Universidad de León
Bachelor Degree on Computer Science and Engineering
Course on Computer Networks

Weekly Homework no. 7 (WH₅-Practice)

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--- Study Guide ---

1. **To be read carefully**: Finally, these weekly homework (WH) assignments do count to the overall final grade according to the official Course Guide updated on 22nd-April. The Weekly Homework is a valuable means for you to remain fully involved with the course while away from campus.

2. At all times, have the textbook by Peterson & Davie at hand. Most of the material that we have taught so far belongs in book chapters 1 and 2. Find the 6th edition to the book, here:

   https://github.com/SystemsApproach/book/releases/download/v6.1/book.pdf

3. A valuable resource as you undertake the practice exercises contained in **WH₇-Practice** is the practices on ARP and IP that we did the past academic year:

   http://paloalto.unileon.es/cn/labs/CN-IP-ARP-ICMP.pdf

   Also, you may find useful skimming the summary presentation about that practice from 2019:

   http://paloalto.unileon.es/cn/labs/CN-IP-ARP-ICMP-DHCP.pdf

4. If you need assistance, contact me via the email given above; I recommend that you send your comments and your questions to the **class forum** in the Agora. While RemLabB6 is open, usually I'll be listening to your questions on the CN Chat, which results very practical for obtaining my assistance with the practices.

5. **Make sure that you fully understand the procedures to** *access the remote network* in Lab B6 which are explained in WH3, in section "Instructions for accessing Lab B6 Remote Network". When you access RemLabB6 by following the provided instructions and using your login and password, you end up logging in host 192.168.86.11 in Network 2 (See fig. 1). The practices included in this WH entail your accessing the other hosts in Network 2 with ssh. The user name to be used in these cases is **administrator** and the password is Lab B6's general password: "**19xxdpq16".** Note that you have root privileges in the latter hosts (192.168.86.**22**, 192.168.86.**33**, 192.168.86.**44**), consequently you must exercise due care when you use them, so that we keep them functional for the whole class.

6. Host 192.168.86.11 in Network 2 is your *trampoline* into Network 2. Every time you access Network 2 via ssh -p 50500 paloalto.unileon.es, the internal host that receives your login is 192.168.86.11; this latter host is your *trampoline* to the remaining hosts in Network 2 (192.168.86.**22**, 192.168.86.**33**, 192.168.86.**44** and others that we will announce in due time).

7. **These practices offer you training you need for the on-line final** exam (Theory and Practices), consequently do these practices attentively, thinking each exercise out and resolve your doubts with your study and by contacting me if necessary.
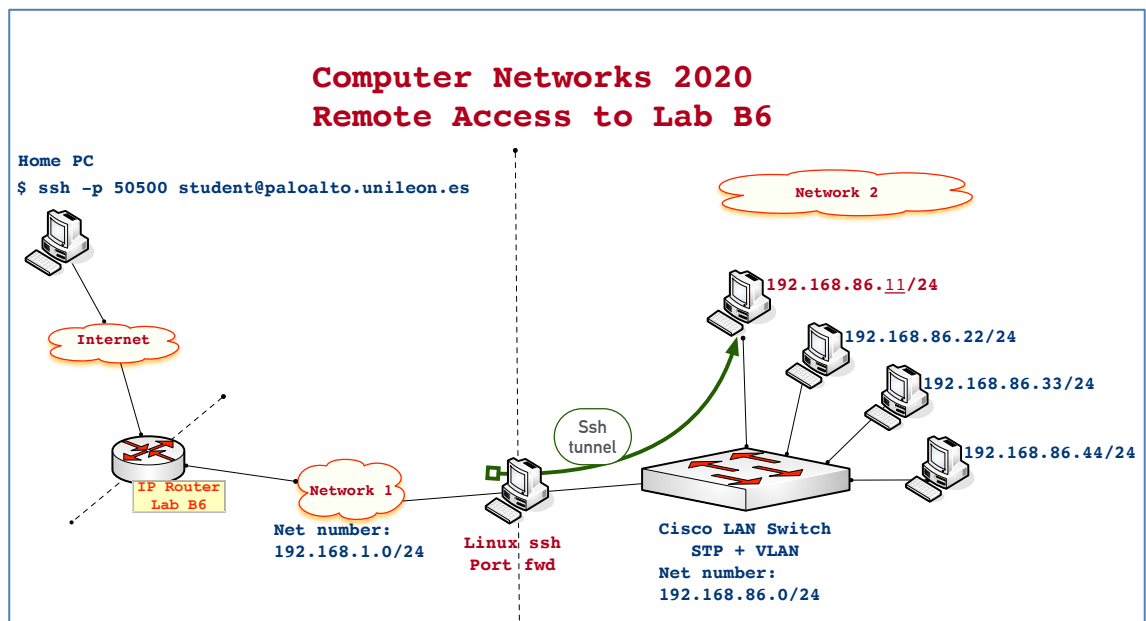

Figure1. Host 192.168.86.11 is your *trampoline* into Network 2. From that host you can open as many ssh sessions with the other hosts (22, 33 and 44) as you need

8. Contact me if you need that I open RemLabB6 at times other than those announced (Tuesdays and Thursdays) or if you need assistance:

Weekly Homework (WH₇-Practice)

This section __is__ to be included in your homework submission. These exercises will be assessed. You must submit __your original work__ and cite sources in case you used some.

Base documentation

- **Class notes, presentations and questionnaires about the Internet** Architecture (Lectures from February and early March).

- **Chapter 3 from textbook by P&D and their explanation about ARP**

Sundry technical information

MAC addresses of relevant Network 2 hosts's interfaces

Host	Interface name	IP	MAC
Internal 22	eno1	192.168.86.22	`e0:d5:5e:dd:ec:67`
Internal 33	eno1	192.168.86.33	`e0:d5:5e:d8:84:b6`
Internal 44	eno1	192.168.86.44	`e0:d5:5e:d8:82:26`

Exercises for practice

1. Connect to your account in paloalto.unileon.es (ssh -p 50009 …)

2. Power up one host from the three hosts available (Internal 22, Internal 33, or Internal 44)

3. When the intended host has finished its booting process, log in it with the administrator user (Password is 19xxdpq16)

   a. Start a trace filtering for arp messages (Assume you logged in at internal 22

   ```
   [internal 22] $ tcpdump –i eno1 arp
   ```

     b. Let the terminal unattended, waiting for the expected frames to arrive

4. Move to your [Internal 11] terminal and do these steps:

     a. Get the current contents of the arp table of host Internal 11:

```
[internal 11] $ arp -a
```

     b. Clear the arp table entry corresponding to host 192.168.86.22 (Internal 22) in [internal 11]:

```
[internal 11] $ arp -d 192.168.86.22
```

     c. Again, check the current contents of the arp table of host Internal 11 does not contain a resolution for 192.168.86.22:

```
[internal 11] $ arp -a
```

Now, your host doesn't know the MAC address corresponding to 192.168.86.22, thus, if you send it a ping, before sending the first frame, you host will have to find out the MAC of 192.168.86.22. Resolving this MAC entails using the ARP protocol. First, your host will send an ARP REQUEST to the broadcast address, afterwards host 192.168.86.22 will respond with an ARP RESPONSE containing the host interface's MAC.

To check that your host 192.168.86.11 receives the ARP RESPONSE, you'll have to run tcpdump:

```
[internal 11] $ tcpdump -i eno1 arp
```

     d. Now, from a new terminal you send a ping to 192.168.86.22 (From host 192.168.86.11)

```
[internal 11] $ ping 192.168.86.11
```

5. **Document and explain** the results that you have obtained, as much in [internal 11] as in [internal 22]. If necessary, repeat all the steps if some results are not what you expected; maybe you want to change the *experiment* somehow so that you better understand some aspect of this practice or the lecture. If you need some explanation about ARP, read the practice and the presentation that we used the past year. Find the URLs to the practice script and the presentation, above.