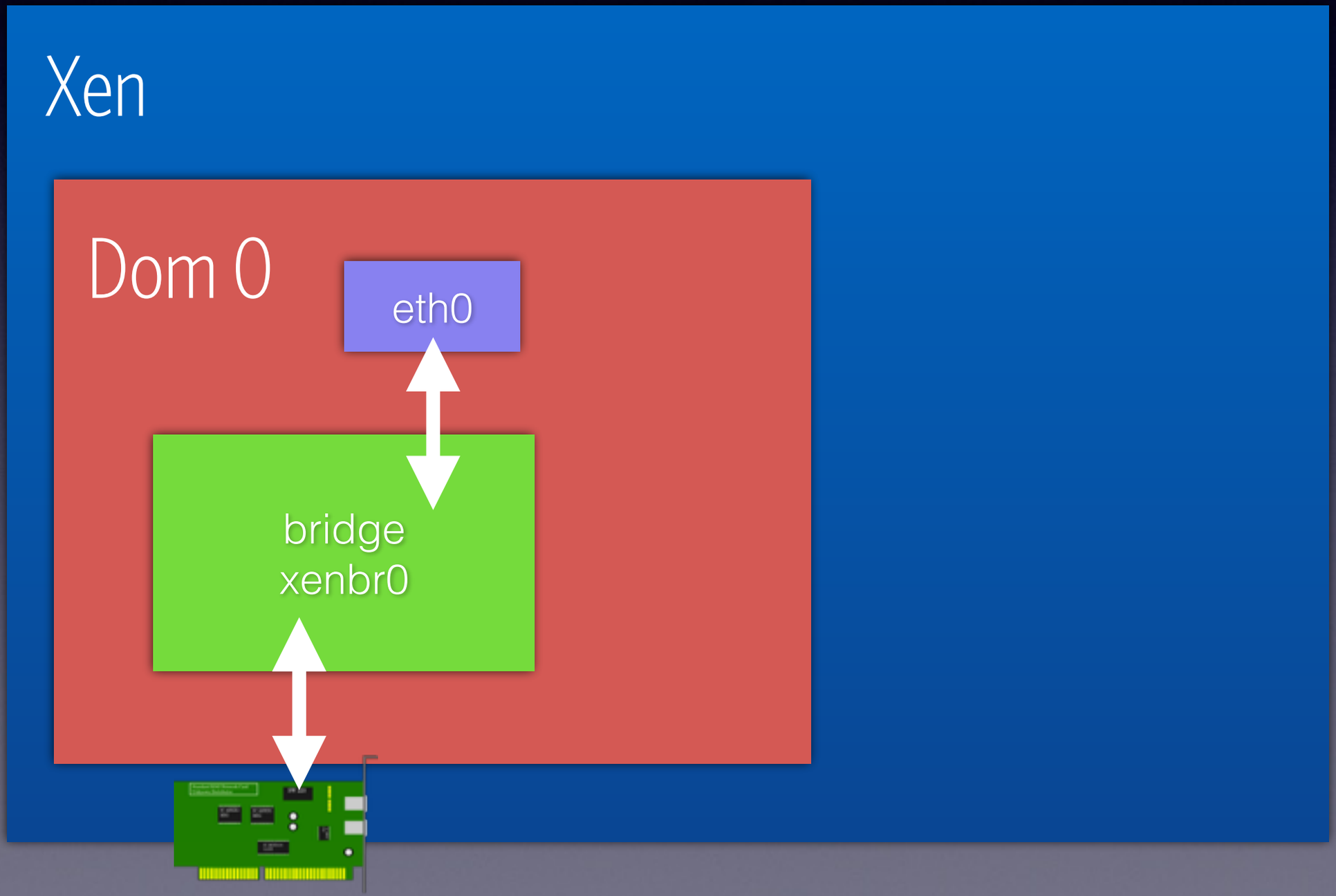
How Xen connect to outside ?



How Xen connect to outside ?



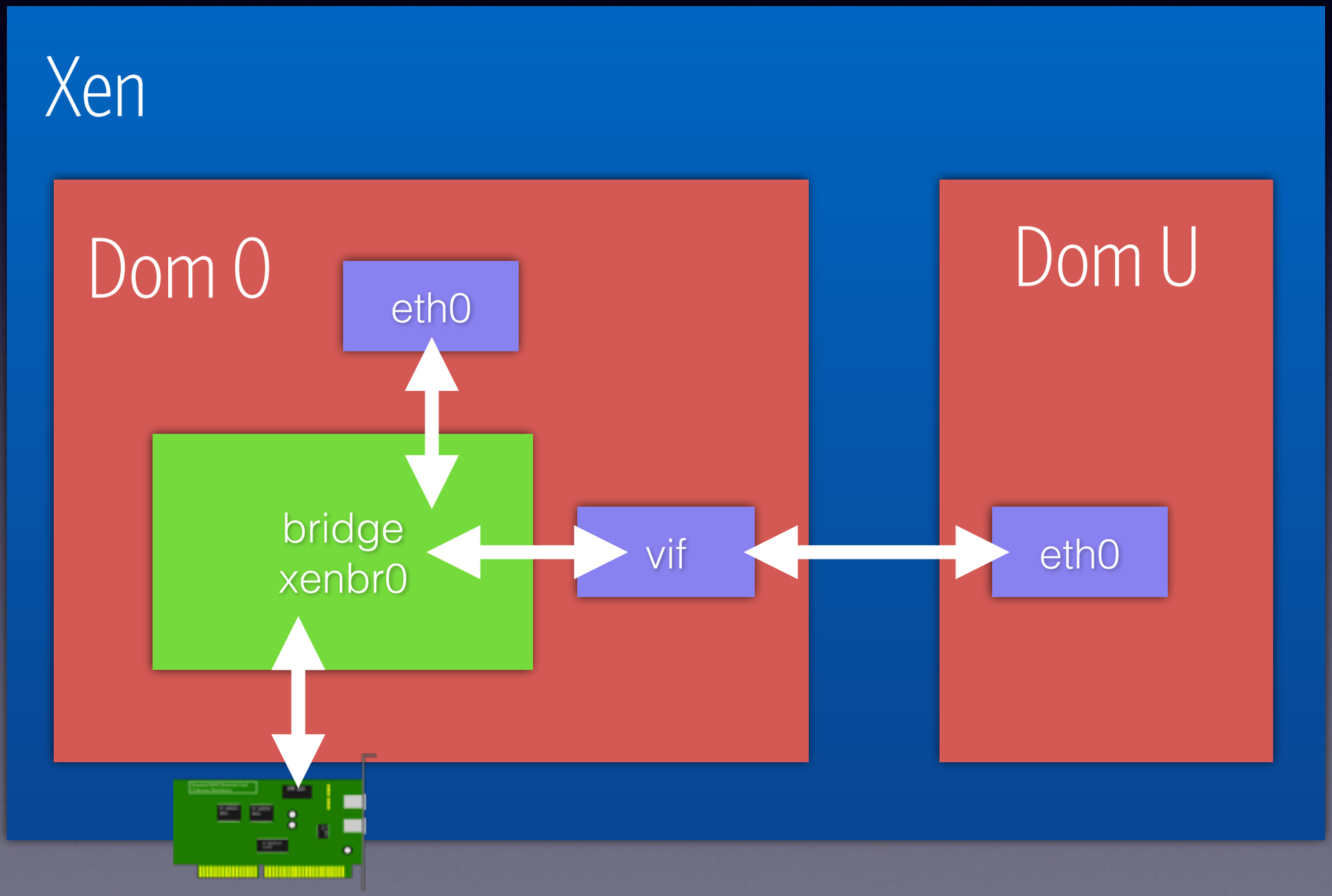
How Xen connect to outside ?



```
em1       Link encap:Ethernet  HWaddr 74:86:7A:DC:7E:AC
          inet6 addr: fe80::7686:7aff:fedc:7eac/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:169486 errors:0 dropped:0 overruns:0 frame:0
          TX packets:182206 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:159315373 (151.9 MiB)  TX bytes:192678256 (183.7 MiB)
          Interrupt:16

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:26074 errors:0 dropped:0 overruns:0 frame:0
          TX packets:26074 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:193926741 (184.9 MiB)  TX bytes:193926741 (184.9 MiB)

vif2.0    Link encap:Ethernet  HWaddr FE:FF:FF:FF:FF:FF
          inet6 addr: fe80::fcff:ffff:feff:ffff/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:18973 errors:0 dropped:0 overruns:0 frame:0
          TX packets:31947 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:32
          RX bytes:1047425 (1022.8 KiB)  TX bytes:65123995 (62.1 MiB)

xenbr0    Link encap:Ethernet  HWaddr 74:86:7A:DC:7E:AC
          inet addr:192.168.32.13  Bcast:192.168.32.255  Mask:255.255.255.0
          inet6 addr: fe80::7686:7aff:fedc:7eac/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:109276 errors:0 dropped:0 overruns:0 frame:0
          TX packets:50045 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:90278372 (86.0 MiB)  TX bytes:183160229 (174.6 MiB)
```

Add a new VM

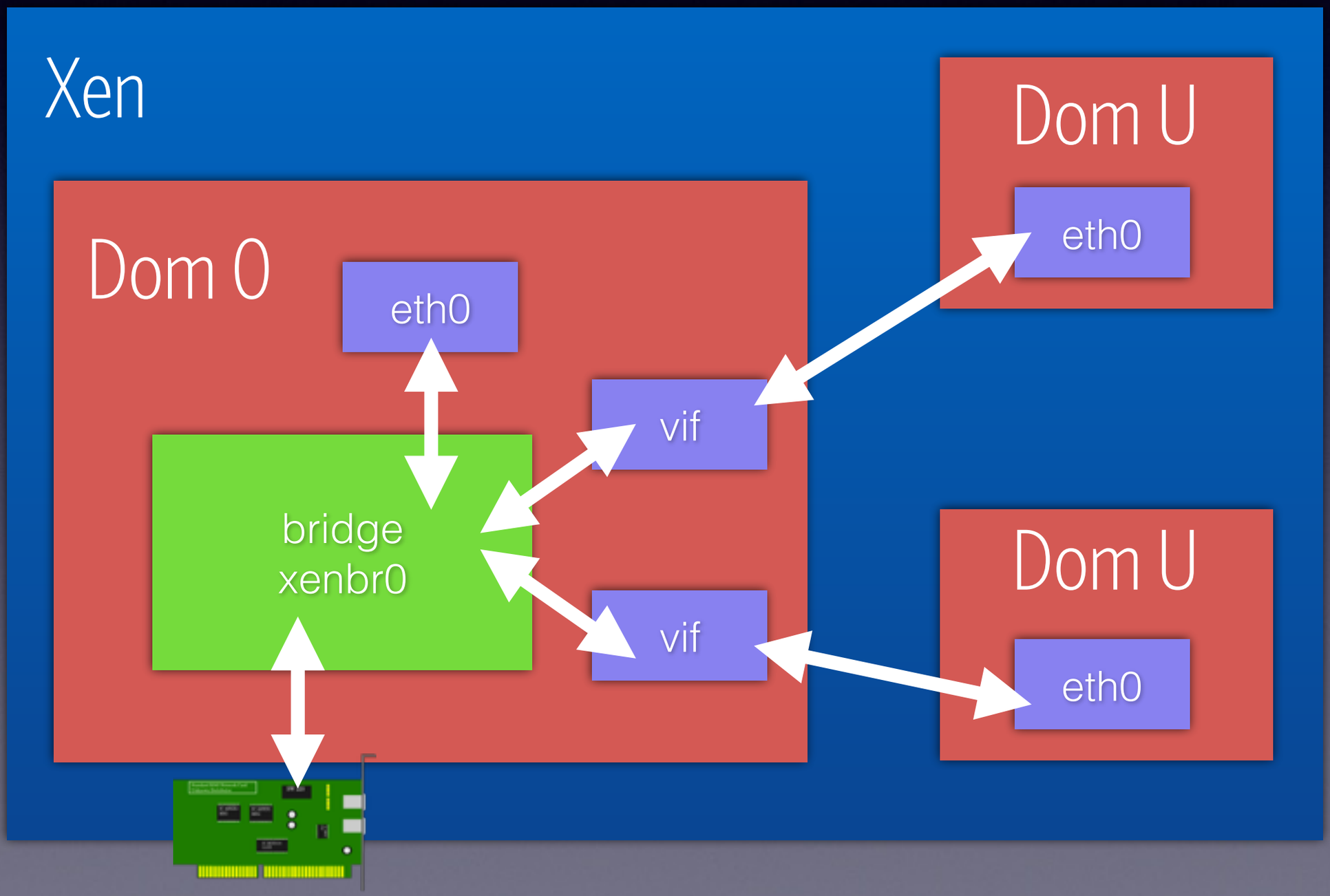
How Xen connect to outside ?



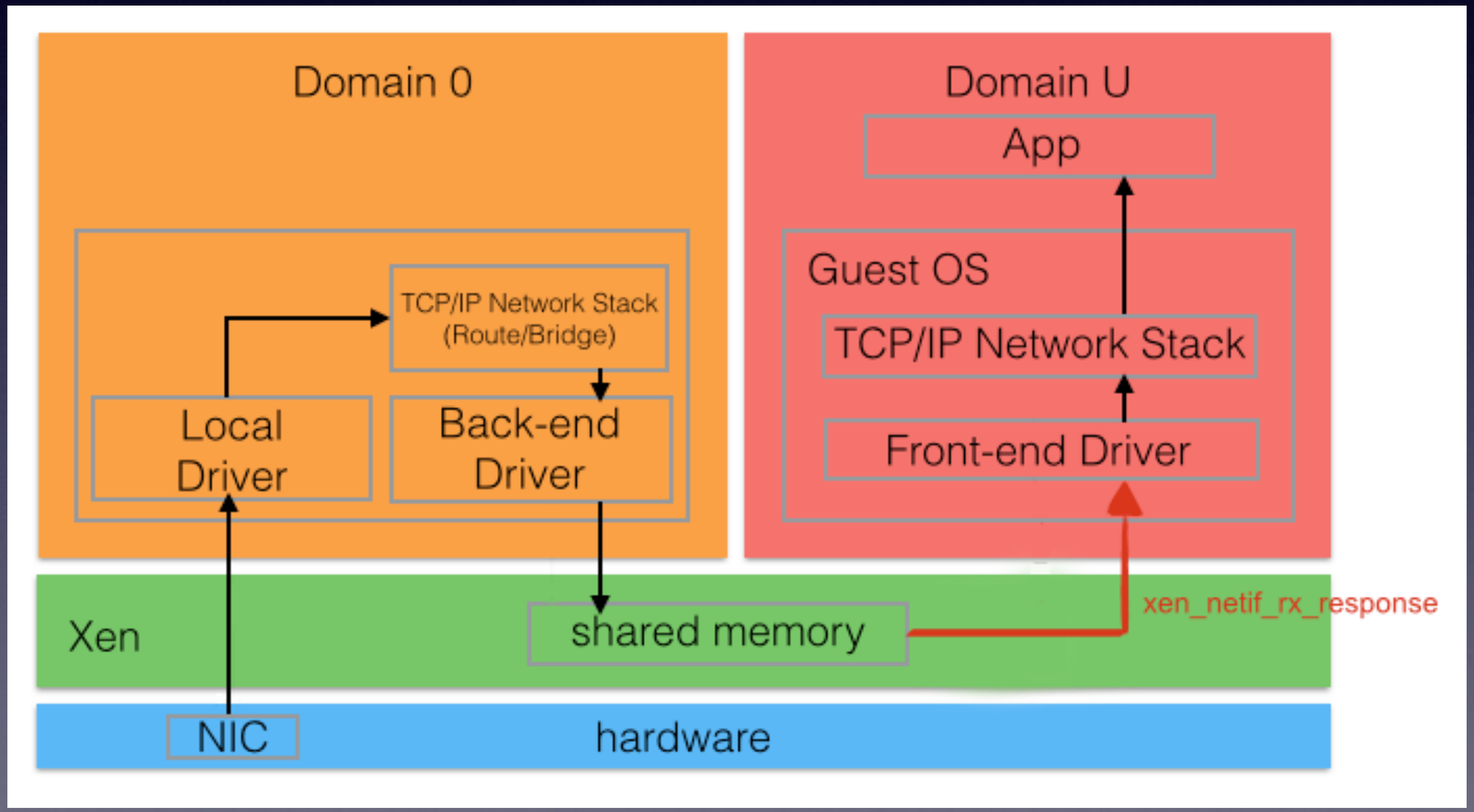
```
em1       Link encap:Ethernet  HWaddr 74:86:7A:DC:7E:AC
          inet6 addr: fe80::7686:7aff:fedc:7eac/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:170120 errors:0 dropped:0 overruns:0 frame:0
          TX packets:182500 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:159410543 (152.0 MiB)  TX bytes:192720388 (183.7 MiB)
          Interrupt:16

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:26074 errors:0 dropped:0 overruns:0 frame:0
          TX packets:26074 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:193926741 (184.9 MiB)  TX bytes:193926741 (184.9 MiB)

vif2.0    Link encap:Ethernet  HWaddr FE:FF:FF:FF:FF:FF
          inet6 addr: fe80::fcff:ffff:feff:ffff/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:18992 errors:0 dropped:0 overruns:0 frame:0
          TX packets:32302 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:32
          RX bytes:1048557 (1023.9 KiB)  TX bytes:65191919 (62.1 MiB)

vif5.0    Link encap:Ethernet  HWaddr FE:FF:FF:FF:FF:FF
          inet6 addr: fe80::fcff:ffff:feff:ffff/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:46 errors:0 dropped:0 overruns:0 frame:0
          TX packets:83 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:32
          RX bytes:2754 (2.6 KiB)  TX bytes:13572 (13.2 KiB)

xenbr0    Link encap:Ethernet  HWaddr 74:86:7A:DC:7E:AC
          inet addr:192.168.32.13  Bcast:192.168.32.255  Mask:255.255.255.
          inet6 addr: fe80::7686:7aff:fedc:7eac/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:109880 errors:0 dropped:0 overruns:0 frame:0
          TX packets:50274 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:90357542 (86.1 MiB)  TX bytes:183196215 (174.7 MiB)
```

Add one more VM

How Xen connect to outside ?



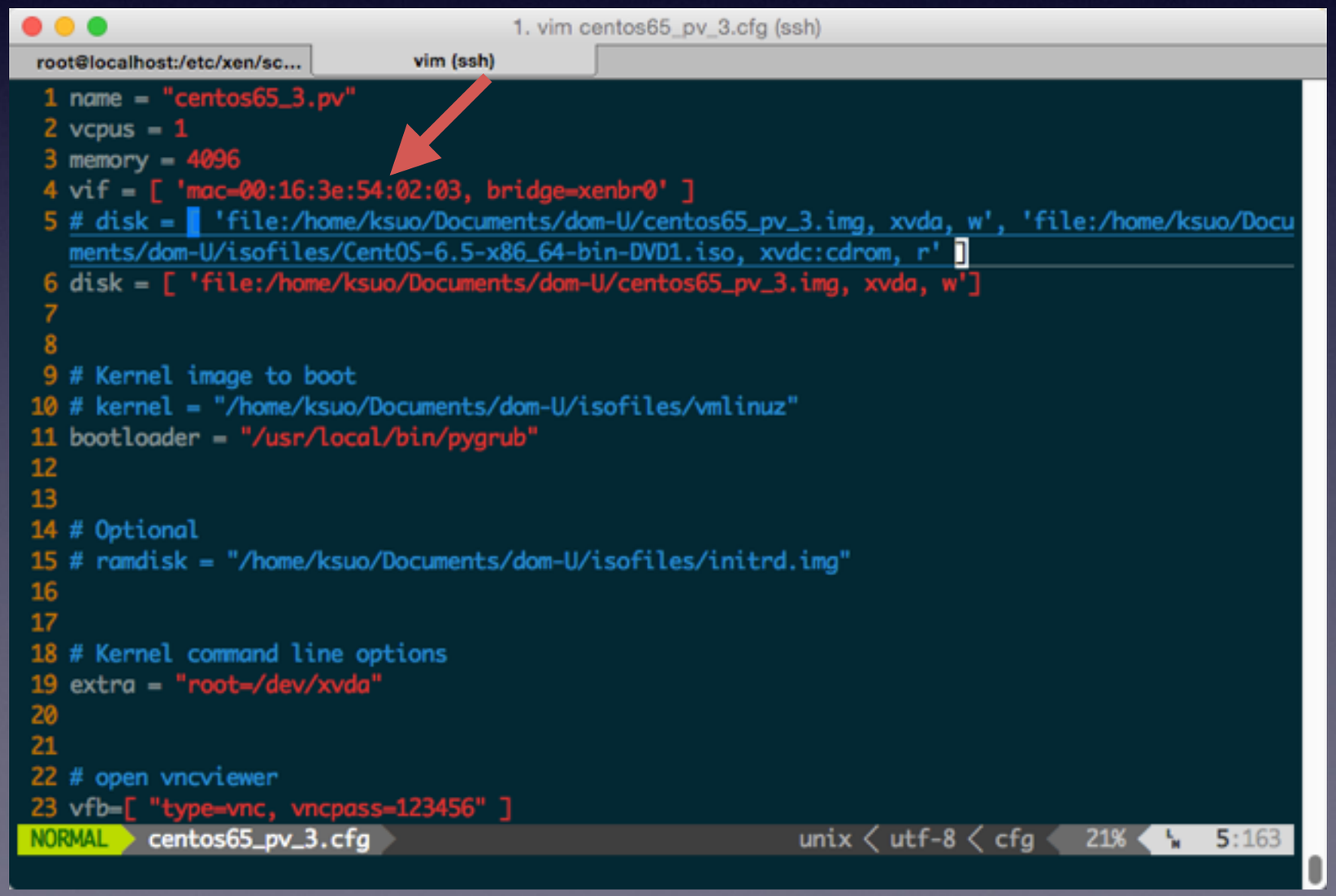
How Xen connect to outside ?



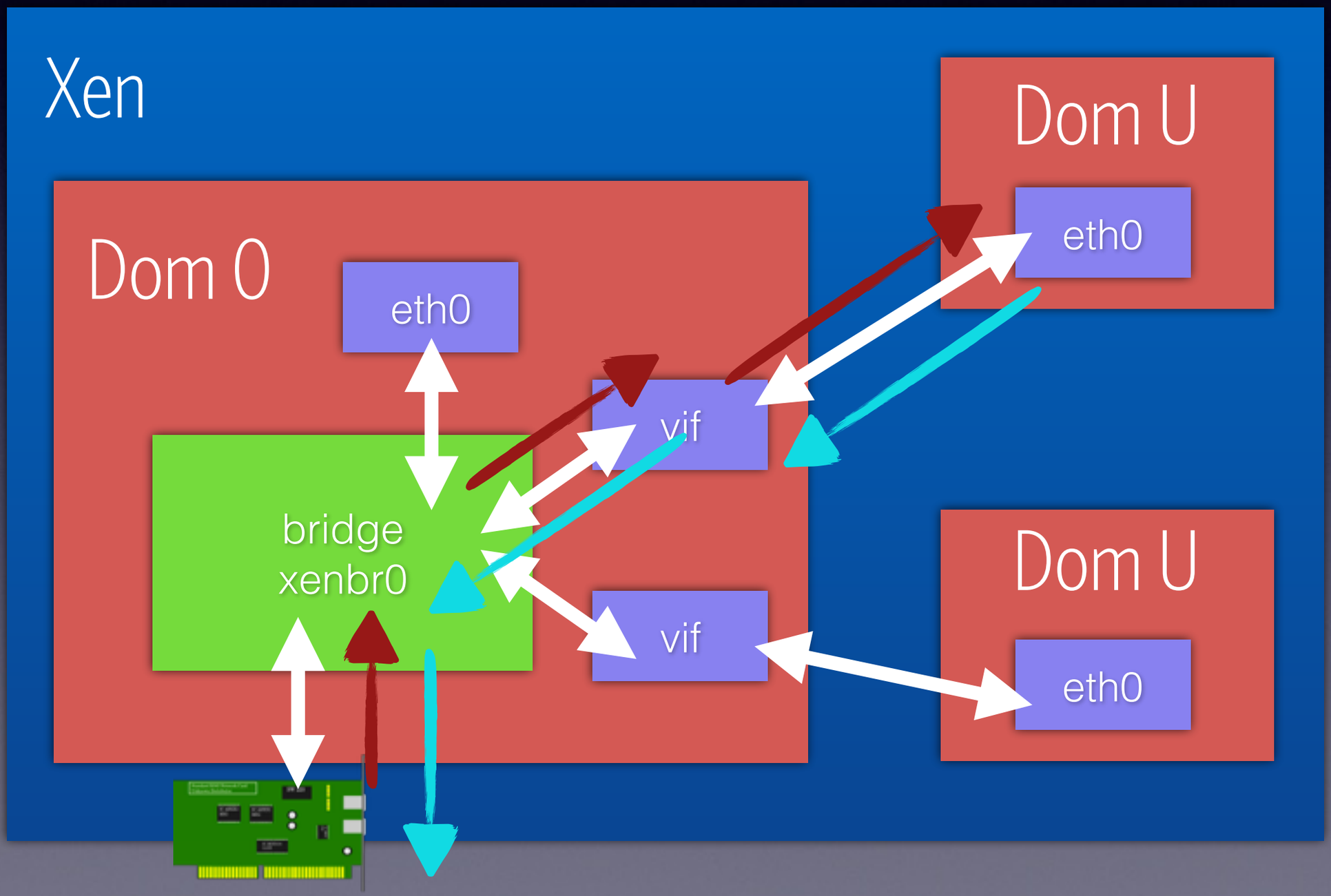
How Xen connect to outside ?

inside Dom U

vif = ["key1 = value1", "key2 = value2"]
vif = [mac=00:16:3E:02:00:41,bridge=xenbr0']



How Xen connect to outside ?



Conclusion of Xen

- What is Xen ?
- Xen history
- Xen design philosophy
- How Xen virtualize resources ?
- How to install Xen ?
- How to build VMs on Xen ?
- How Xen connects to the outside ?

Thank you