# Mininet - II

CSE 461 Computer Networks

# Hopefully part2 wasn’t too bad...

# Part 3

- You can hardcode who-is-where in `cores21_setup`.
- Run `links` in the Mininet console to see who's where.
- If your `pingall` fails, make sure that you flood ARP. (Why?)

```
[h10@10.0.1.10/24]--{s1}--\
[h20@10.0.2.20/24]--{s2}--{cores21}--{dcs31}--[serv1@10.0.4.10/2
4]  [h30@10.0.3.30/24]--{s3}--/     |
                                    |
                      [hnotrust1@172.16.10.100/24
                      ]
```

# Using Wireshark with the Mininet VM (Demo at the end)

- In host (your physical computer/CSE VDI machine):
  - Install X Window Server: XQuartz (macOS host) / Xming or VcXsrv or Cygwin X(Windows host)
  - For macOS, you *might* need this near the top of your ~/.ssh/config (try if it doesn't work w/o it):

```
Host *
    XAuthLocation /usr/X11/bin/xauth
```

- In VM (Vagrant/VMware/EC2 instance): [`ssh -Y` into your VM if not using vagrant]
  - Install Wireshark: `sudo apt install wireshark`
  - Launch your controller (another terminal): `sudo ~/pox/pox.py misc.part3controller`
  - Magic command req'd for Vagrant:

```
sudo xauth add $(xauth list $DISPLAY)
```

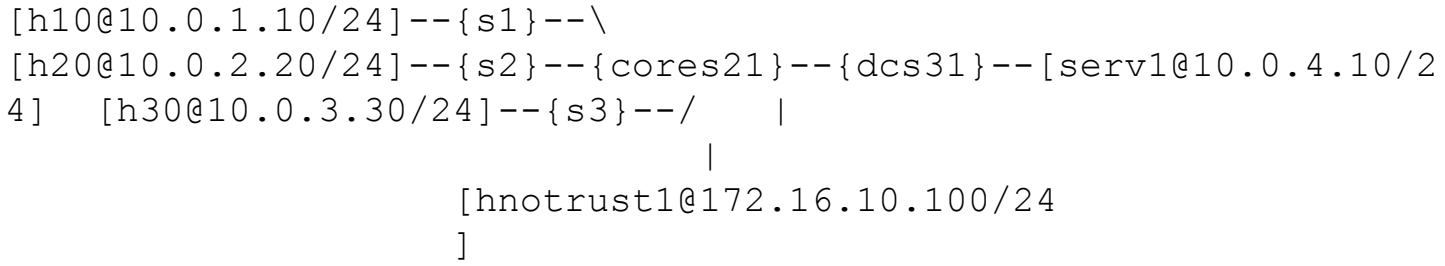
  - Launch Wireshark as root: `sudo wireshark &`
  - You should be able to see the `ethX` interfaces for your switches

# Alternatively...

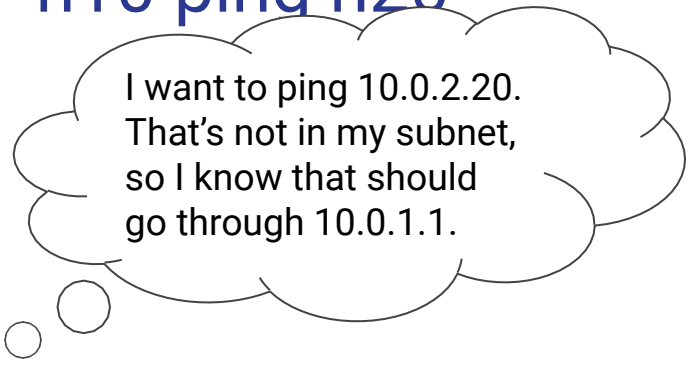
- If Wireshark doesn’t work for you, you can also simply dump packet content in `_handle_PacketIn` by printing out `packet.dump()` (I did that when I took the class and it was good enough, although Wireshark somehow looks cooler.)

# Part 4

- Must not hardcode who-is-where.
- Learn by backward learning --- learn who-is-where when we hear from them.



# Part 4 - h10 ping h20

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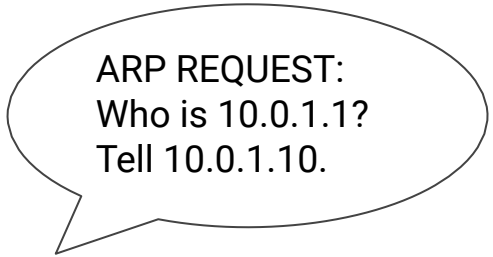


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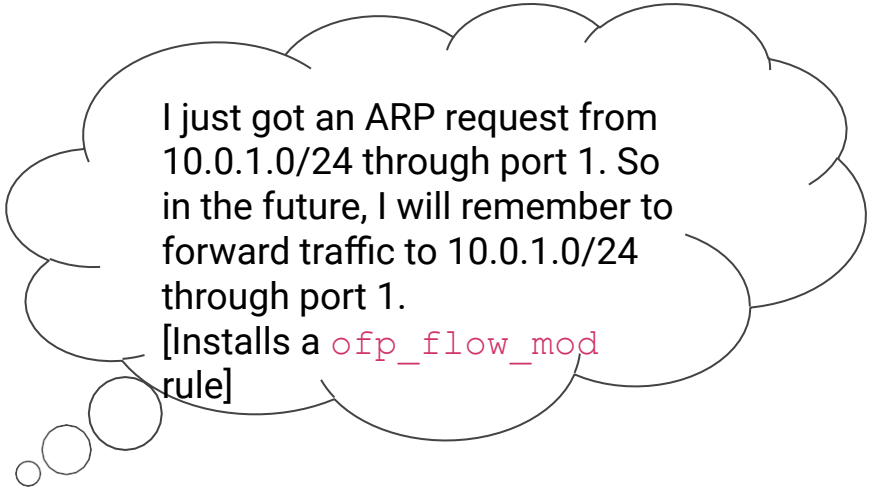


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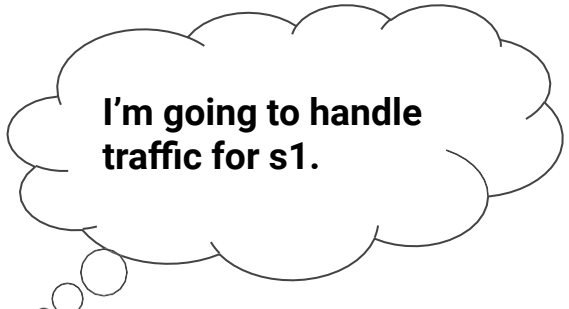


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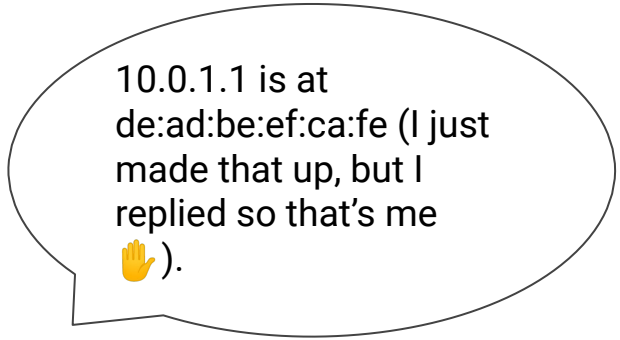


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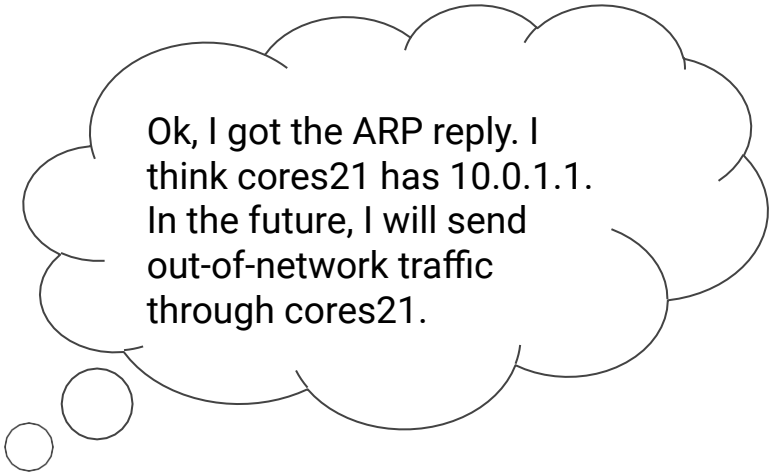


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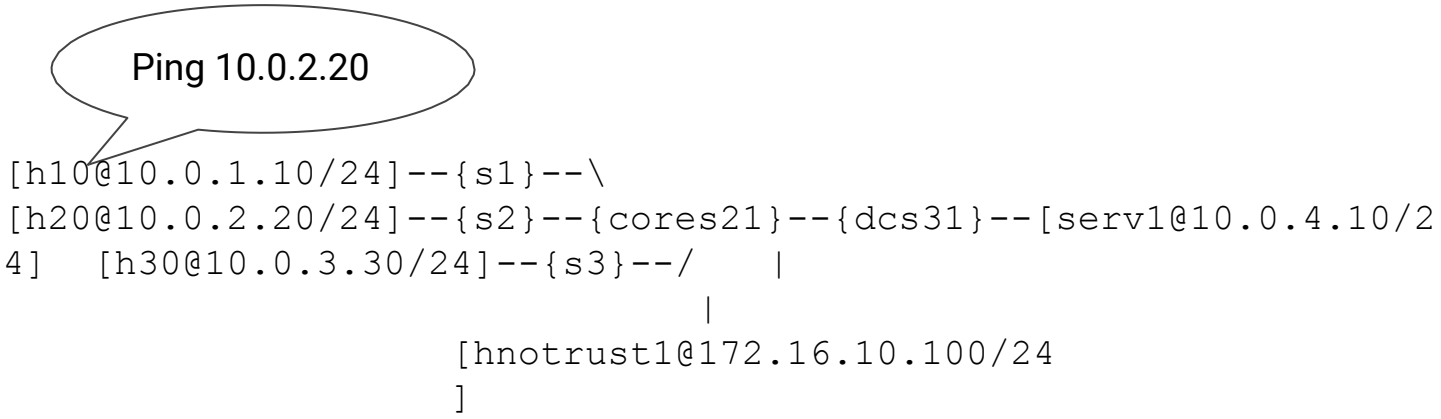

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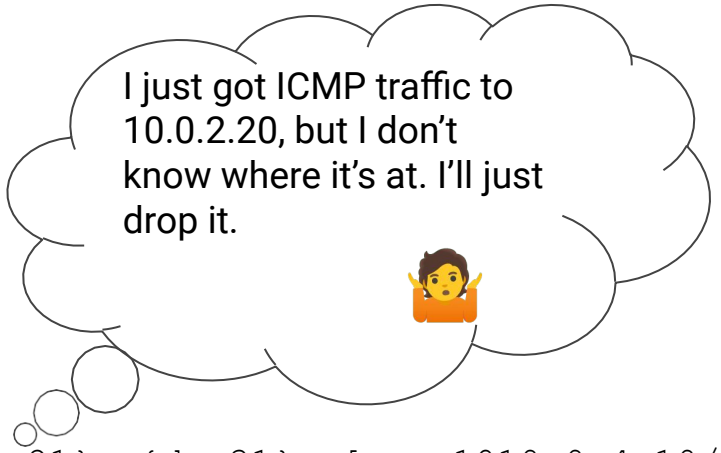


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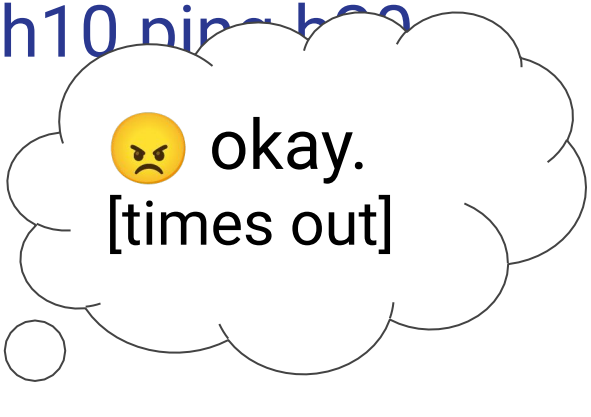


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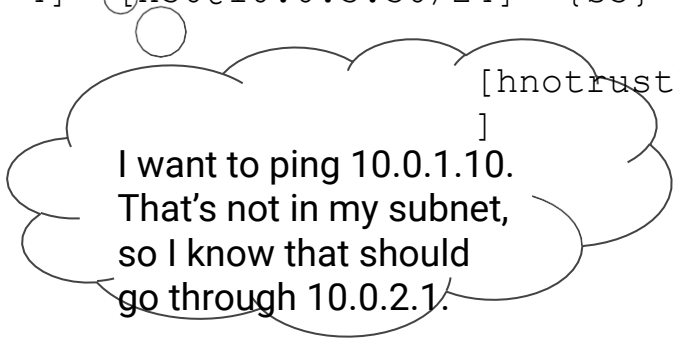

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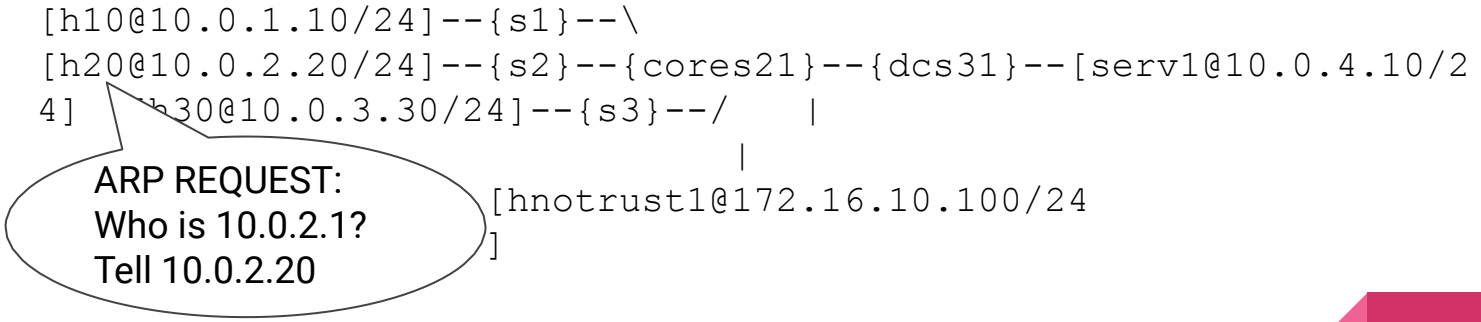

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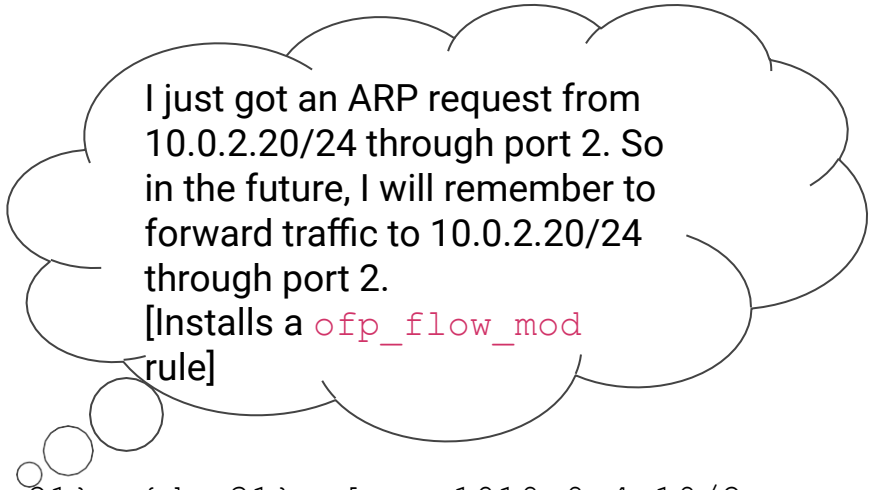


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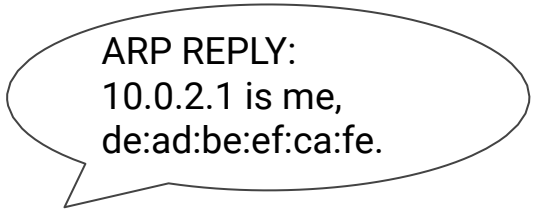


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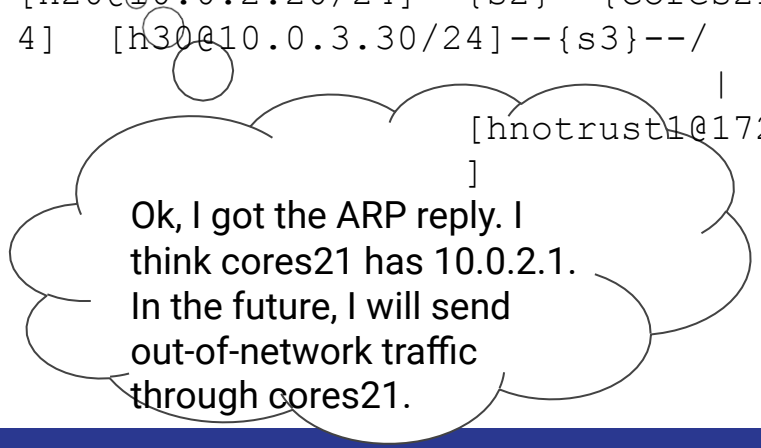

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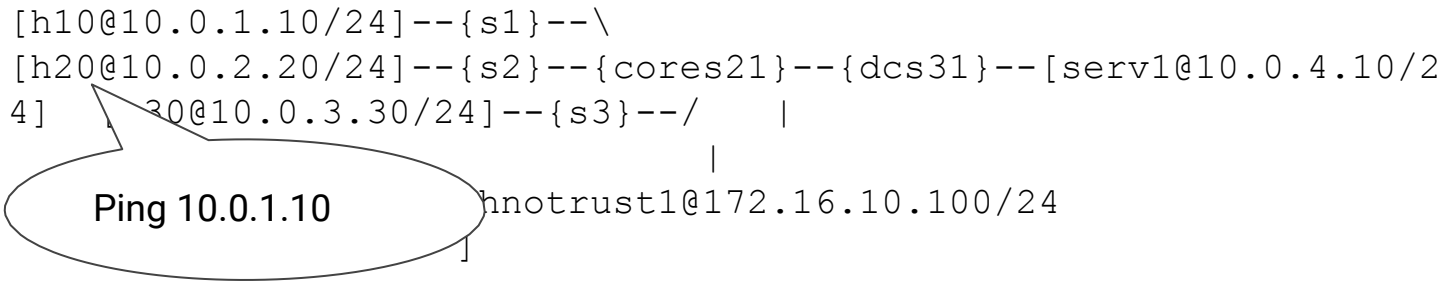

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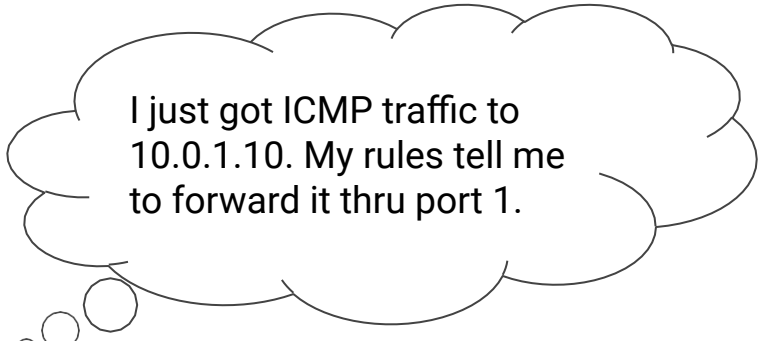


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                      ]
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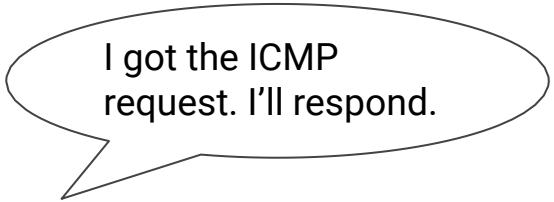


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                                   |
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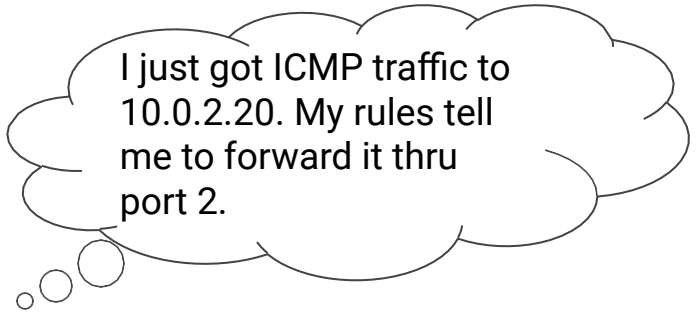


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                                                                    |
                                                  [hnotrust1@172.16.10.100/24]
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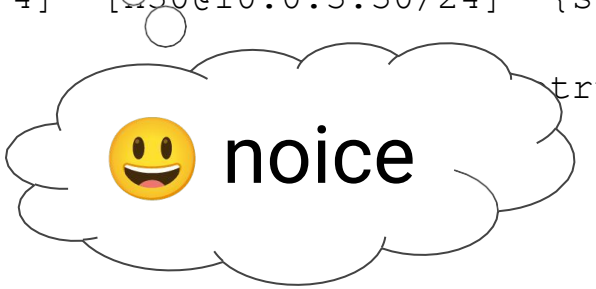
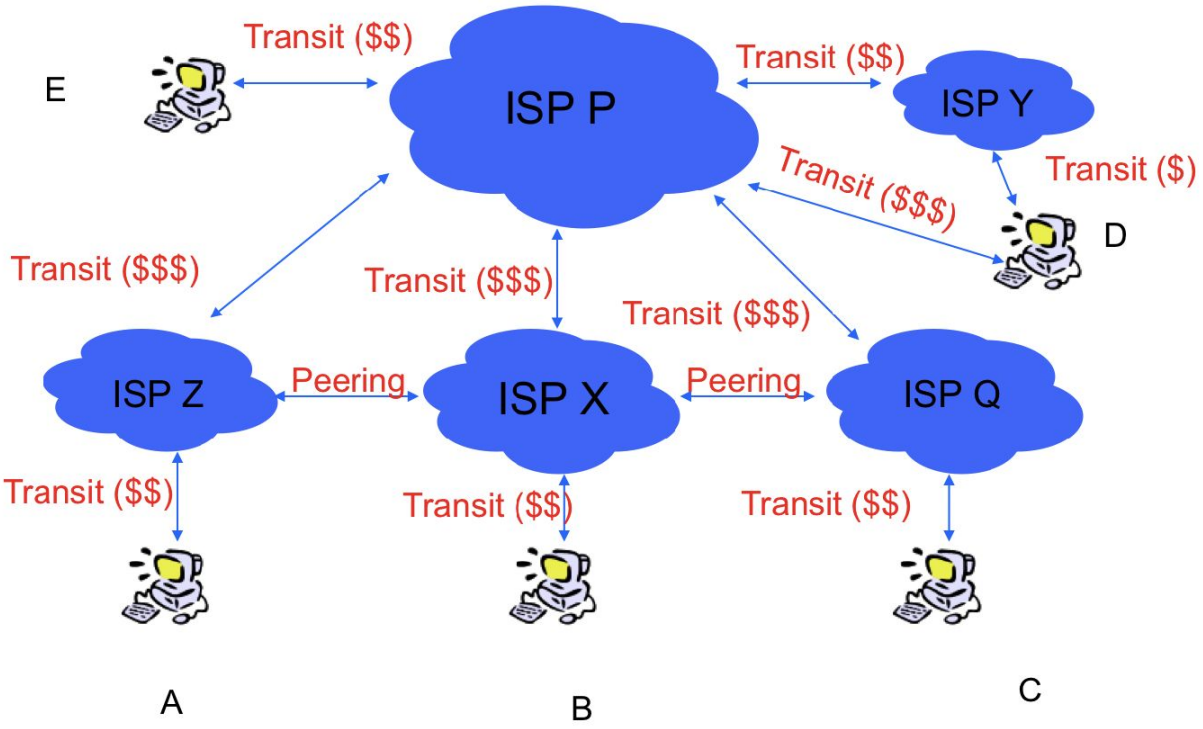
[h10@10.0.1.10/24]--{s1}--\
[h20@10.0.2.20/24]--{s2}--{cores21}--{dcs31}--[serv1@10.0.4.10/2
4]   [r30@10.0.3.30/24]--{s3}--/    |
                                     |
                                  trust1@172.16.10.100/24
```



# Part 4 Summary

- `cores21` will respond to all ARP **requests**, claiming to be every sX, so it can forward all the IP/ICMP traffic.
- Once `cores21` knows where each host is, it will install a rule to forward IP traffic to that host through that port. (But **don't install duplicate rules**, b/c we don't want the rule table to grow with pings.)
- Therefore, pings to a host will always fail until `cores21` hears from that host.
- What will the output of `pingall` look like? What if we run `pingall` again?

# Extra exercise (BGP)



# Extra exercise

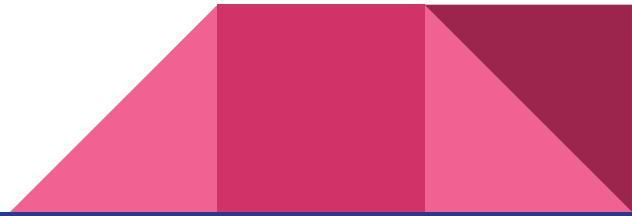
The above depicts a set of ASes with their peering and transit relations shown. Write down the
route taken by packets from
1) A to B and B to A
Answer: A ⇔ Z ⇔ X ⇔ B

2) A to C and C to A
Answer: A ⇔ Z ⇔ P ⇔ Q ⇔ C

3) A to D and D to A
Answer: A ⇔ Z ⇔ P ⇔ Y ⇔ D

# Extra exercise (DNS)

Show the different steps of a DNS query of andy.ece.uw.edu from various DNS servers. Number each step and draw arrows indicating the sender and recipient of each query.On top of each arrow write messages of the form: “who is <host>?”, “ask <nameserver>” or “<host> is at <IP-address>”. Servers that respond to recursive queries are labeled (R) and those that respond to iterative queries are labeled (I). The first step has been done for you. Assume andy.ece.uw.edu just recently registered with dns.ece.uw.edu with IP address 128.2.1.2 and no other nameservers are aware of andy’s existence.



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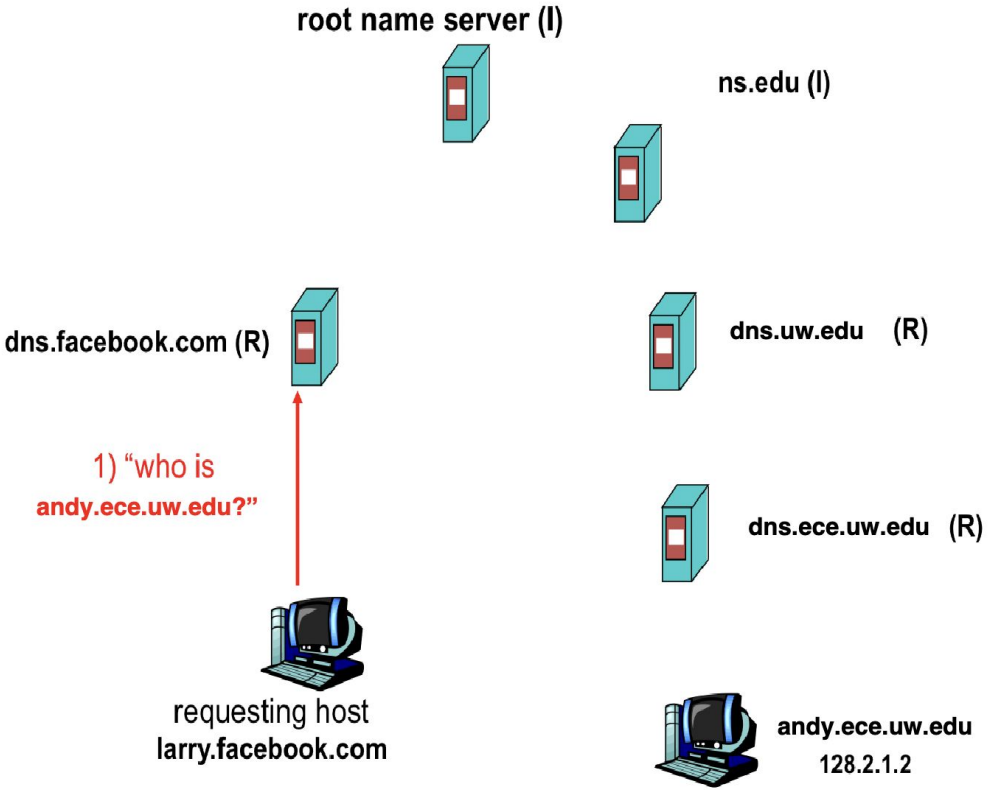
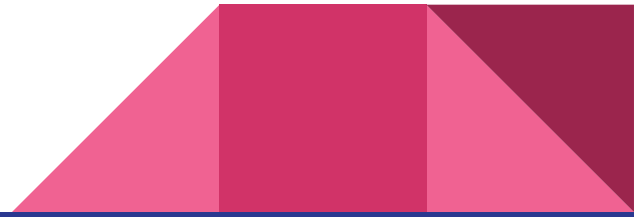


# Extra exercise (DNS)

(2) From dns.facebook.com → root… “who is andy.ece.uw.edu”?
(3) From root → dns.facebook.com … “ask ns.edu”?
(4) From dns.facebook.com → ns.edu… “who is andy.ece. uw.edu”?
(5) From ns.edu → dns.facebook.com … “ask ns. uw.edu”?
(6) From dns.facebook.com → ns. uw.edu… “who is andy.ece. uw.edu”?
(7) From ns. uw.edu → ns.ece. uw.edu … “who is andy.ece. uw.edu”?
(8) From ns.ece. uw.edu → ns. uw.edu … “Andy.ece. uw.edu is at 128.2.1.2”
(9) From ns. uw.edu → dns.facebook.com … “Andy.ece. uw.edu is at 128.2.1.2”?
(10) From dns.facebook.com → larry.facebook.com … “Andy.ece. uw.edu is at 128.2.1.2”

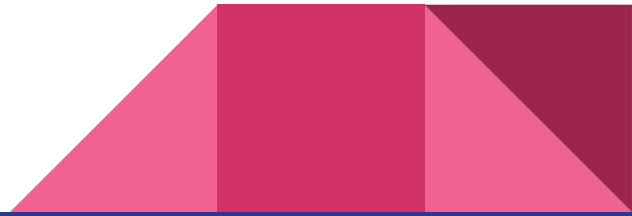
# Extra exercise (DNS)

A few minutes later, an identical subsequent request to the same server is made. Show the different steps of the DNS query as before.



# Extra exercise (DNS)

(2) From dns.facebook.com → larry.facebook.com ... “Andy.ece.uw.edu is at 128.2.1.2”



# Q&A, Extra OH