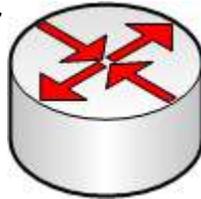# VIRTUAL NETWORKING
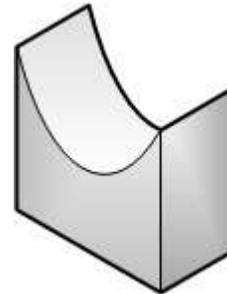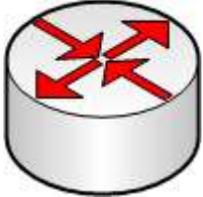# WITH "ORACLE VM VIRTUALBOX"
FROM A "LINUX" PERSPECTIVE

Summary:

"Oracle VM VirtualBox" provides five virtual networking configurations for the virtual machines of a "Linux" host computer:
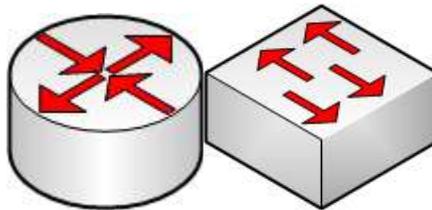
a "Shared Folders" gateway/router

a "Network Address Translation" ("NAT") router
(with no internal LAN switching)

a "Bridged" bridge (with no internal LAN switching)

a "Host-Only" router
with internal LAN switching

and
an "Internal Network" LAN switch with optional DHCP services
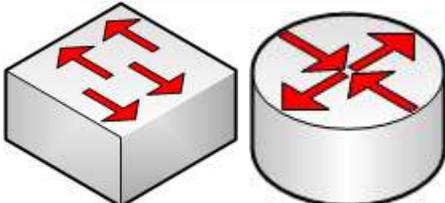
VIRTUAL NETWORK ADAPTERS
FOR EACH VIRTUAL MACHINE
IN "ORACLE VM VIRTUALBOX"

You can provide up to 4 network adapters for each virtual machine:

Use your right mouse button to click on the desired virtual machine:
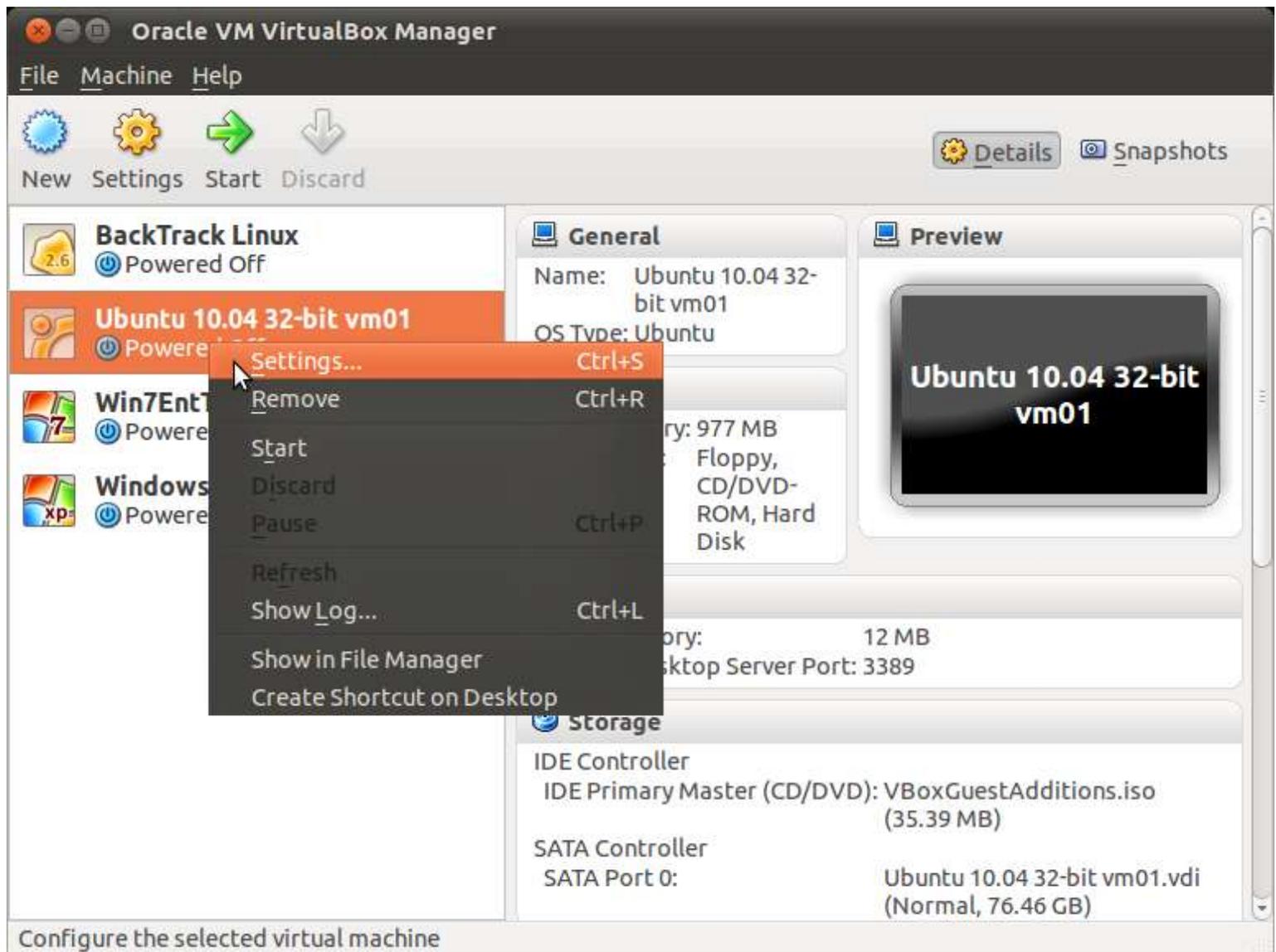
Use the left mouse button to click on "Settings" on the popup context menu.

A ".. Settings" box will be displayed:

Click on "Network":
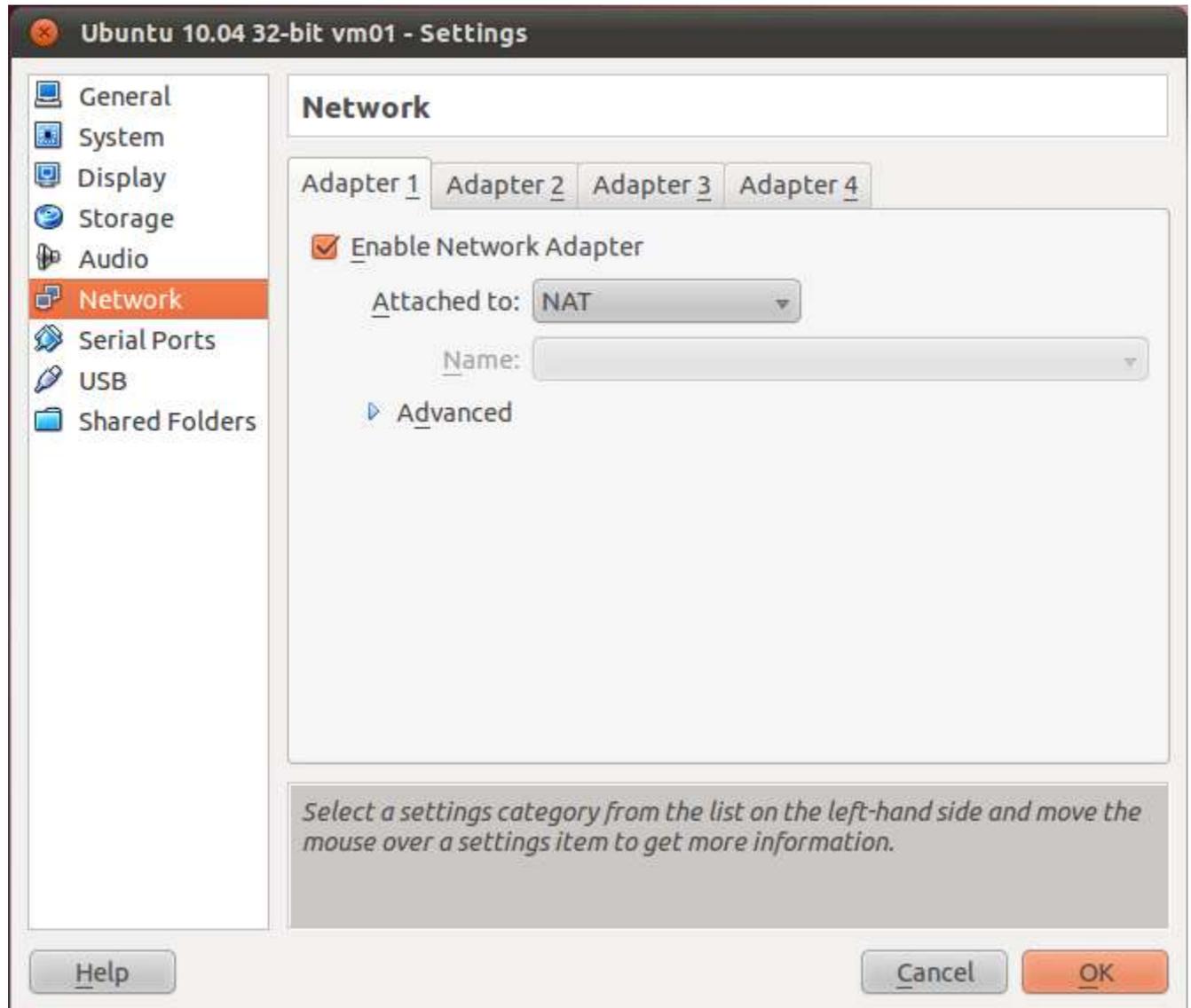
Each of the 4 tabs represents a virtual network adapter that you can activate and configure.

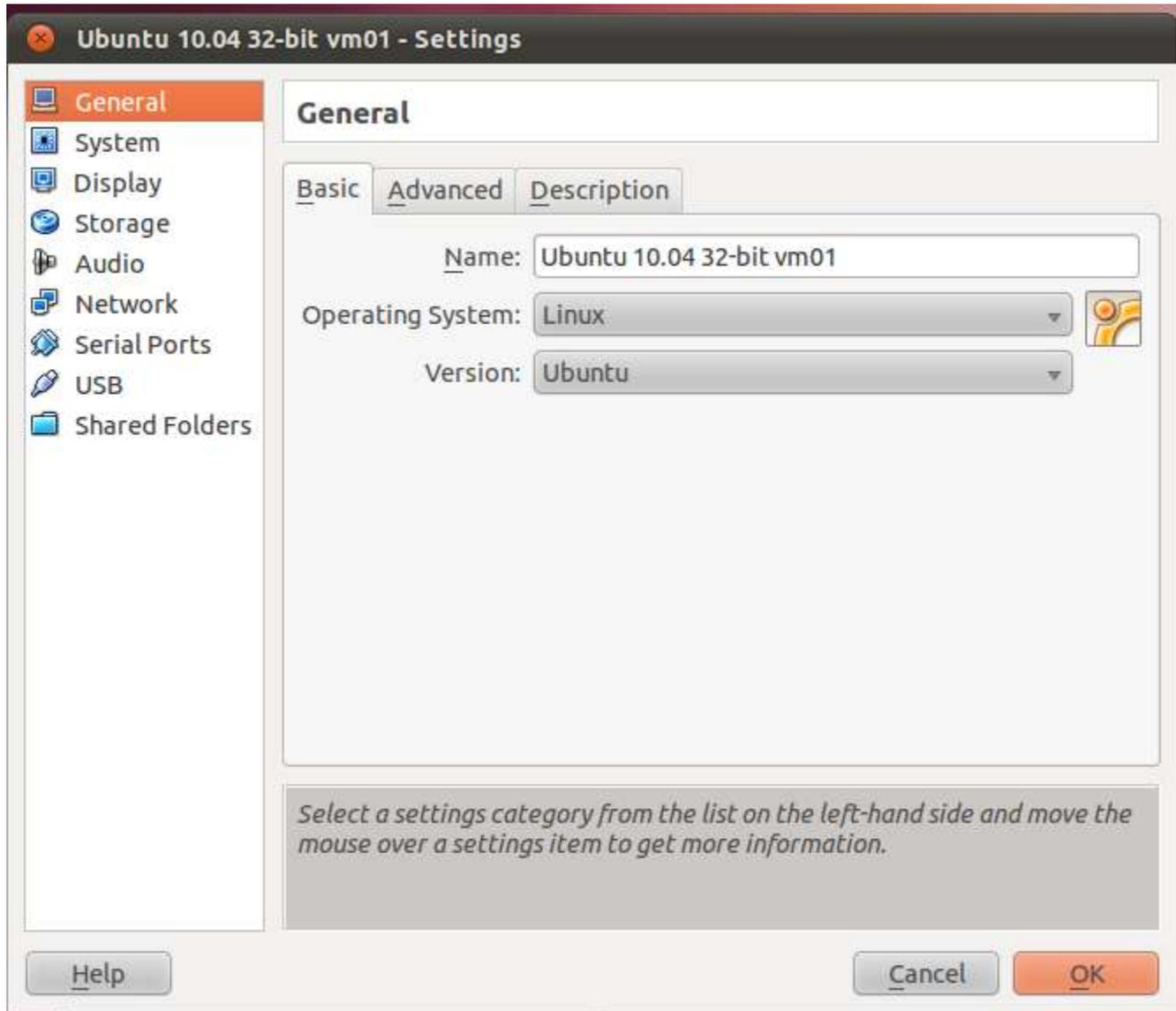If you click on the drop-down list button to the right of the "Attached to:" field, you will see a list of the virtual networks that "Oracle VM VirtualBox" provides to a virtual machine:
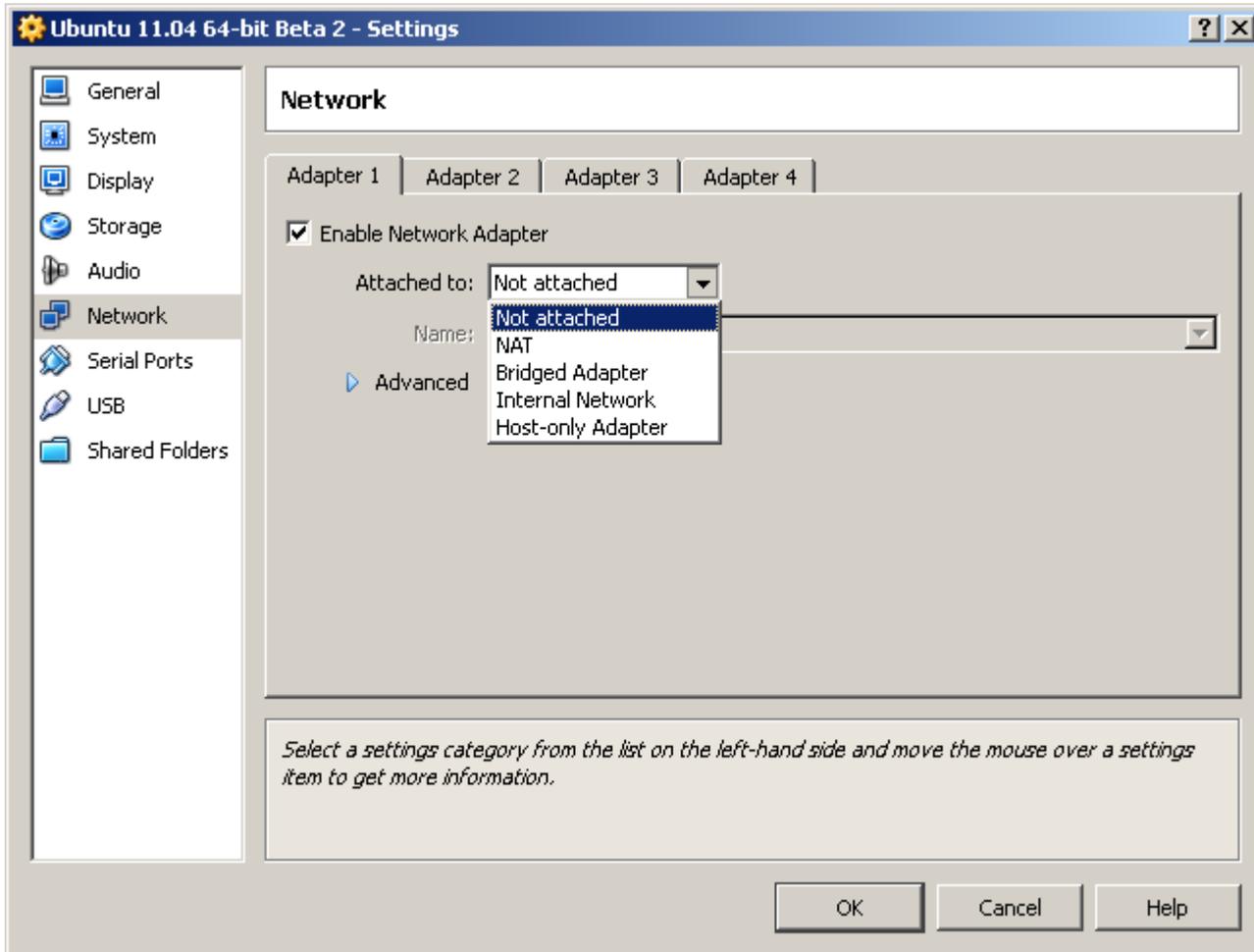
Please note that
"NAT" is the virtual "Network Address Translation" ("NAT") router,

"Bridged Adapter" is the virtual "Bridged" bridge,

"Host-only Adapter" is the virtual "Host-Only" router,

and

"Internal Network" is the virtual "Internal Network" LAN switch.

The operating system of the virtual machine treats all of the virtual network adapters as if they were a real items of hardware:

VIRTUAL NETWORK ADAPTERS
FOR THE HOST COMPUTER
IN "ORACLE VM VIRTUALBOX"

In the virtual "Shared Folders" gateway/router, no virtual network adapter is used.

In the virtual "Network Address Translation" ("NAT"), "Bridged" bridge, or "Internet Networking" LAN switch networks, the virtual network adapter in the host computer runs in "stealth mode" and you cannot access or configure it.

In the virtual "Host-Only" router network configuration, the virtual network adapter in the host is a virtual wired Ethernet adapter that is called "
vboxnet0

To view and/or configure "vboxnet0":

Open a terminal window.

Type in

ifconfig

Then press the "Enter" key of your keyboard.

vboxnet0 will probably be the bottom-most network adapter that is displayed:

```
testuser@testuser-VGC-RA820G-UC: ~

File  Edit  View  Search  Terminal  Help
          RX packets:39 errors:0 dropped:0 overruns:0 frame:0
          TX packets:39 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:4134 (4.1 KB)  TX bytes:4134 (4.1 KB)

vboxnet0  Link encap:Ethernet  HWaddr 0a:00:27:00:00:00
          inet addr:192.168.56.1  Bcast:192.168.56.255  Mask:255.255.255.0
          inet6 addr: fe80::800:27ff:fe00:0/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:105 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:18060 (18.0 KB)

vmnet1    Link encap:Ethernet  HWaddr 00:50:56:c0:00:01
          inet addr:172.16.106.1  Bcast:172.16.106.255  Mask:255.255.255.0
          inet6 addr: fe80::250:56ff:fec0:1/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:86 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

vmnet8    Link encap:Ethernet  HWaddr 00:50:56:c0:00:08
          inet addr:172.16.211.1  Bcast:172.16.211.255  Mask:255.255.255.0
          inet6 addr: fe80::250:56ff:fec0:8/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:87 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

testuser@testuser-VGC-RA820G-UC:~$ ifconfig vboxnet0
vboxnet0  Link encap:Ethernet  HWaddr 0a:00:27:00:00:00
          inet addr:192.168.56.1  Bcast:192.168.56.255  Mask:255.255.255.0
          inet6 addr: fe80::800:27ff:fe00:0/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:105 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:18060 (18.0 KB)

testuser@testuser-VGC-RA820G-UC:~$ 
```

If you see that "vboxnet0" has an IP address, it means than there is at least one VirtualBox virtual machine that is running and connected to the virtual "Host-Only" router.
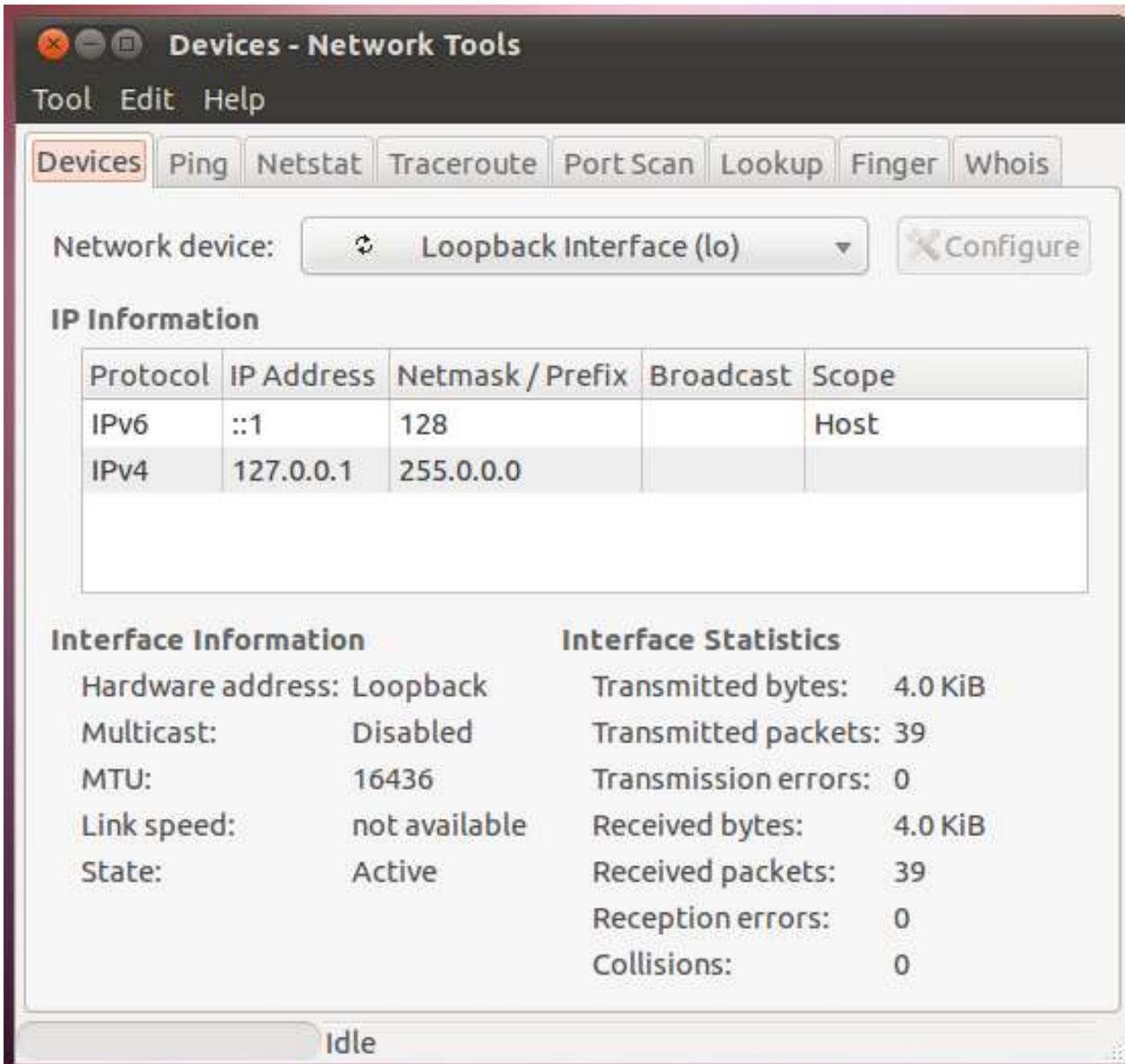
In Ubuntu, you can see "vboxnet0" in one other way:
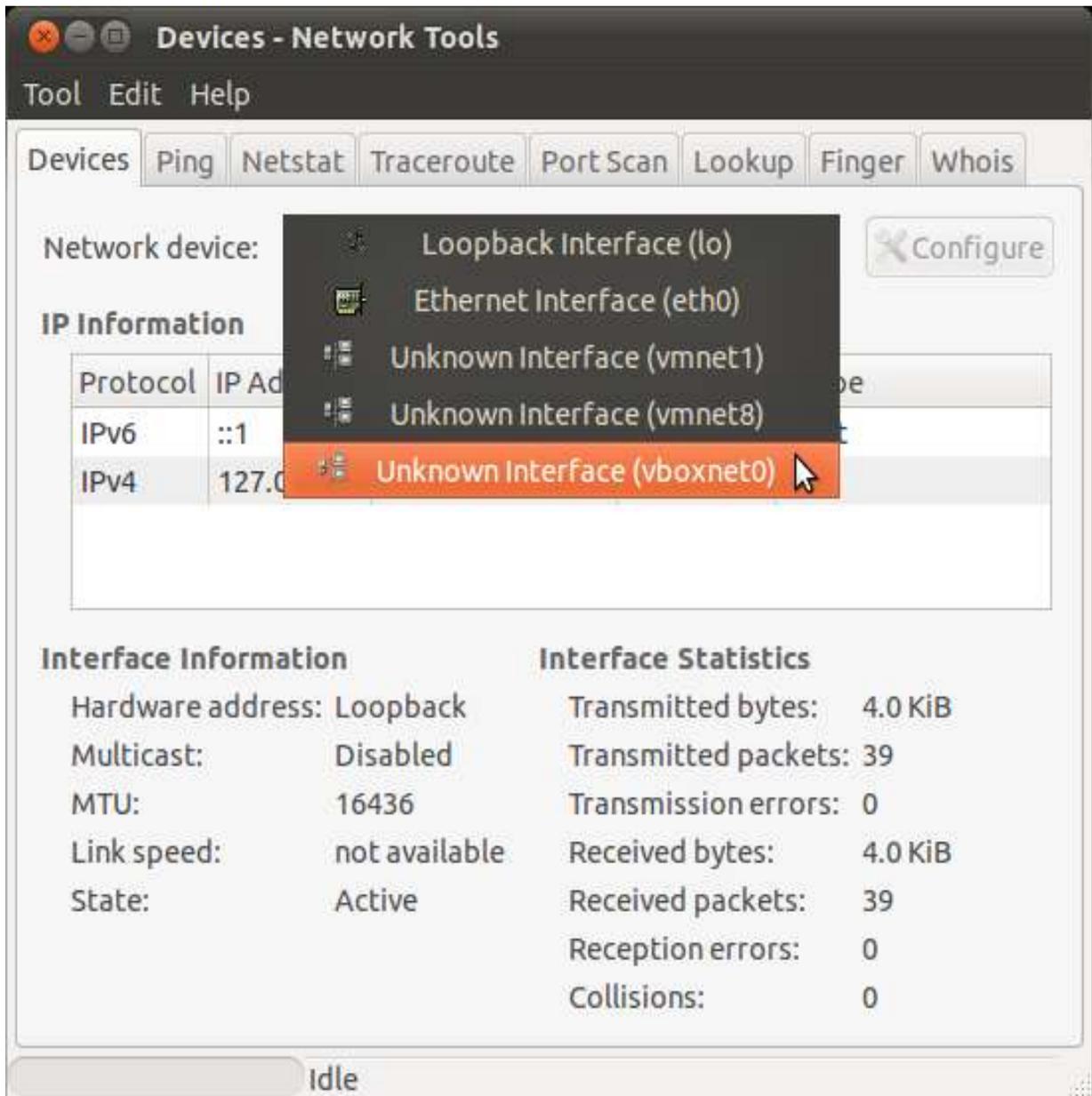From inside the Ubuntu virtual machine:
Click on "System".
Click on "Administration".
Click on "Network Tools":

Click on the drop down button for "Network Device".
Then click on "Unknown Interface (vboxnet0)" in the drop-down list:

The specifications for the virtual "vboxnet0" Ethernet adapter will be displayed:

Protocol	IP Address	Netmask / Prefix	Broadcast	Scope
IPv6	fe80::800:27ff:fe00:0	64		Link
IPv4	192.168.56.1	255.255.255.0		

Interface Information

Hardware address: 0a:00:27:00:00:00
Multicast: Enabled
MTU: 1500
Link speed: not available
State: Active

Interface Statistics

Transmitted bytes: 25.0 KiB
Transmitted packets: 143
Transmission errors: 0
Received bytes: 0.0 B
Received packets: 0
Reception errors: 0
Collisions: 0

Idle

"[Shared Folders](#)" GATEWAY/ROUTER
with designated target folder located on the host
with no accessible or visible network interfaces in the host or the virtual machine
with no upstream routing to the Internet.
Oracle's "Guest Addtions" software must be installed into each virtual machine.
"Guest Additions" software is provided to you as an *.iso CD image file called
VBoxGuestAdditions.iso
Multiple virtual machines can access the same target folder on the host.
"Shared Folders" must be configured for each virtual machine.
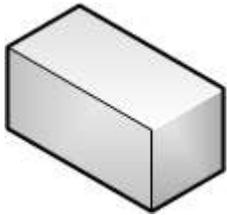"Windows" virtual machine sees a "Shared Folder" inside the "VBOXSVR" virtual server.
"Linux" virtual machine sees a "Shared Folder" mounted in /media but no access is
permitted.
The "Shared Folders" gateway/router does not work for Macintosh virtual machines at the
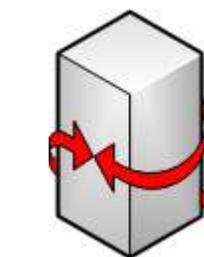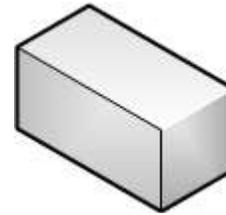present time.
No indication in host file system that a folder is being shared.

Host computer   Virtual Machine

```
□ 🖥 Network
    ⊞ 🖳 32-BITWIN7HPVM
    □ 🖳 VBOXSVR  .
        ⊞ 👤 \\VBOXSVR\Shared_from_VM
```

"Shared" Folder(s)   "Shared Folders"   "Windows" virtual machine
= host folder access   Gateway/Router   sees a virtual server
   from the virtual machine   called "VBOXSVR"
                                                       Virtual network adapter is not used.

 File system of virtual machine
    does not indicate that the "Shared Folder"
    is being shared.
Host has no access to the file system of
    the virtual machine
This is not NFS or FTP.

ADDITIONAL INFORMATION ABOUT THE VIRTUAL "SHARED FOLDERS" GATEWAY/ROUTER:

On a Linux host, you can find "VBoxGuestAdditions.iso" file in the "additions" folder under where you installed VirtualBox (normally /opt/VirtualBox/).

Oracle's instructions for setting up "Shared Folders" for a "Windows" or "Linux" virtual machine can be found at
http://www.virtualbox.org/manual/ch04.html#sharedfolders

For additional instructions for setting up "Shared Folders for a "Ubuntu" virtual machine, see
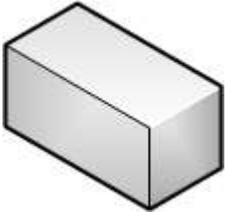https://help.ubuntu.com/community/VirtualBox/SharedFolders
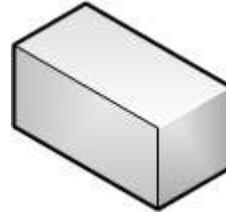and
http://www.howtogeek.com/75705/access-shared-folders-in-a-virtualbox-ubuntu-11.04-virtual-machine/

"[Network Address Translation](#)"("NAT") router
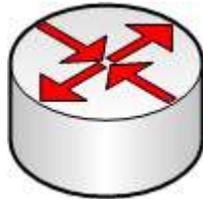with NAT service, DHCP server, and upstream routing to the Internet,

Host computer

Virtual Machine

Internet access
from the virtual machine

"NAT" router
  with NAT service
  with DHCP service
  with upstream routing
   to the Internet
  with LAN switching
   between the host
   and virtual machines
  (with no LAN switching
   between the
   virtual machines)

From inside a Linux virtual
 machine:
 to access folders on the
 host that are shared
 by means of Samba (SMb)
 or "Network File System" (NFS)
 please see
"Using IP Addresses to
 Access Shared Files and
Folders" in a Virtual Machine"
  (at the end of this document).

"Bridged" bridge

with mandatory "TEE" connection to either an upstream, real network adapter
(or to an operating system-provided virtual bridge on the host such as the "Windows Network Bridge")
with no internal LAN switching
(with LAN switching between virtual machines performed by the real physical network)
(with LAN switching between the host and virtual machines performed by the real physical network)
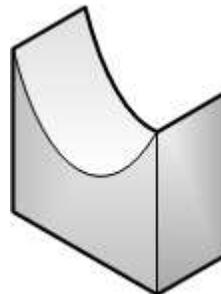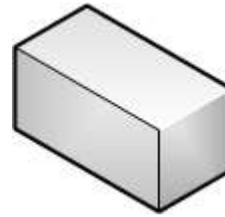(with NAT server and DHCP server provided by the real physical network)
With this virtual network option, the virtual machine(s) participate on the real physical network as "peers" with the host.

Host computer   Virtual Machine
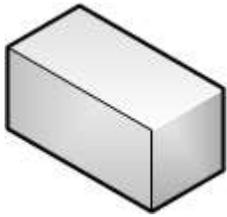
Internet access
   from virtual machine
Optional host folder access
   from virtual machine
   by means of
Windows "File Sharing"
or "Homegroups"

"Bridged" bridge
   provides "TEE"
   to a real physical
   physical network
   adapter but does not
   switch between
   virtual machines

From inside a Linux virtual machine, to access folders on the host or on other virtual machines that are shared by means of Samba (SMB) or NFS please see the section called "Using IP Addresses to Access Folders That are Shared by SAMBA (SMB) or Network File System"(NFS)
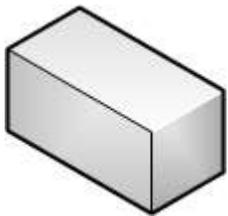
(at the end of this document).

In the "Bridged" bridge virtual network, the real physical network provides DHCP services, upstream routing to the Internet, NAT services, LAN switching between the host and virtual machines, and LAN switching between virtual machines.
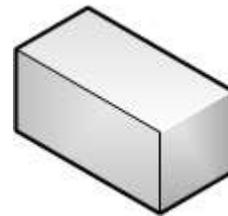

"Host-Only" router
with mandatory LAN switching between the host and the virtual machine,
with LAN switching or routing between virtual machines,
with an optional DHCP server, no NAT server, and no upstream routing to the Internet
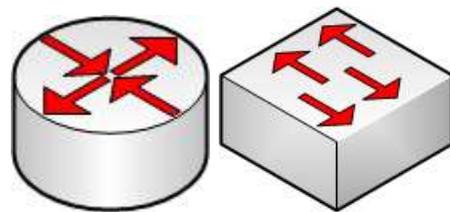

Host computer   Virtual Machine

Local Area Connection
Network, Shared
Intel(R) PRO/1000 MT Desktop Adap...

No Internet Access   "Host-only" router
  from virtual machine   with mandatory LAN switching
Optional host folder access   between host and virtual machines
  from virtual machine   with LAN switching or routing between
  by means of   virtual machines.
  Windows "File Sharing"
  or "Homegroups"

VirtualBox Host-Only Network
Unidentified network
VirtualBox Host-Only Ethernet Adapter

Host has a "Virtual Host-Only Ethernet Adapter"
  which connects the file system of the host
    to the "Host-only" router

The "Host-only" router acts as a firewall to prevent communications between the Internet
    and all virtual machines.
This is the hardest configuration to set up:

It often takes a multiple reboots and long waits before the host can see shared files on the virtual machines and vice versa.
Sometimes it is necessary to attach more than one virtual machine to the "Host-only" router before file sharing starts up between virtual machines and between virtual machines and the host.

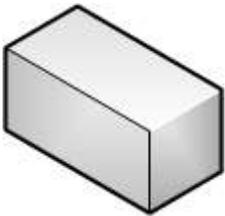## "Internal Network" switch ("intnet")
with LAN switching between virtual machines
with no LAN switching or routing between virtual machines and the host
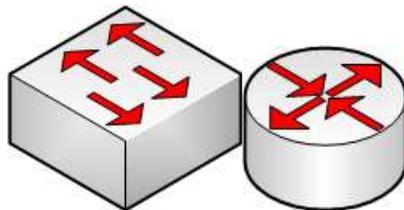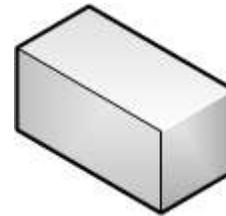with an optional DHCP server (a router function)
with no NAT server, and no upstream routing to the Internet

Host computer   Virtual Machine

Local Area Connection
Network, Shared
Intel(R) PRO/1000 MT Desktop Adap...

No host folder access   "intnet"   Optional
   from virtual machine   switch   DHCP
No internet access   with   server
   from virtual machine   LAN switching
                                  between
                                  virtual
                                  machines

From inside a Linux virtual machine, to access folders on other virtual machines that are shared by means of Samba (SMB) or Network File System (NFS) please see the section called
"Using IP Addresses to Access Folders That are Shared by SAMBA (SMB) or "Network File System"(NFS))
at the end of this document).

USING IP ADDRESSES TO ACCESS FOLDERS THAT ARE SHARED BY SAMBA(SMB) OR "NETWORK FILE SYSTEM"(NFS)

Computers that are attached to local area networks (LANs) are often real slow to discover the files and printers that are shared from other LAN-attached computers so you sometimes have to help them connect to other computers for file and folder sharing.

In the following two situations, you sometimes need to proactively force a connection between two LAN-attached computers:

SITUATION 1:
When you are inside a "VirtualBox" virtual machine and you need to access a files that is shared from the host computer by means of SAMBA (SMB) or Network File System (NFS)
or

SITUATION 2:
When you are working in the host comptuer and you need to acces a file that is shared from within a "VirtualBox" virtual machine by means of SAMBA (SMB) or Network File System (NFS).

STEP-BY-STEP PROCEDURE:

Step 1:
Go to the computer where the files or folders are being shared from.

Step 2:
Open a terminal window:

Step 3:
If the computer is a "Windows" computer, type in
ipconfig /all
and press the enter key.

If the computer is a Linux computer, type in
ifconfig
and press the enter key:

Step 4:
Locate the IP address of the real network adapter and write it down.
In our example, the IP address is
127.0.0.1


```
testuser@testuser-VGC-RA820G-UC: ~

File  Edit  View  Search  Terminal  Help
          collisions:0 txqueuelen:1000
          RX bytes:1506814 (1.5 MB)  TX bytes:238224 (238.2 KB)

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:16436  Metric:1
          RX packets:466 errors:0 dropped:0 overruns:0 frame:0
          TX packets:466 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:69688 (69.6 KB)  TX bytes:69688 (69.6 KB)

vboxnet0  Link encap:Ethernet  HWaddr 0a:00:27:00:00:00
          inet addr:192.168.56.1  Bcast:192.168.56.255  Mask:255.255.255
          inet6 addr: fe80::800:27ff:fe00:0/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:278 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:54138 (54.1 KB)

vmnet1    Link encap:Ethernet  HWaddr 00:50:56:c0:00:01
          inet addr:172.16.106.1  Bcast:172.16.106.255  Mask:255.255.255
          inet6 addr: fe80::250:56ff:fec0:1/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:169 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

vmnet8    Link encap:Ethernet  HWaddr 00:50:56:c0:00:08
          inet addr:172.16.211.1  Bcast:172.16.211.255  Mask:255.255.255
          inet6 addr: fe80::250:56ff:fec0:8/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:165 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

Step 5:

Go to the virtual or real computer from which you wish to access the files on the source computer and click on open a "Nautilus" file management window if this computer is running Linux.

If the virtual or real computer from which you wish to access the files on the source computer is a Ubuntu Linux computer, click on "Places" and then click on "Computer":
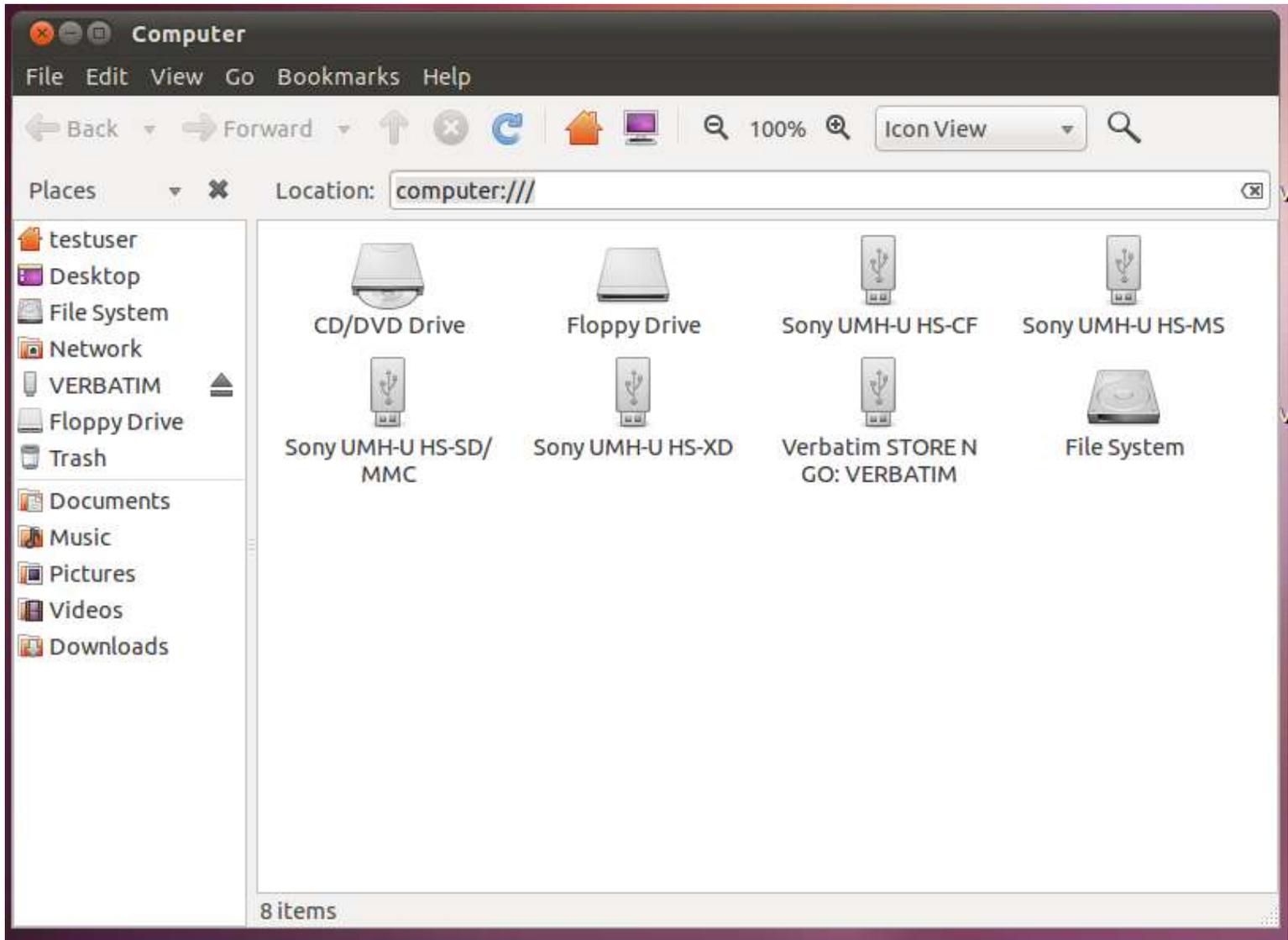
*

Step 6:

If you now have a "Windows Explorer", "My Computer" or "Computer" windows, go to it's address box.

If you now have a "Nautilus" window, click on "Go". Then click on "Location":
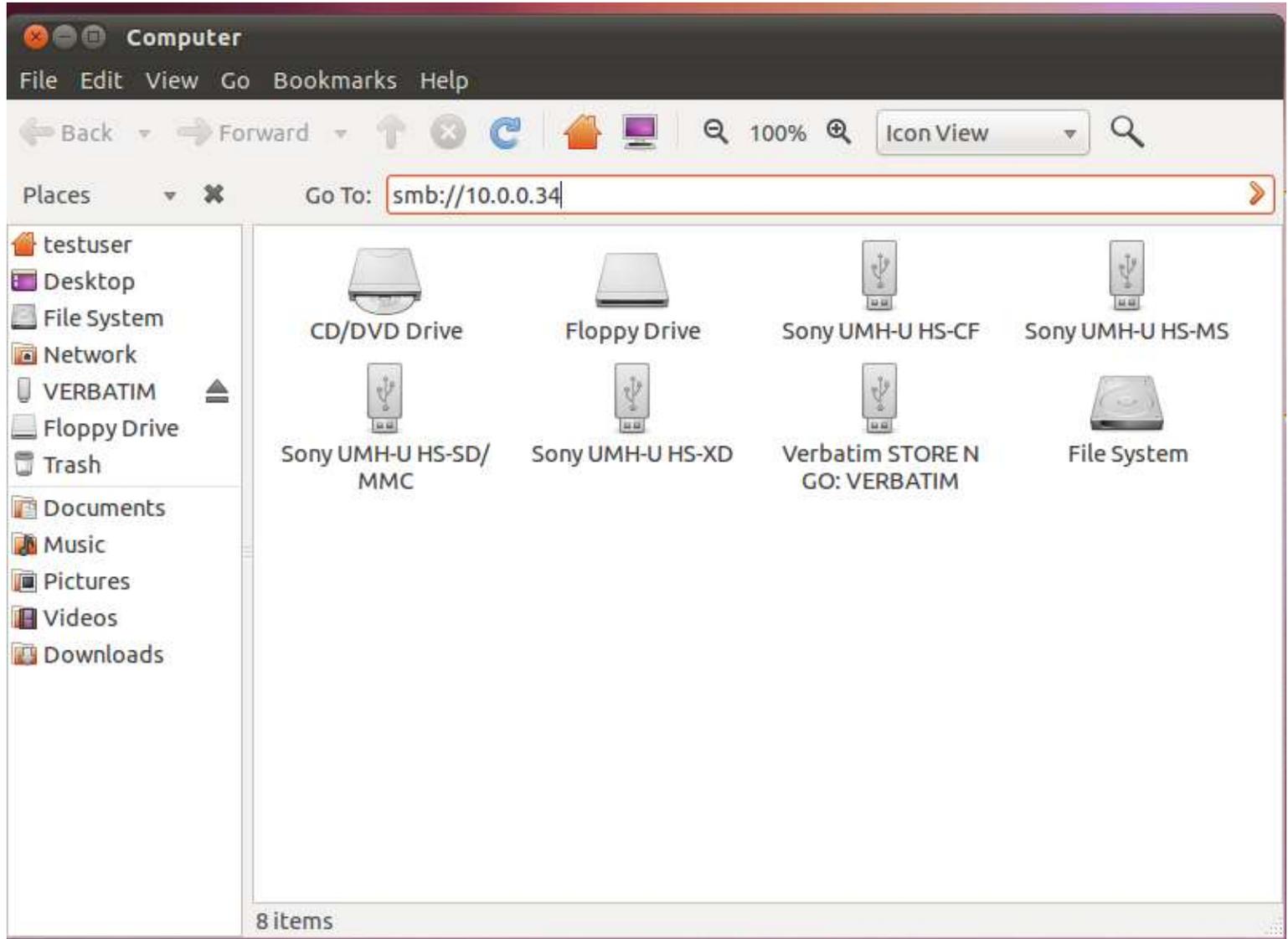
Step 7:
In the address box, type in
smb://<ip address of destination>
and then press the enter key of the keyboard.
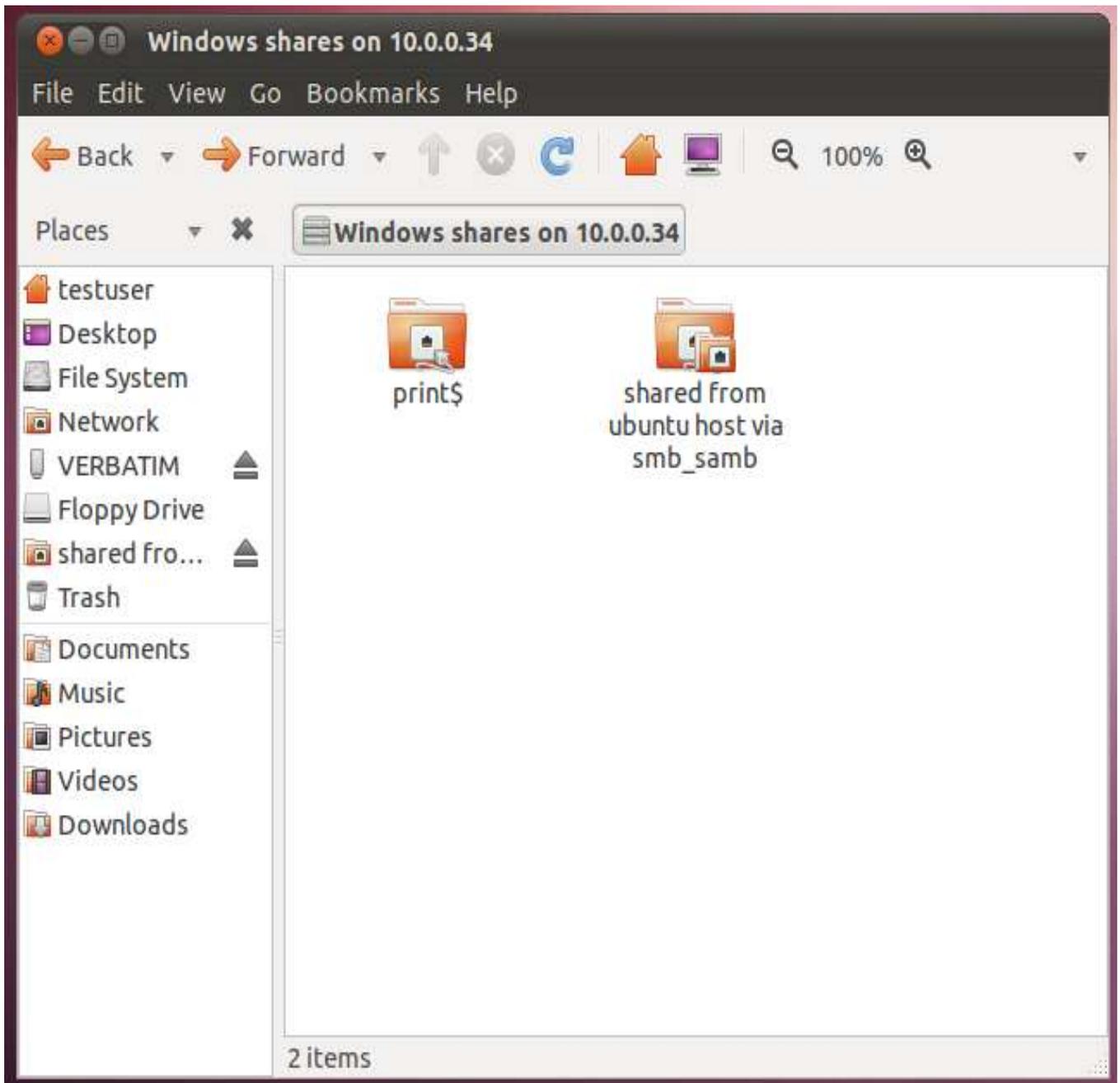In our example, we type in

smb://10.0.0.34
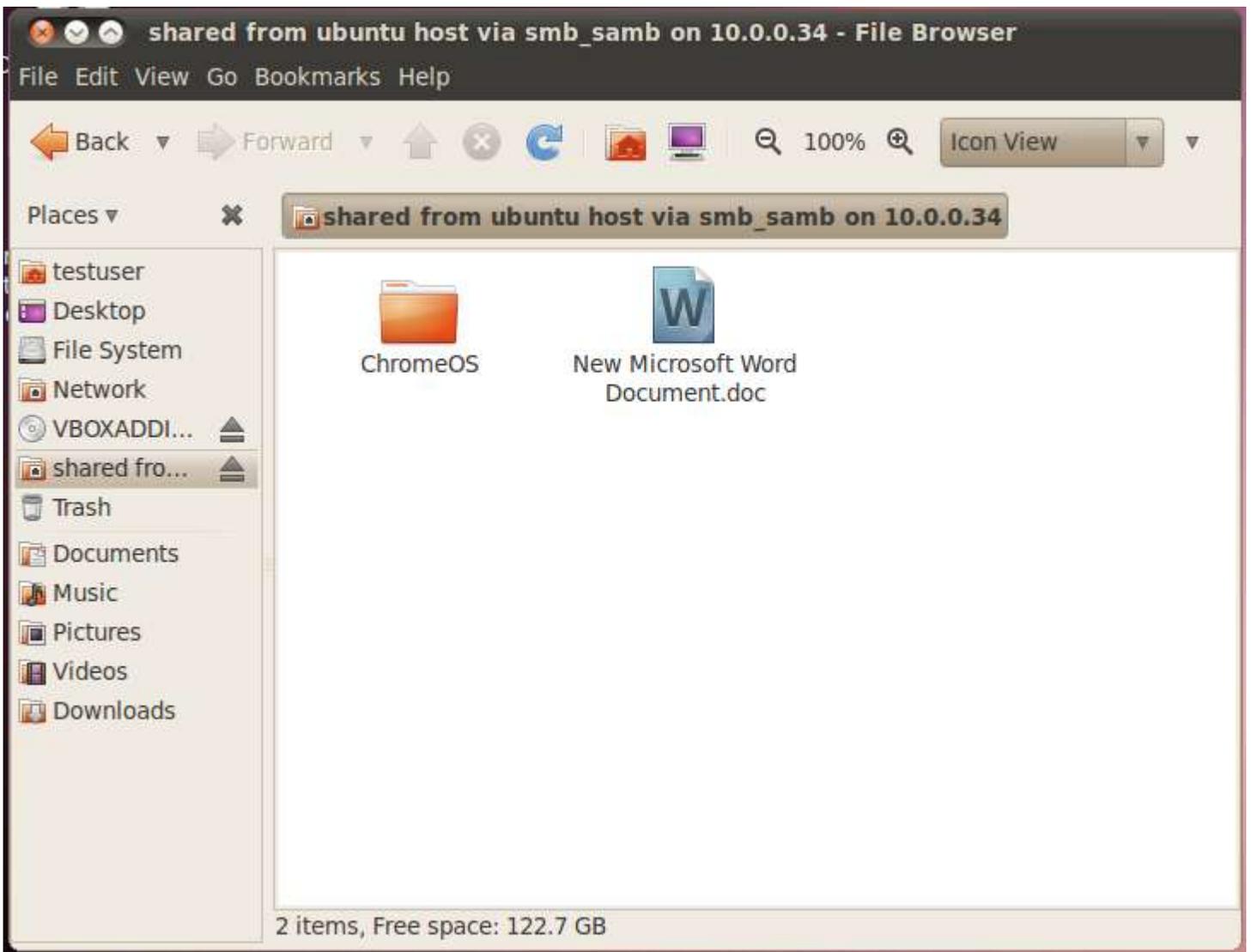and then we pressed the enter key:

Step 8:
All of the shared folders on the target will be displayed:

Note that all remote files that are shared via "Samba"("SMB" are called "Windows shares" by the "Ubuntu" operating system.

In this example, a shared folder and a shared printer are displayed.
If you double-click on the shared folder, you will see it's contents:

Please do not confuse these shared folders with those shared by means of the "Shared Folders" gateway/router. These shared folders are shared by means of standard sharing mechanisms such as "Samba" (SMB) and "Network File System" (NFS) and these standard file sharing mechanisms utilize the virtual Ethernet adapter(s) that is provided to the virtual machine by "VirtualBox". The "Shared Folders" gateway/router provides fo one-way file sharing that is proprietary to the "VirtualBox" software application—it can only share folders that are located on the host computer.

References:

http://www.virtualbox.org/manual/ch06.html

http://www.dedoimedo.com/computers/virtualbox-network-sharing.html

http://www.virtualbox.org/manual/UserManual.html

http://ninjazebra.com/virtualbox_network_scenarios