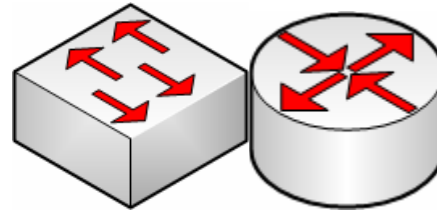


VIRTUAL NETWORKING WITH "VMware Player" FROM A "LINUX" PERSPECTIVE

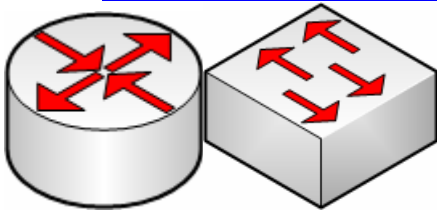
Summary:

"VMware Player" provides **five** virtual networking configurations for the virtual machines of a Windows or Linux host computer:

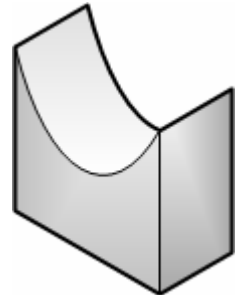


1. a "[Shared Folders](#)" gateway/router:

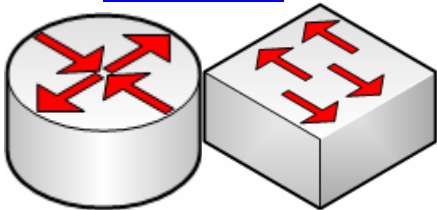
2. a "[Network Address Translation](#)" ("NAT") router with LAN switching:



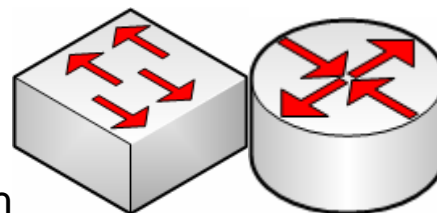
3. a "[Bridged](#)" bridge (with no internal LAN switching):



4. a "[Host-only](#)" router with LAN switching:

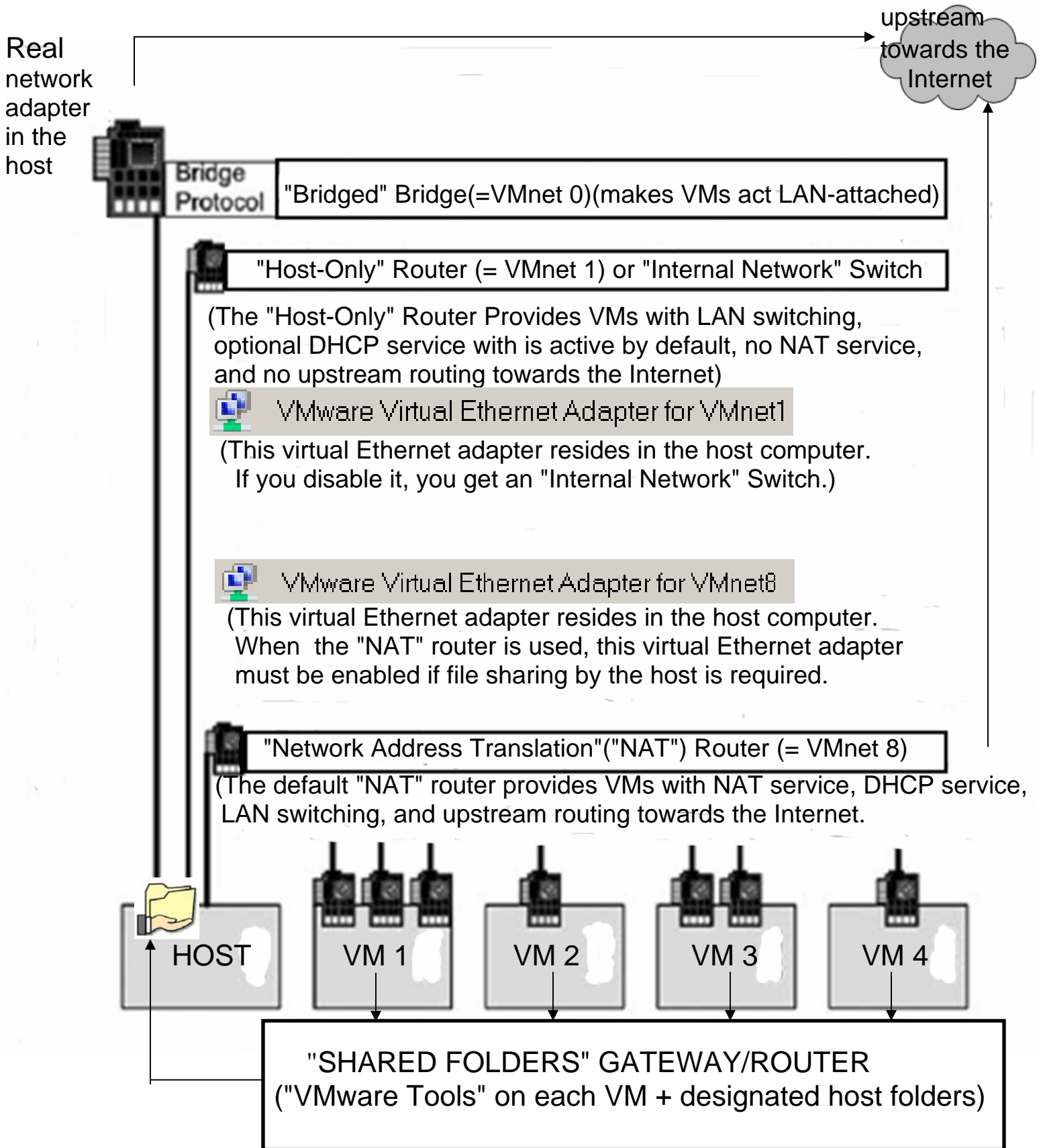


and



5. an "[Internal Network](#)" LAN switch with optional DHCP services which consists of the "Host-Only" router with the host disconnected from it.

CONFIGURATION DIAGRAM



Reference:

http://media.techtarget.com/searchNetworking/downloads/Book_VMware_Chapter_8.pdf

VIRTUAL NETWORK ADAPTERS INSIDE HOST COMPUTERS IN “VMWARE PLAYER”

If you open a terminal window on the host computer and run
ifconfig

and press the Enter key:

The, you can see that “Vmware Player” has added two virtual wired Ethernet
LAN adapters to your host computer:

vmnet1

and

vmnet2.

testuser@testuser-VGC-RA820G-UC: ~

File Edit View Search Terminal Help

testuser@testuser-VGC-RA820G-UC:~\$ ifconfig

```
eth0    Link encap:Ethernet  HWaddr 00:11:2f:a2:1c:aa
        inet addr:10.0.0.34  Bcast:10.0.0.255  Mask:255.255.255.0
        inet6 addr: fe80::211:2fff:fea2:1caa/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:32702 errors:0 dropped:0 overruns:0 frame:0
        TX packets:13411 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:27061608 (27.0 MB)  TX bytes:1915713 (1.9 MB)
```

```
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:901 errors:0 dropped:0 overruns:0 frame:0
        TX packets:901 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:101980 (101.9 KB)  TX bytes:101980 (101.9 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:216 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

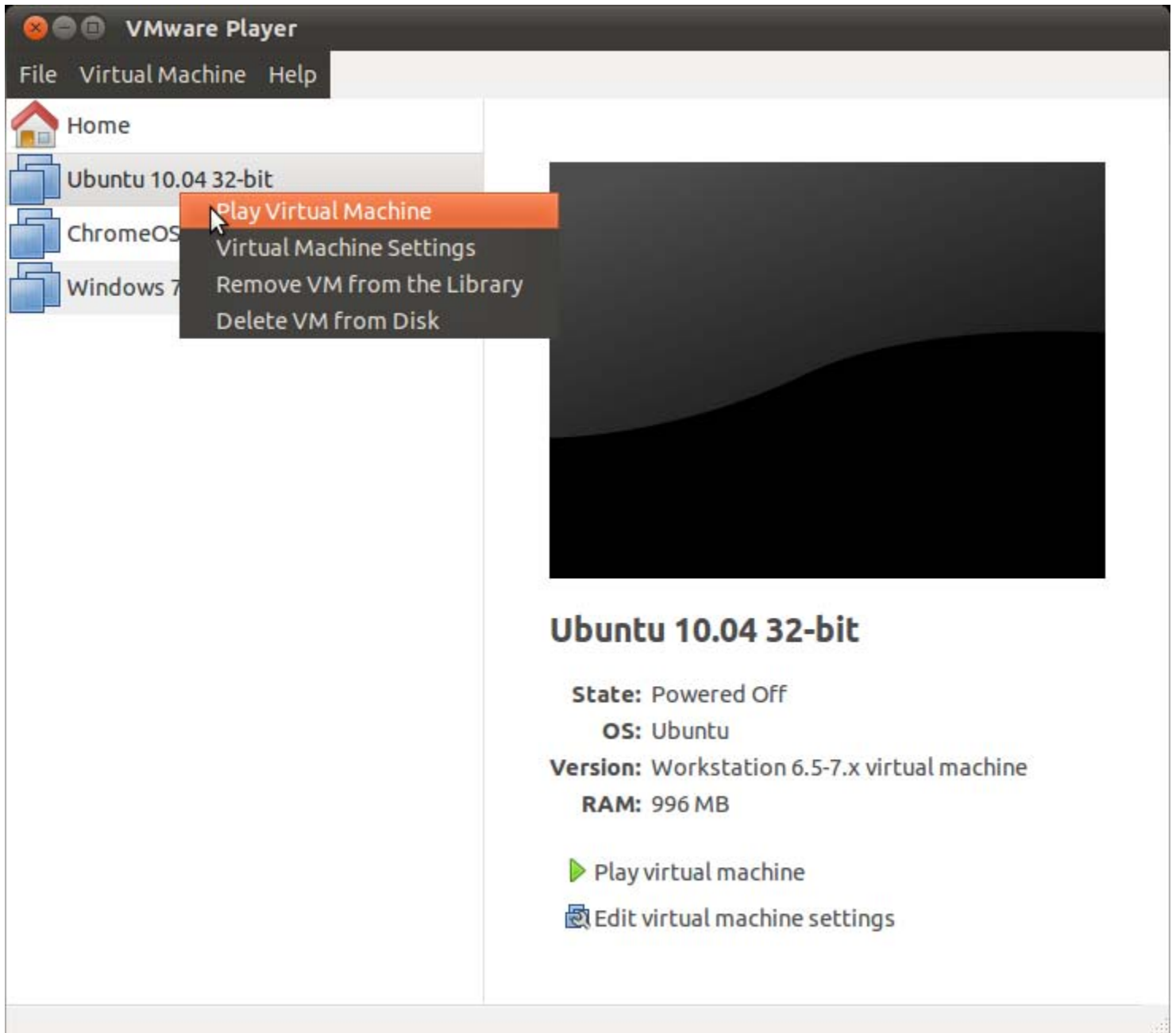
```
vmnet8  Link encap:Ethernet  HWaddr 00:50:56:c0:00:08
        inet addr:172.16.211.1  Bcast:172.16.211.255  Mask:255.255.255.0
        inet6 addr: fe80::250:56ff:fec0:8/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:573 errors:0 dropped:0 overruns:0 frame:0
        TX packets:228 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:~\$ █

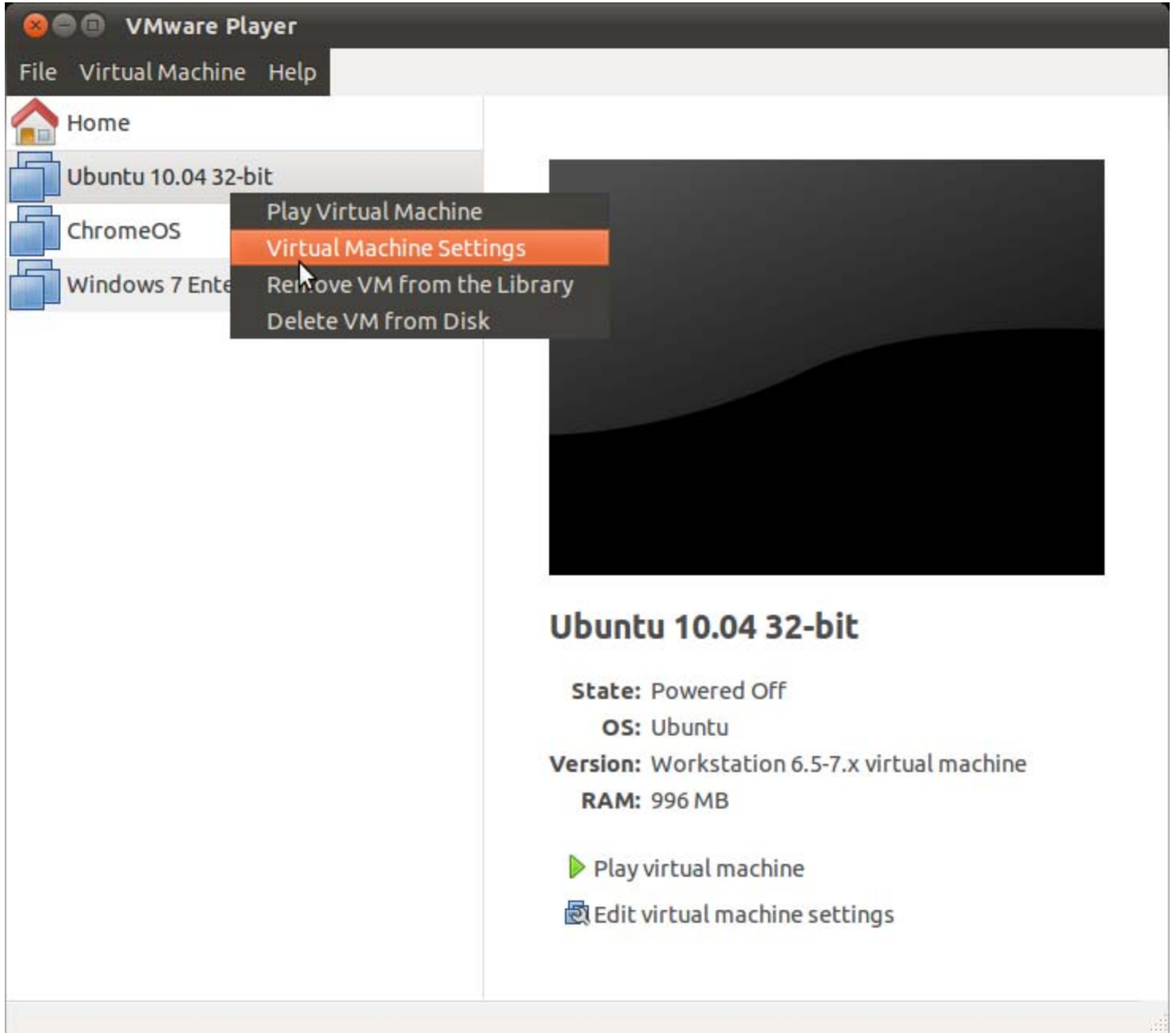
VIRTUAL NETWORK ADAPTERS INSIDE VIRTUAL MACHINES IN “VMWARE PLAYER”

By using the "Add Hardware Wizard" in the "Virtual Machine Settings" box, you can provide unlimited network adapters for each virtual machine:

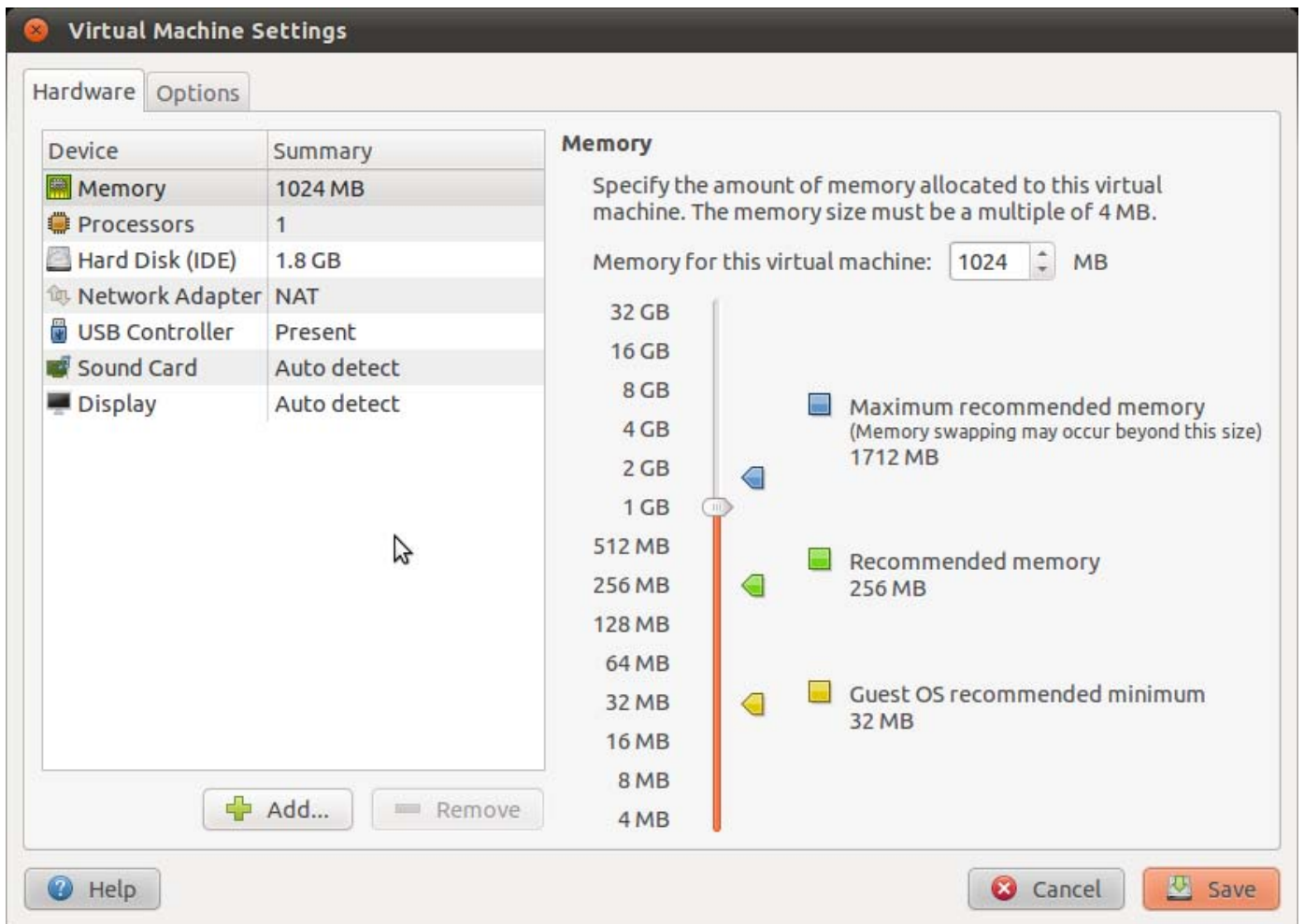
Use your RIGHT mouse button to click on the virtual machine:



Then, use the left mouse button to click on "Virtual Machine Settings" on the popup context menu.

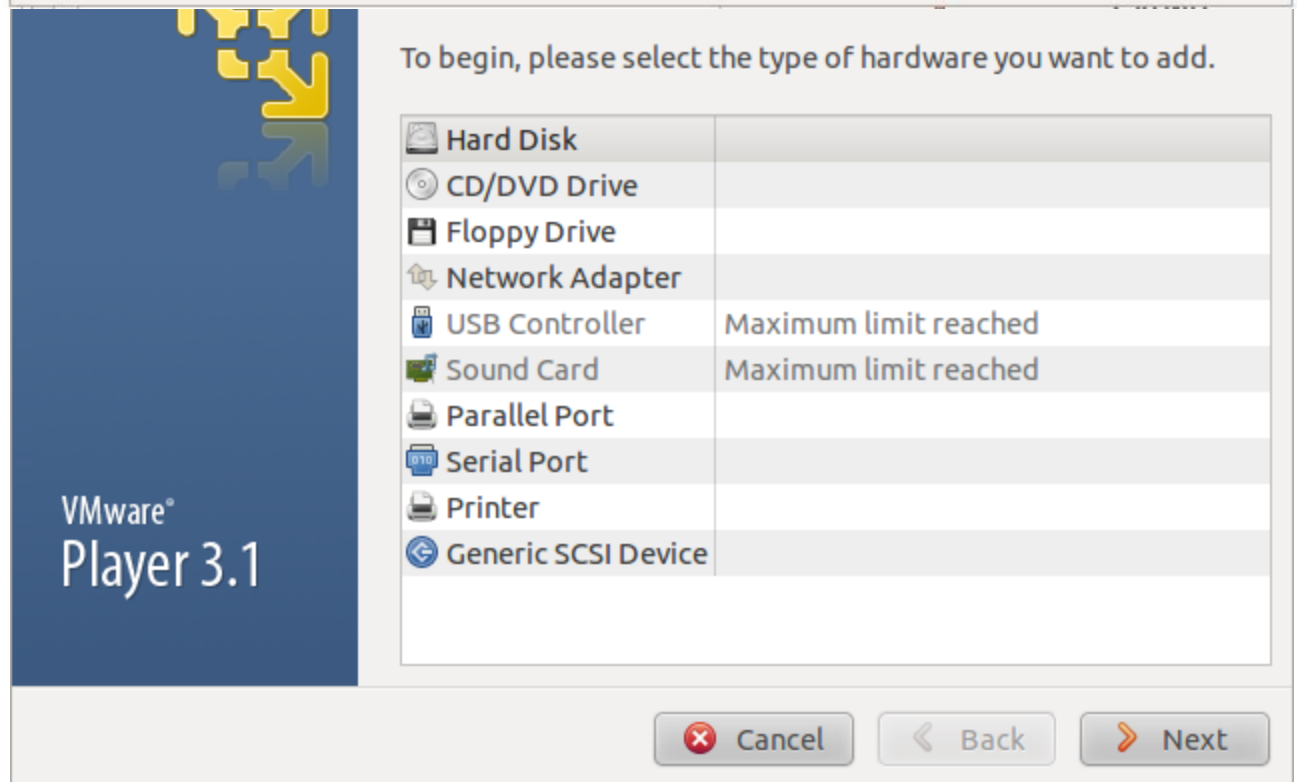
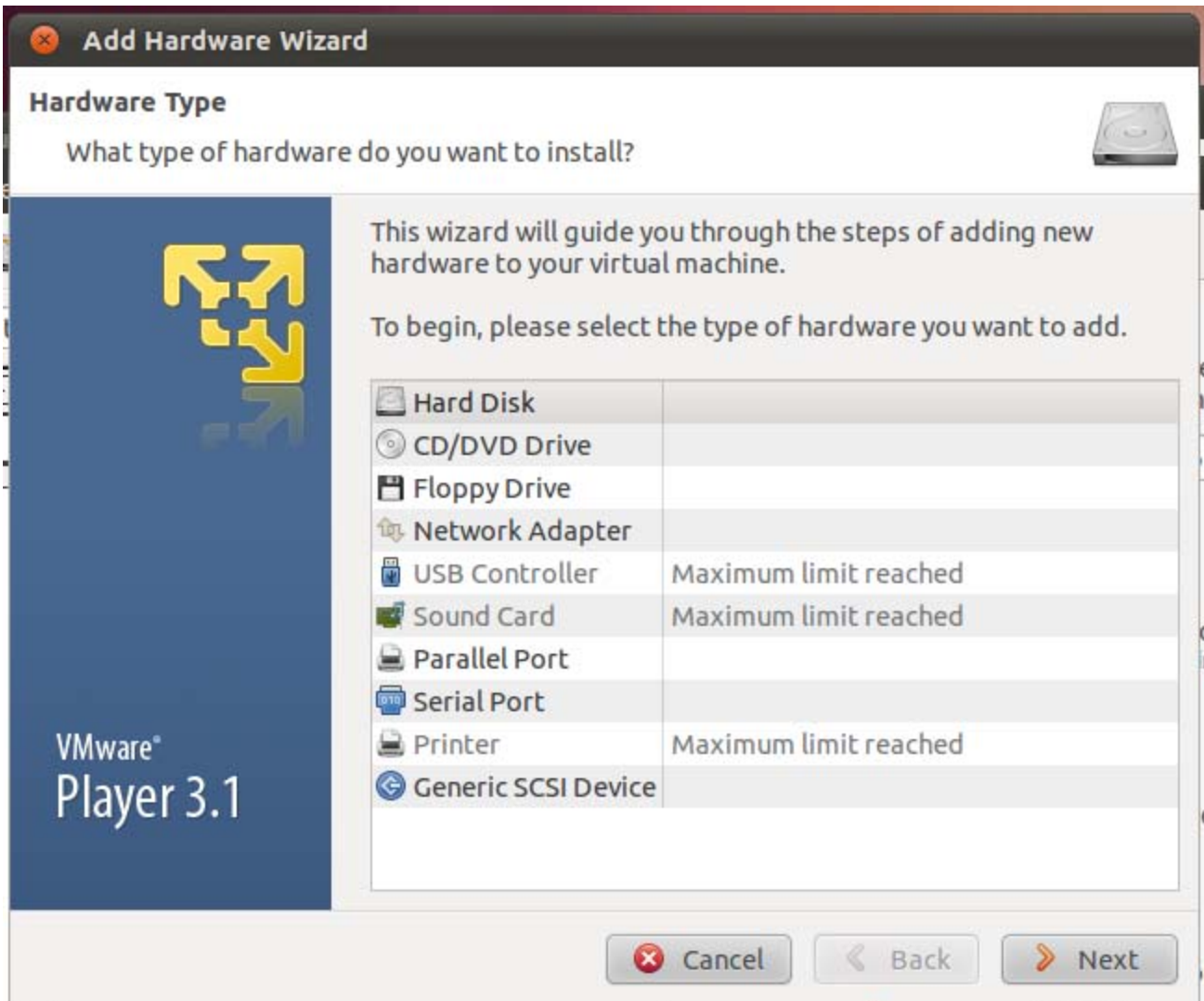


A "Virtual Machine Settings" box will be displayed:

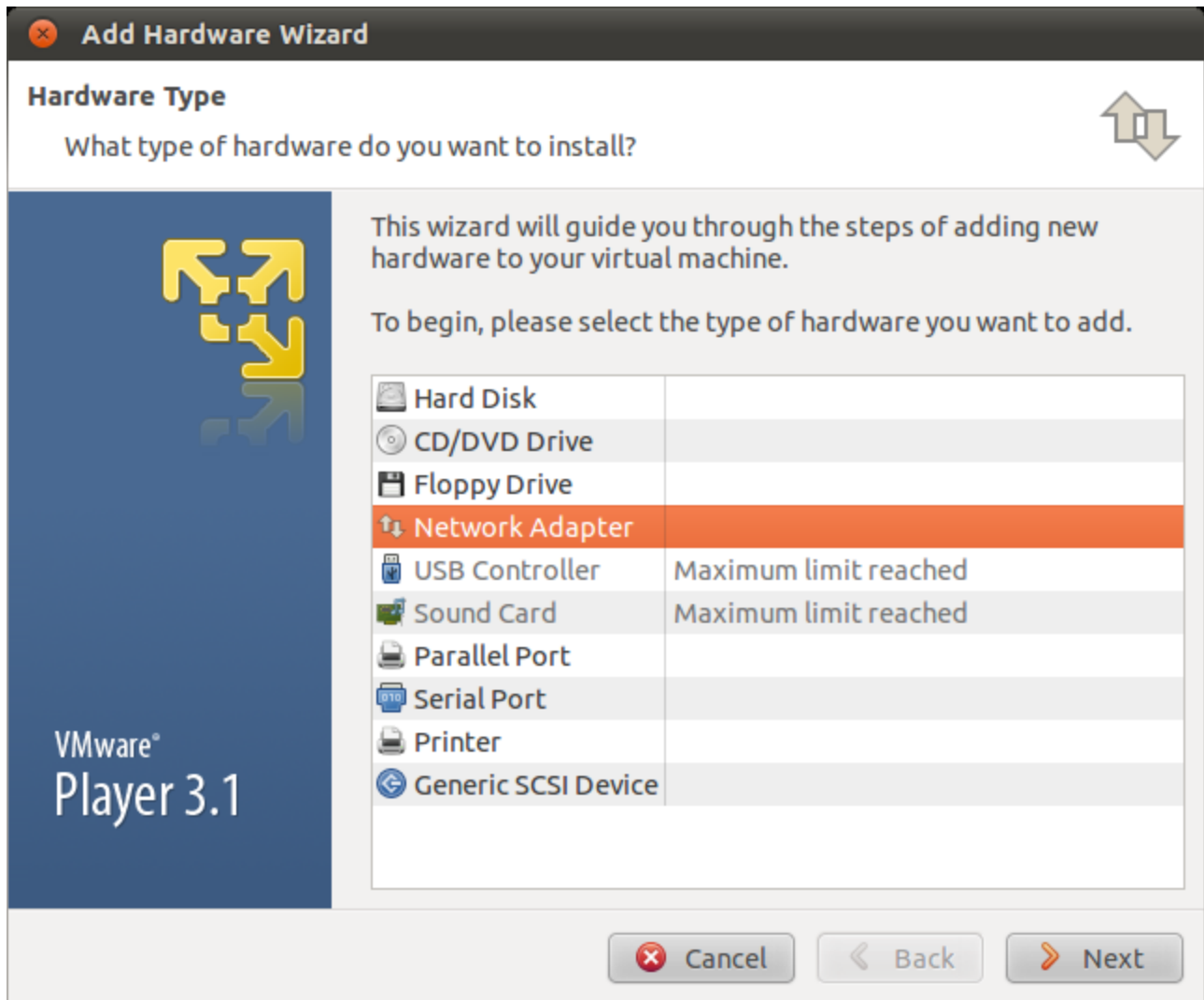


Click on the "Add" button.

An "Add Hardware Wizard" box will be displayed:

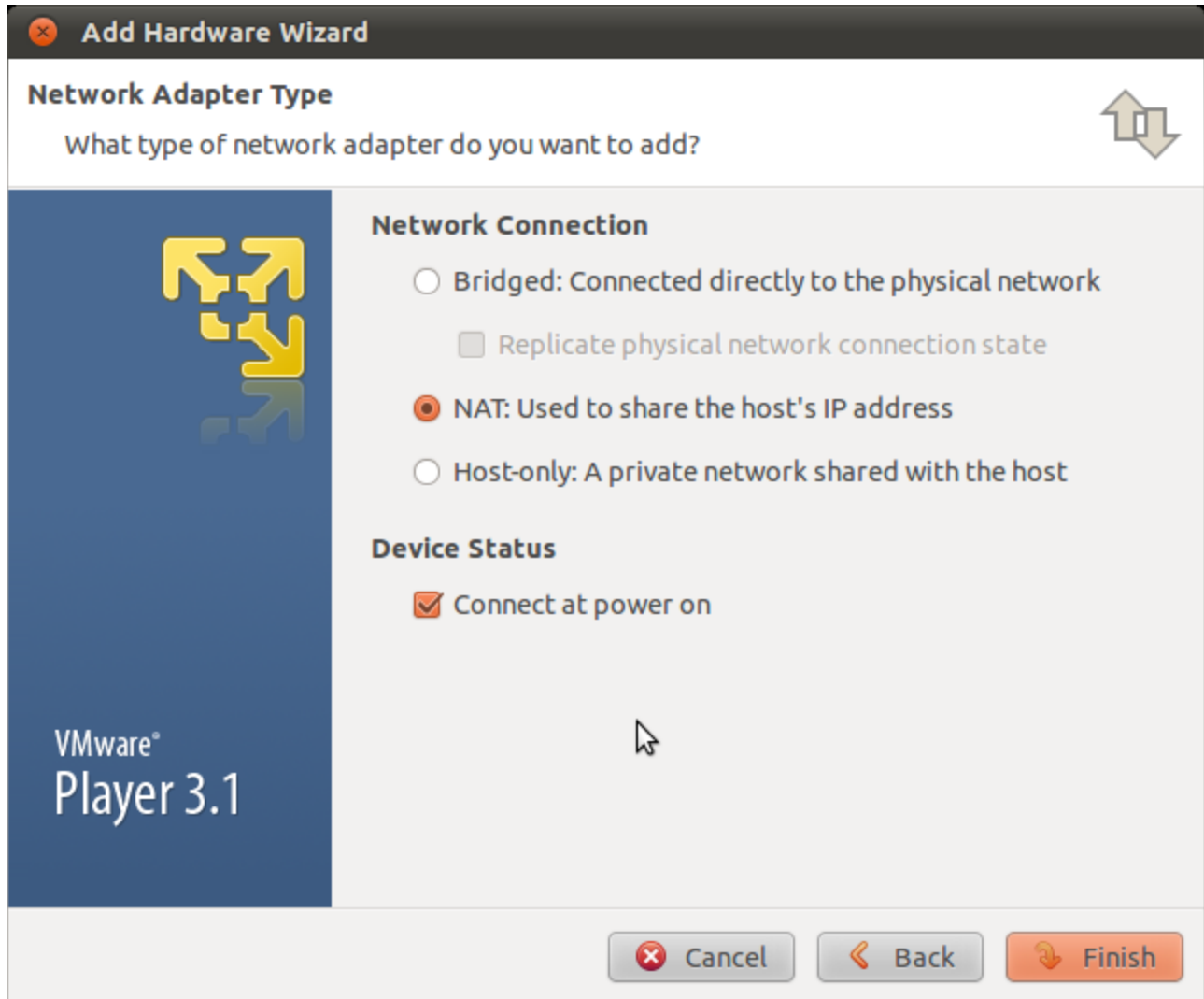


Click on "Network Adapter" to highlight it:



Click on the "Next" button.

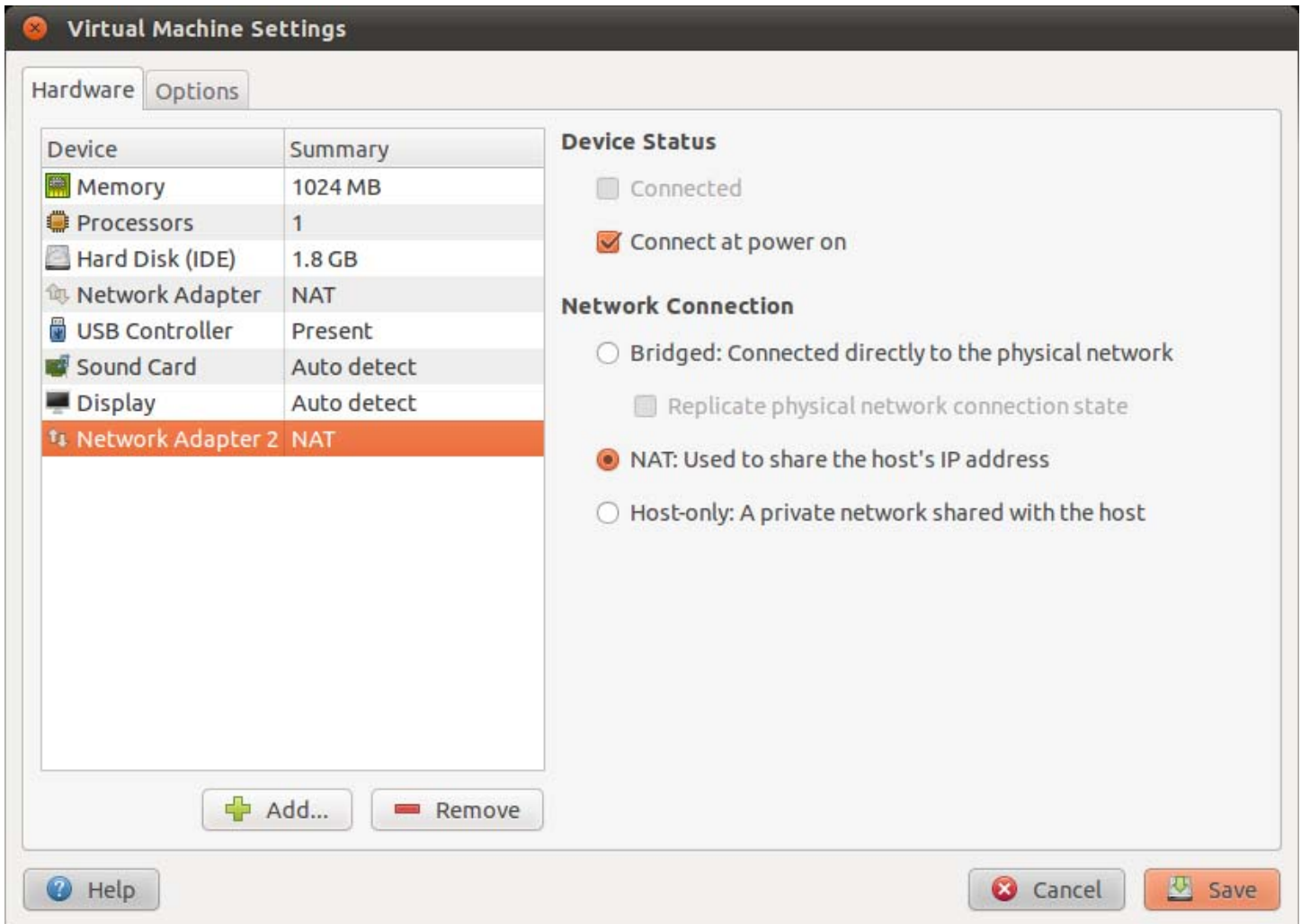
A "Network Adapter Type" box will be displayed:



Use the radio buttons to select the desired network configuration.

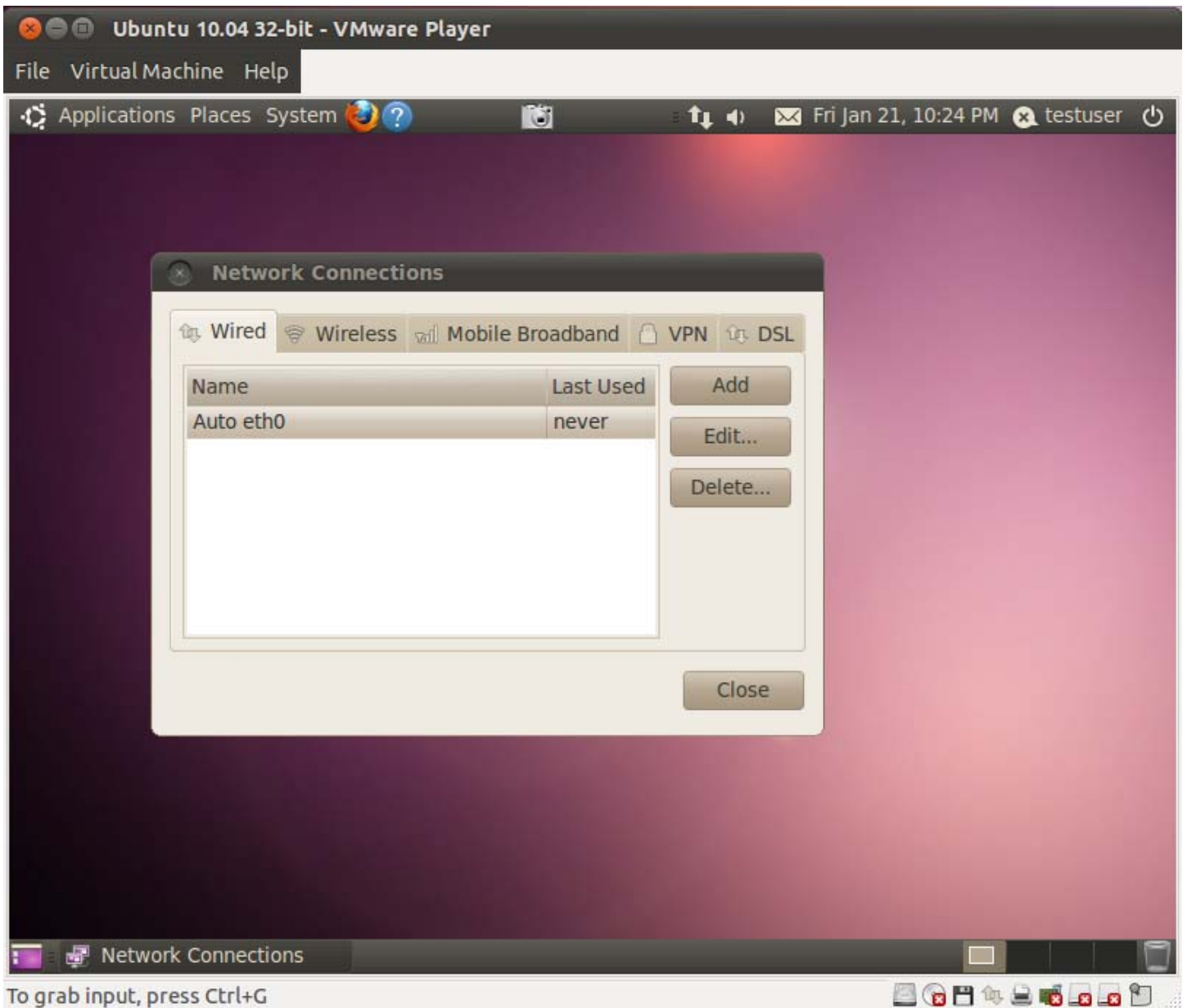
Then click on the "Finish" button.

The new network adapter will now be displayed in the "Virtual Machine Settings" box:



Click on the "Save" button.

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



"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.

"VMware Tools" software must be installed into each virtual machine.

After you install it, the "VMware Tools" software inside a Windows virtual machine is located at

C:\Program Files(x86)\VMware\VMware Player\windows.iso

or

C:\Program Files\VMware\VMware Player\windows.iso

"VMware Tools" software inside a Linux virtual machine is downloaded from a server at the VMware company as a folder called VBOXADDITIONS_<version number of VirtualBox>

Then you use the files in this folder to install "VirtualBox Additions" software into the Linux virtual machine.

Multiple virtual machines can access the same target folder on the host.

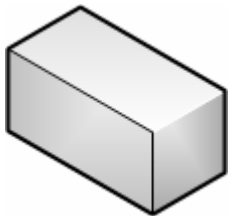
"Shared Folders" must be configured for each virtual machine.

A "Windows" virtual machine sees a "Shared Folder" inside the "vmware-host" virtual server.

A "Linux" virtual machine sees a "Shared Folder" mounted in /mnt/hgfs/.

There is no indication in host file system that a folder is being shared.

Host computer

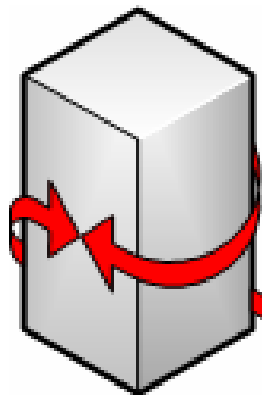
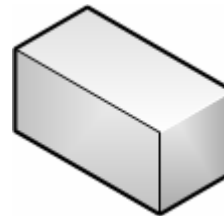


"Shared Folder(s)"
= host folder access
from virtual machine

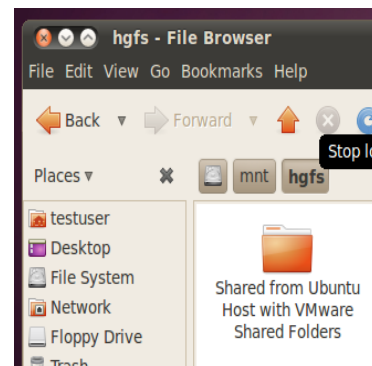
File system of virtual machine
does not indicate that the
folder is shared.

The host computer has no access to the file system of virtual machine.

Virtual Machine



"Shared Folders"
Gateway/Router



Virtual machine sees the
"Shared Folder(s)" at
/mnt/hgfs/

Virtual network adapter is not used

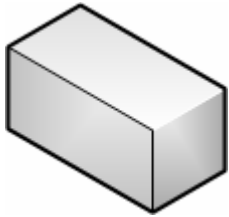
"Network Address Translation" ("NAT") router ("VMnet 8")

The "NAT" router configuration is the default one that VMware Player provides.

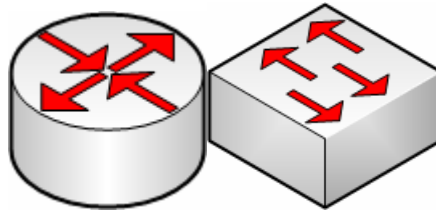
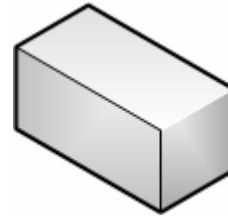
It provides the following services for all virtual machines:

NAT service, DHCP server, and upstream routing to the Internet,
LAN switching between the host and virtual machines provided by the "NAT" Router,
and LAN switching between virtual machines provided by the "NAT" Router

Host computer



Virtual Machine



Internet access
from virtual machine
Optional host folder access
from virtual machine
if configured through
Samba/SMB file sharing
or Network File System (NFS)

"NAT" router
with NAT service
with DHCP server
with upstream routing
to the Internet
with LAN switching between
virtual machines
with LAN switching between
the host and virtual machines

Virtual machine
communications to
LAN and Internet
using the virtual LAN
network adapter.

The "NAT" router will work fine whether or not the host is attached to it.

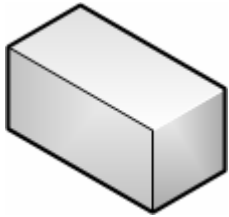
To connect or disconnect the host computer from the "NAT" router, you can enable or disable the "VMware Network Adapter VMnet8" virtual Ethernet adapter.

If you disable this network adapter, then the host will be unable to share files with any of the virtual machines, while the virtual machines can still share files with each other.

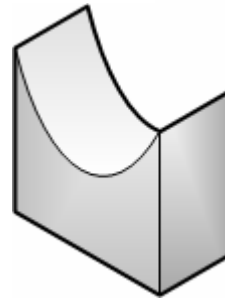
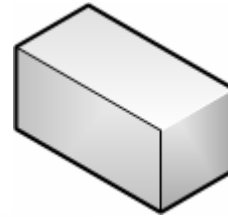
"Bridged" bridge ("VMnet 0")

with mandatory "TEE" connection to either an upstream, real network adapter or to an operating system-provided virtual bridge on the host,
(with LAN switching between virtual machines performed by the real physical network)
(with LAN switching between the host and guests performed by the real physical network)
(with NAT server and DHCP server provided by the real LAN).
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
with SAMBA/SMB file sharing
or Network File System(NFS)

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

Virtual machine
communicates to the
"Bridged" bridge
using the virtual LAN
adapter.

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.

In the "Bridged" bridge configuration, the host cannot be disconnected from the "Bridged" bridge. From any Linux host on your local area network, all files on the virtual machines that connected to the virtual "Bridged" bridge and that are shared by means of "Samba" (SMB) can be accessed by means of the procedure called

"Using IP Addresses to Access Folders that are Shared by "Samba" (SMB) or "Network File System" (NFS)

(which is located at the end of this document).

You can also use this procedure from inside the virtual machines to access Samba or NFS-shared files on the host or on other hosts on your real physical LAN network.

PROBLEMS WITH "UBUNTU 10.10" HOSTS THAT HAVE BOTH A WIRED NETWORK ADAPTER AND A WIRELESS NETWORK ADAPTER:

When running "VMware Player 3" on an Ubuntu 10.10 host, if we had both a wired Ethernet adapter and a WiFi adapter installed on the host, both Windows and Linux virtual machines with "bridged" network adapters failed to make an upstream connection to the Internet by acquiring an IP address through DHCP.

When running "VMware Player 3" on an Ubuntu 10.10 host, if we only had a wired Ethernet adapter installed on the host, both Windows and Linux virtual machines with "bridged" network adapters were able to make a connection to the Internet. Our Ubuntu virtual machines were able to automatically acquire a DHCP IP address and made a connection upstream to the Internet. However, we had to use the above workaround for "Windows 7.." virtual machines.

"Host-Only" router ("VMnet 1")

or

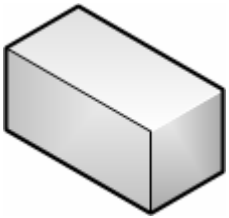
"Internal Network" LAN Switch

with LAN switching between the host and the virtual machine,

with LAN switching between virtual machines,

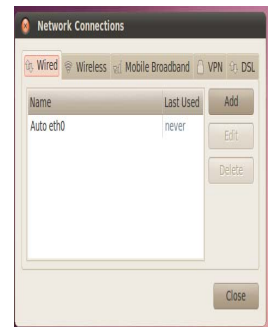
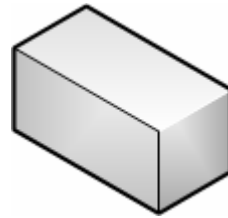
with an optional DHCP server, no NAT server, and no upstream routing to the Internet for virtual machines

Host computer

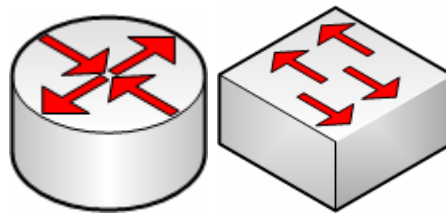


Optional host folder access
from virtual machine
with Samba(SMB)
or Network File System(NFS)
No Internet access
from virtual machine

Virtual Machine



Virtual machine
communicates
with the
"Host-Only Router
or other virtual
machines using
the virtual
LAN adapter



"Host-only" router
with mandatory
LAN switching
between host and virtual machine
with LAN switching between
virtual machines
with optional DHCP server
with no NAT server.

The host has a "VMware Virtual Ethernet Adapter for VMnet1"
which connects the file system of the host
to the "Host-only" router

If you disable the "VMware Network Adapter for VMnet1", then "VMnet1" becomes an "Internal Network" switch with connectivity between virtual machines, but with no connection to the host.

In the "Host-Only" configuration, there is a LAN switching connection between the host and the "Host-only" virtual router: The virtual "VMware Virtual Ethernet Adapter for VMnet1" that VMware provides for the host can be enabled or disabled from the "Network Connections" applet box of the Windows "Control Panel".

If you disable the "VMware Network Adapter for VMnet1", then "VMnet1" becomes an "Internal Network" switch with connectivity between virtual machines, no connection to the host for virtual machines, and no connection to the Internet for virtual machines.

This is the hardest configuration to set up.

The "Host-only" router acts as a firewall to prevent communications between the Internet and all virtual machines.

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.

From any Linux host on your local area network, all files on host that are shared by means of "Samba" (SMB) can be accessed by means of the procedure called "Using IP Addresses to Access Folders that are Shared by "Samba" (SMB) or "Network File System" (NFS) (which is located at the end of this document).

You can also use this procedure from inside the virtual machines to access Samba or NFS-shared files on other virtual machines that are connected to the virtual "Host-Only" router.

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 “Vmware Player” virtual machine and you need to access a file(s) 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 computer and you need to access a file that is shared from within a “VMware” 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)

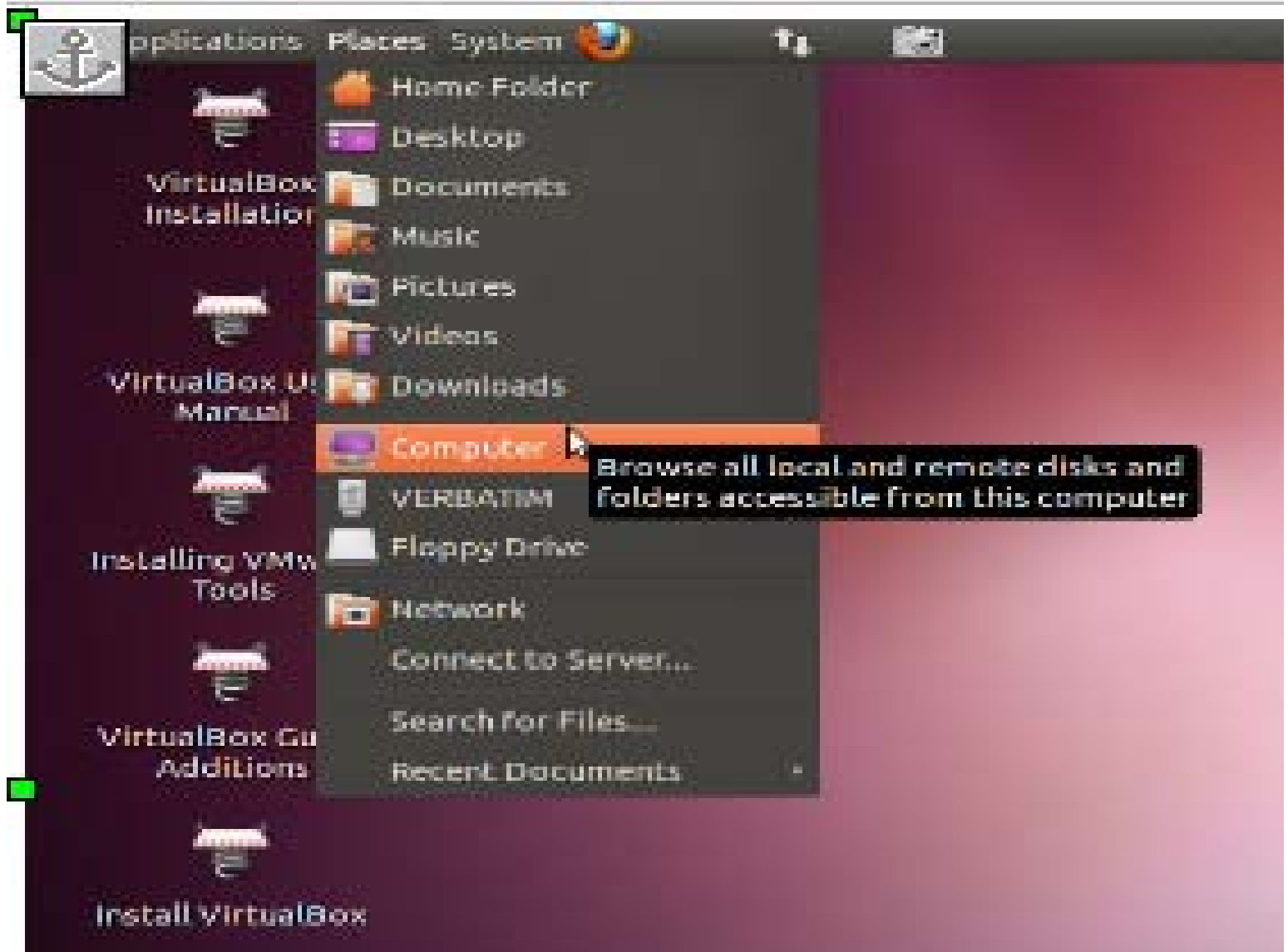
vmnet1    Link encap:Ethernet  HWaddr 00:50:56:c0:00:01
      inet addr:172.16.106.1  Bcast:172.16.106.255  Mask:255.255.255
      inet6 addr: fe80::250:56ff:fec0:1/64 Scope:Link
      UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
      RX packets:0 errors:0 dropped:0 overruns:0 frame:0
      TX 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.

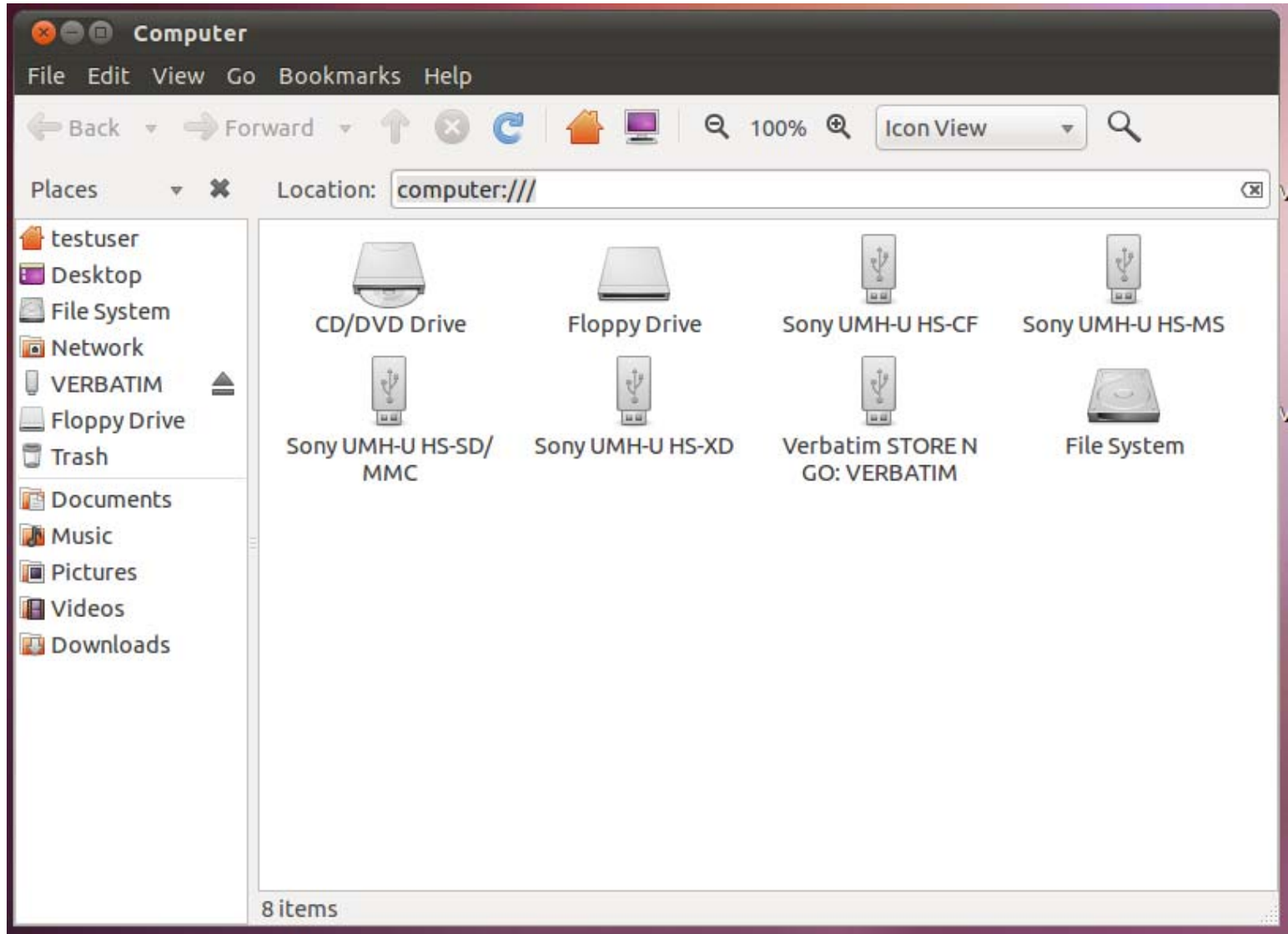
If the virtual or real computer from which you wish to access the files on the source computer is a Ubuntu Linux computer, click on “Places” and then click on “Computer”:



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”:



If the virtual or real computer from which you wish to access the files is a “Windows” computer, open a “Windows Explorer”, “Computer”, or “My Computer” window instead of a “Nautilus” window.

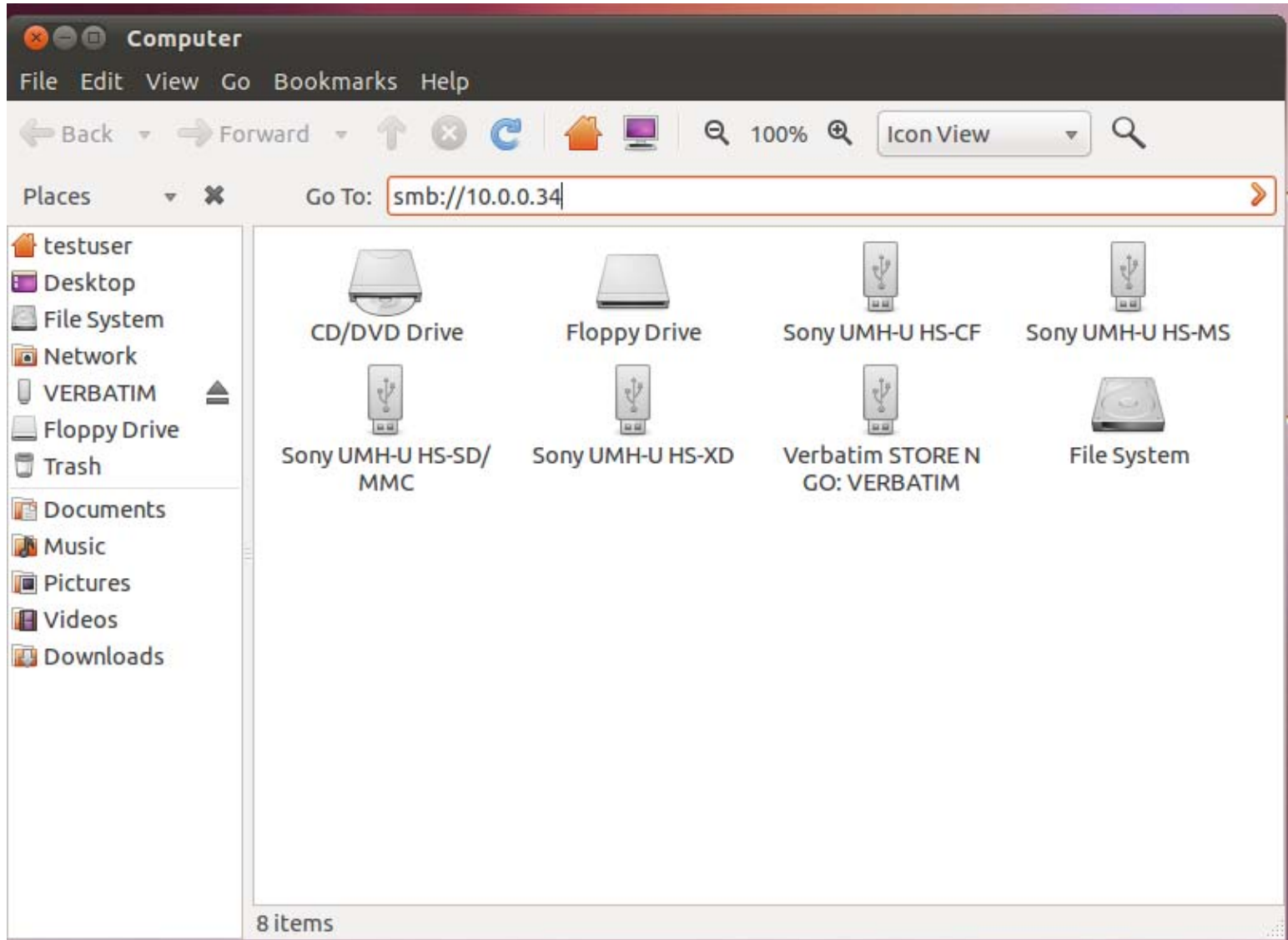
Step 7:

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

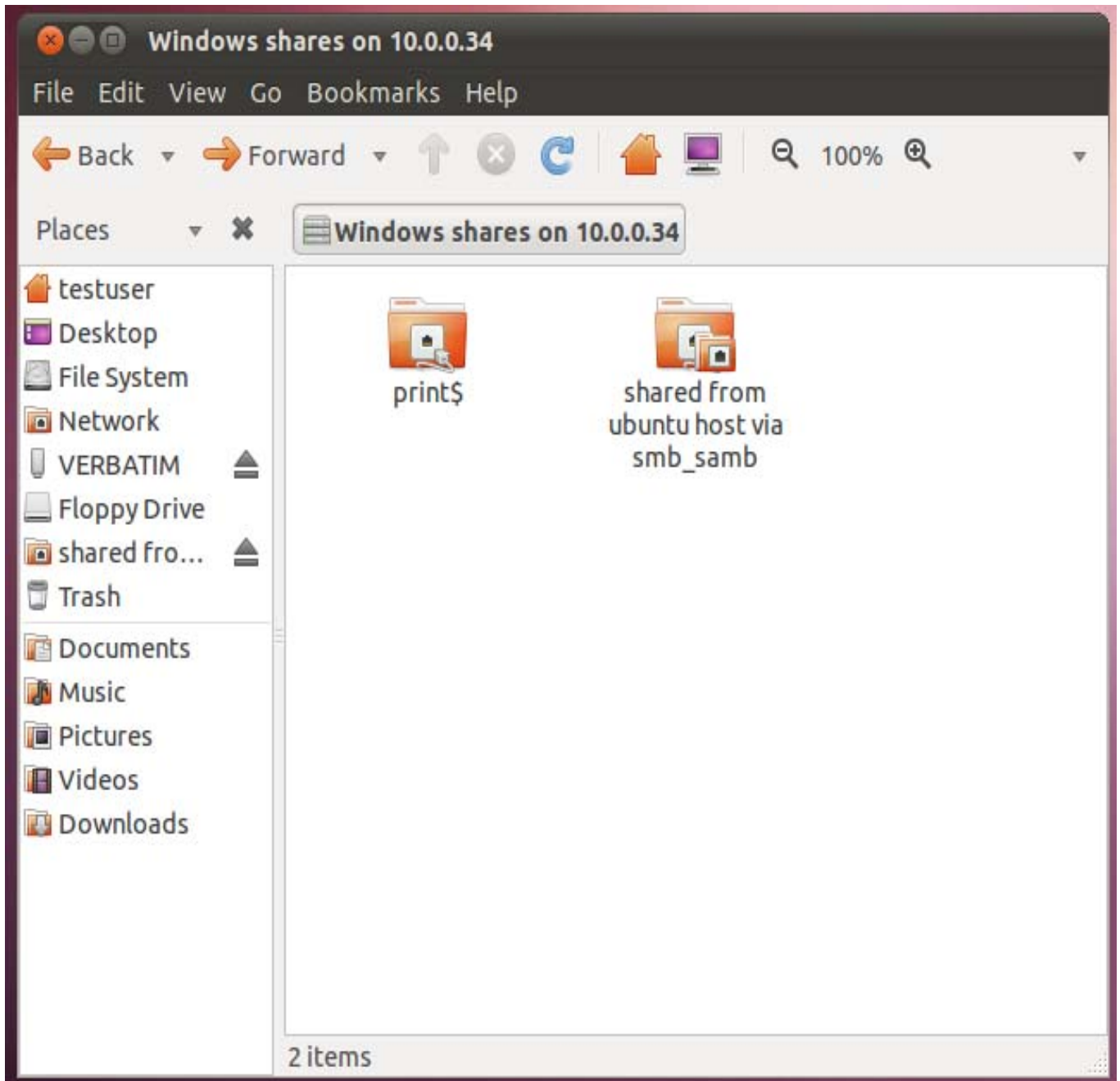
smb://10.0.0.34

and then we pressed the enter key:



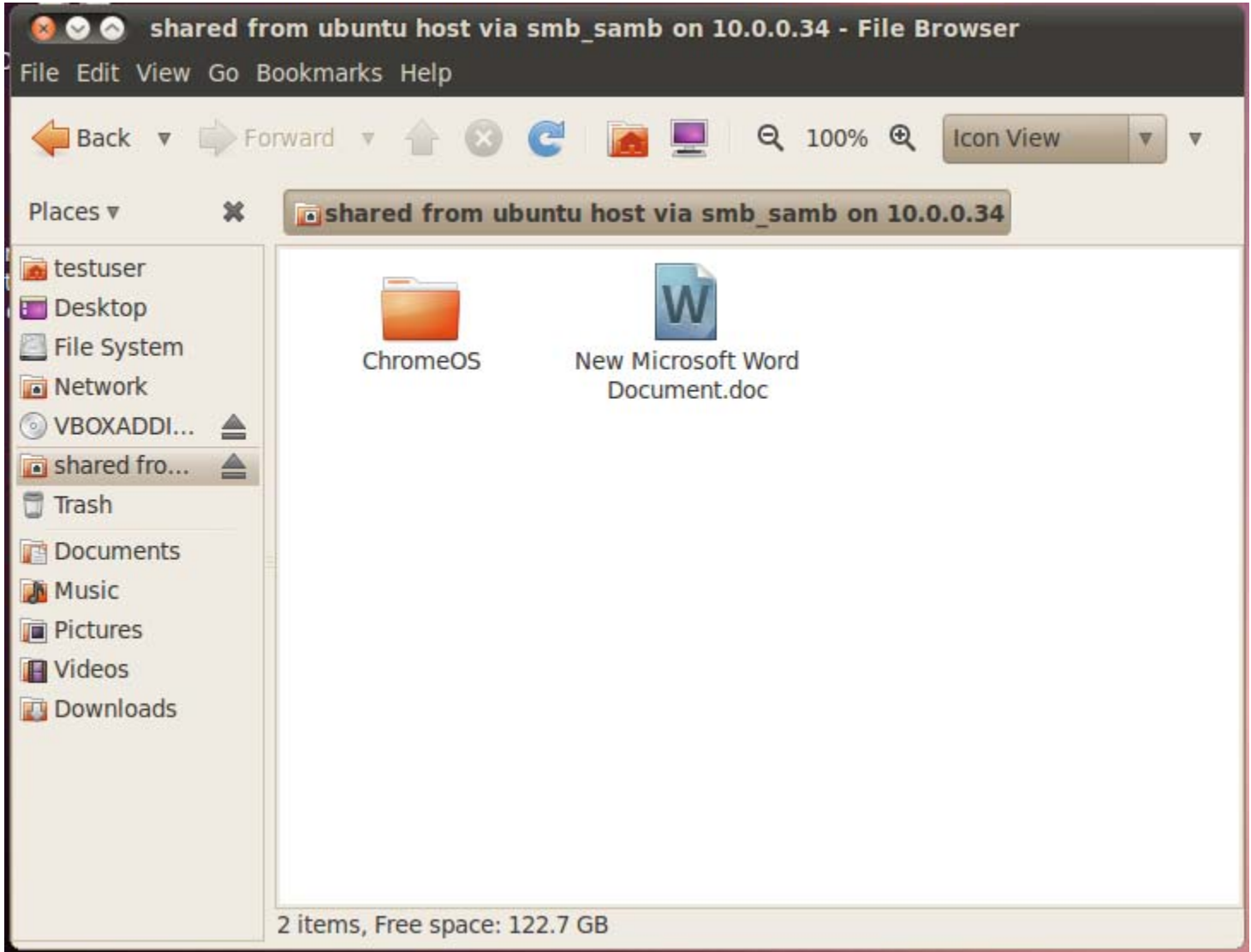
Step 8:

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



Note that "Ubuntu" refers to remote files that are shared via "Samba"("SMB" are called "Windows shares").

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 utilize the virtual Ethernet adapter(s) that is provided to the virtual machine by “Vmware Player”. The “Shared Folders” gateway/router provides fo one-way file sharing that is proprietary to the “Vmware Player” software application—it can only share folders that are located on the host computer.

References for virtual networking in "Vmware Player" in general:

http://pubs.vmware.com/server1/vm/wwhelp/wwhimpl/common/html/wwhelp.htm?context=vm&file=network_nat_details_gsx.html

and

http://pubs.vmware.com/server1/vm/wwhelp/wwhimpl/common/html/wwhelp.htm?context=vm&file=network_2host_route_gsx.html