Lab exercise: build an internet

simulated with VirtualBox

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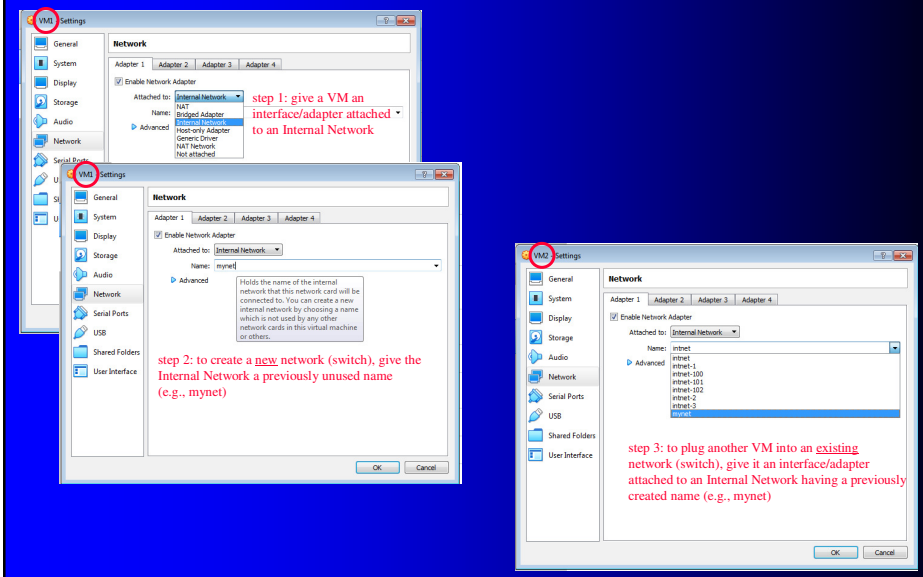
Local ingredients to build a LAN

- you will build 4 LANs
- each LAN will have 2 hosts (member computers)
- virtual ingredients for a LAN
  - 2 computers 
  - 1 switch 
  - 2 cables 
- a LAN: 

Ingredients in VirtualBox

- what is a computer in VirtualBox?
  - a VM (virtual machine)
- what is a switch in VirtualBox?
  - a named "Internal Network"
- what is a cable in VirtualBox?
  - a VM's adapter configured as "Attached to" a particular Internal Network by its name

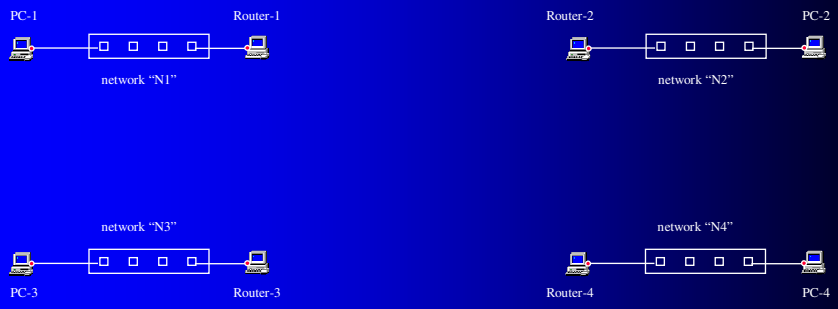
Building a LAN in VirtualBox



VM1 and VM2 are now effectively cabled together into the "mynet" switch

Construct your 4 localnets

task: enable internal ping among each LAN's members
LANs remain isolated from each other

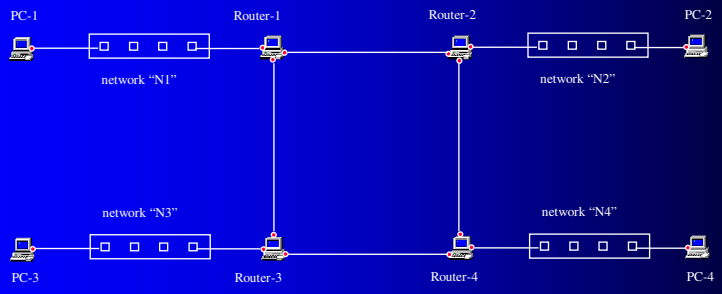


Ingredients to join localnets into an internet

- routers need (2) more interfaces/adapters
- routers need (4) more local networks conjoining them

Construct your 4 localnets

task: enable external ping among all end-machines (PC-n)



How many distinct, separate local networks are shown?
Be sure you are able to identify each by drawing a circle around it, identifying its members.

Reference – linux syntax

- host route - to a single machine
  - route add –host 192.168.4.2 eth0
- network route, local - to a group of machines
  - route add –net 192.168.4.0 netmask 255.255.255.0 eth0
- network route, thru gateway - to a group of machines
  - route add –net 192.168.5.0 netmask 255.255.255.0 gw 192.168.4.1
- default route - to "any and all" else
  - route add default gw 192.168.4.1

Reference – linux syntax

- Forwarding enabler

```
echo 1 > /proc/sys/net/ipv4/ip_forward
```

- Route table entry addition/deletion example

```
route add -net 1.2.3.0 netmask 255.255.255.0 eth0
route del -net 1.2.3.0 netmask 255.255.255.0 eth0
```