





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

The image displays three screenshots of the VirtualBox VM Settings window, specifically the Network tab, illustrating the steps to build a LAN:

- Step 1:** The first screenshot shows the Network settings for Adapter 1. The "Attached to" dropdown is set to "Internal Network". A red circle highlights the "Internal Network" option. A red text box next to it says: "step 1: give a VM an interface/adaptor attached to an Internal Network".
- Step 2:** The second screenshot shows the "Advanced" section of the Network settings. The "Name" field is set to "mynet". A red circle highlights the "Name" field. A red text box next to it says: "step 2: to create a new network (switch), give the Internal Network a previously unused name (e.g., mynet)".
- Step 3:** The third screenshot shows the "Advanced" section of the Network settings for a second VM. The "Attached to" dropdown is set to "Internal Network". A red circle highlights the "Internal Network" option. A red text box next to it says: "step 3: to plug another VM into an existing network (switch), give it an interface/adaptor attached to an Internal Network having a previously created name (e.g., mynet)".

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

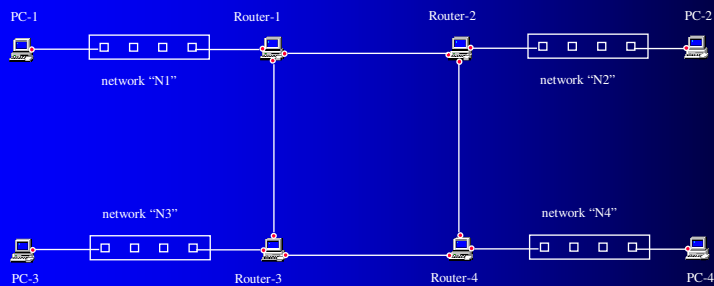


Ingredients to join localnets into an internet

- 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
```