Resources / Lab Exercises (/COMP3331/20T2/resources/44913) / Lab Exercise 1: Tools of the Trade

Lab Exercise 1: Tools of the Trade

Specification

Make Submission

Check Submission

Collect Submission

There are 6 labs during this course. For each student, the 5 best performing labs will contribute to your final lab mark.

Objectives:

- Get familiar with the basic networking tools: ping, traceroute, ifconfig, netstat, nslookup
- Gain insights into evaluating network performance and understanding network topology

Prerequisites:

- · Week 1 Lectures
- · Relevant Parts of Chapter 1 of the textbook
- Introduction to Tools of the Trade (https://webcms3.cse.unsw.edu.au/COMP3331/20T2/resources/44919)
- runping.sh (https://webcms3.cse.unsw.edu.au/COMP3331/20T2/resources/45194)
- plot.sh (https://webcms3.cse.unsw.edu.au/COMP3331/20T2/resources/45199)
- Basic understanding of Linux. A good resource is (http://www.ee.surrey.ac.uk/Teaching/Unix/) here (http://www.ee.surrey.ac.uk/Teaching/Unix/) but there are several other resources available online

Marks: 10 marks

- This lab comprises of a number of exercises. Pl note that not all the exercises for this lab are marked. However, you have to submit a report containing answers for all of the lab exercises.
- Please attend only in your allocated lab slot.
- We expect the students to go through as much of the lab exercises as they can at home and come to the lab for clarifying any doubts in procedure/specifications.

Deadline:

09:45 am Thursday 18/06/2020. You can submit as many times as you wish before the deadline. A later submission will override the earlier submission, so make sure you submit the correct file. Do not leave until the last moment to submit, as there may be technical or communications error and you will not have time to rectify it.

Late Penalty:

The late penalty will be applied as follows:

1 day after deadline: 20% reduction
2 days after deadline: 40% reduction
3 or more days late: NOT accepted

Note that the above penalty is applied to your final mark. For example, if you submit your lab work 2 days late and your score on the lab is 8, then your final mark will be 8 - 3.2 (40% penalty) = 4.8.

Submission Instructions:

Prepare a PDF document **Lab1.pdf** with answers to all questions for all exercises. To include other supporting documents, create a tar archive of all the files called **Lab1.tar.** Submit the archive using give or WebCMS3 interface. You can submit from a lab machine or ssh into the CSE login server. Instructions to ssh into CSE login servers are here (https://taggi.cse.unsw.edu.au/FAQ/Logging_In_With_SSH/).

- 1. Put all your files (e.g., Lab1.pdf, output.txt) in a directory lab1.
- 2. Type "tar -cvf Lab1.tar lab1"
- 3. When you are ready to submit, at the bash prompt type 3331
- 4. Next, type: give cs3331 Lab1 Lab1.tar
- Please make sure that the tar archive is not corrupted. You can untar (use tar –xvf Lab1.tar) the created
 archive to check that all the files are intact.
- · Max file size for submission is 3MB.
- COMP9331 students should also use 'give cs3331'

•

Original Work Only:

You are strongly encouraged to discuss the questions with other students in your lab. However, each student must submit his or her own work. You may need to refer to the material indicated above (particularly Tools of the Trade document) and also conduct your own research to answer the questions.

OS Compatibility:

Please note that the instructions provided herein assume that you are running the exercises on a Linux machine (similar to the CSE lab machines). These commands (and the scripts provided) may not work as prescribed on other OSes (Windows, OS X, etc.). We strongly recommend that you run these experiments on CSE machines. If you are running from off-campus, you can ssh into a CSE server. We will be unable to help you diagnose any issues that may arise with OSes other than Linux.

Exercise 1: nslookup

Use the nslookup command from the "Tools of the Trade" and answer the following questions:

- 1. Which is the IP address of the website www.koala.com.au? In your opinion, what is the reason of having several IP addresses as an output?
- 2. Find out the name of the IP address 127.0.0.1. What is special about this IP address?

Exercise 2: Use ping to test host reachability

Are the following hosts reachable from your machine by using ping:

- www.unsw.edu.au (http://www.unsw.edu.au)
- (http://www.cse.unsw.edu.au) www.getfittest.com.au (http://www.getfittest.com.au)
- www.mit.edu (http://www.mit.edu)
- www.intel.com.au (http://www.intel.com.au)
- (http://www.intel.com.au) www.tpg.com.au (http://www.tpg.com.au)
- (http://www.telstra.com.au) www.hola.hp (http://www.hola.hp)

- (http://www.hola.hp) www.amazon.com (http://www.amazon.com)
- (http://www.wikileaks.org) www.tsinghua.edu.cn (http://www.tsinghua.edu.cn)
- (http://www.tsinghua.edu.cn) www.kremlin.ru (http://www.kremlin.ru)
- 8.8.8.8

If you observe that some hosts are not reachable, then can you explain why? Check if the addresses unreachable by the ping command are reachable from the Web browser.

Exercise 3: Use traceroute to understand network topology

Note: Include all traceroute outputs in your report.

- 1. Run traceroute on your machine to www.columbia.edu (http://www.columbia.edu) . How many routers are there between your workstation and www.columbia.edu (http://www.columbia.edu) ? How many routers along the path are part of the UNSW network? Between which two routers do packets cross the Pacific Ocean? Hint: compare the round trip times from your machine to the routers using ping.
- 2. Run traceroute from your machine to the following destinations: (i) www.ucla.edu (http://www.ucla.edu) (ii) www.u-tokyo.ac.jp (http://www.u-tokyo.ac.jp) and (iii) www.lancaster.ac.uk (http://www.lancaster.ac.uk) . At which router do the paths from your machine to these three destinations diverge? Find out further details about this router. (HINT: You can find out more about a router by running the Whois command: Whois router-IP-address). Is the number of hops on each path proportional the physical distance? HINT: You can find out the geographical location of a server using the following tool http://www.yougetsignal.com/tools/network-location/ (http://www.yougetsignal.com/tools/network-location/)
- 3. Several servers distributed around the world provide a web interface from which you can perform a traceroute to any other host in the Internet. Here are two examples: (i) http://www.speedtest.com.sg/tr.php (http://www.speedtest.com.sg/tr.php) and (ii) https://www.telstra.net/cgi-bin/trace (https://www.telstra.net/cgi-bin/trace). Run traceroute from both these servers towards your machine and in the reverse direction (i.e. From your machine to these servers). You may also try other traceroute servers from the list at www.traceroute.org (http://www.traceroute.org). What are the IP addresses of the two servers that you have chosen. Does the reverse path go through the same routers as the forward path? If you observe common routers between the forward and the reverse path, do you also observe the same IP addresses? Why or why not?

Exercise 4: Use ping to gain insights into network performance

Note: Include all graphs in your report. You need to run the scripts (runping.sh and plot.sh) when you are physically using a lab machine or connected to a CSE server/lab machine using VLAB / VNC client. You need to ensure gnuplot and ps2pdf are available on your system if you are planning to do this exercise on your own machine.

We now use the ping utility to investigate network delay and its implications on network performance. In particular, we will analyze the dependency of packet size and delay.

There is a shell script, runping.sh (https://webcms3.cse.unsw.edu.au/COMP3331/20T2/resources/45194) , provided that you can use instead of running many pings with different packet sizes by hand. After downloading this script on your machine make sure you can execute it. If not, you will have to execute the following command in the command line: *chmod u+x runping.sh* . To run the ping traces you may use the runping.sh script as follows: ./runping.sh www.abc.net (http://www.abc.net/) (or whatever other destination you want to ping). It will automatically run ping for different packet sizes and with 50 ping packets per size. Note, since a ping is sent once per second, this script will take a few minutes to finish. Basically, this script only executes the commands:

```
$ ping -s 22 -c 50 -i 1 www.abc.net > www.abc.net-p50
...
$ ping -s 1472 -c 50 -i 1 www.abc.net > www.abc.net-p1500
```

and writes the output of the pings to the corresponding files.

Use this script for the following destinations:

(i) www.uq.edu.au (http://www.uq.edu.au/) (ii) www.dlsu.edu.ph (http://www.dlsu.edu.ph/) and (iii) www.tu-berlin.de (http://www.tu-berlin.de/)

In other words, execute the following commands

```
$ ./runping.sh www.uq.edu.au
$ ./runping.sh www.dlsu.edu.ph
$ ./runping.sh www.tu-berlin.de
```

In case you notice one of the hosts above is not responsive, select the following alternate destinations: (i) within Australia (www.flinders.edu.au (http://www.flinders.edu.au/) , www.unsw.edu.au (http://www.unsw.edu.au/)) (ii) Asia (www.upm.edu.my (http://www.upm.edu.my/) , upd.edu.ph (http://upd.edu.ph/)) (iii) Europe (www.aau.dk (http://www.aau.dk/) , www.uio.no (http://www.uio.no/))

Note that all delay values reported are in milliseconds (ms) and reflect the round trip time (RTT) between your host and the destinations.

When the runping.sh script is finished for all destinations, you can plot the results using another provided script, plot.sh (https://webcms3.cse.unsw.edu.au/COMP3331/20T2/resources/45199), as follows:

```
$ ./plot.sh www.uq.edu.au-p*
$ ./plot.sh www.dlsu.edu.ph-p*
$ ./plot.sh www.tu-berlin.de-p*
```

If you cannot execute plot.sh, then fix the permissions by executing the following command in the command line:

```
$ chmod u+x plot.sh
```

The script plot.sh will produce the following files: destination_delay.pdf, destination_scatter.pdf, and destination_avg.txt for each of the destinations (e.g., for www.uq.edu.au (http://www.uq.edu.au/) we have www.uq.edu.au_delay.pdf (http://www.cse.unsw.edu.au/~cs3331/www.uq.edu.au_delay.pdf), www.uq.edu.au_scatter.pdf (http://www.cse.unsw.edu.au/~cs3331/www.uq.edu.au_scatter.pdf) and www.uq.edu.au_avg.txt (http://www.cse.unsw.edu.au/~cs3331/www.uq.edu.au_avg.txt)).

The graph destination_delay.pdf shows how delay varies over time (different colours correspond to different packet sizes), and destination_scatter.pdf shows delay vs. packet size as a scatter plot. destination_avg.txt contains the average (2nd column) and minimum (3rd column) delay values corresponding to each packet size (1st column).

1. For each of these locations find the (approximate) physical distance from UNSW using Google Maps and compute the shortest possible time T for a packet to reach that location from UNSW. You should assume that the packet moves (i.e. propagates) at the speed of light, 3 x 10 8 m/s. Note that the shortest possible time will simply be the distance divided by the propagation speed. Plot a graph where the x-axis represents the distance to each city (i.e. Brisbane, Manila and Berlin), and the y-axis represents the ratio between the minimum delay (i.e. RTT) as measured by the ping program (select the values for 50 byte packets) and the shortest possible time T to reach that city from UNSW. (Note that the y-values are no smaller than 2 since it takes at least 2*T time for any packet to reach the destination

from UNSW and get back). Can you think of at least two reasons why the y-axis values that you plot are greater than 2?

- 2. Is the delay to the destinations constant or does it vary over time? Explain why.
- 3. Explore where the website for www.epfl.ch (http://www.epfl.ch/) is hosted. Is it in Switzerland?
- 4. The measured delay (i.e., the delay you can see in the graphs) is composed of propagation delay, transmission delay, processing delay and queuing delay. Which of these delays depend on the packet size and which do not?

Resource created <u>4 months ago (Wednesday 29 April 2020, 03:56:57 PM)</u>, last modified <u>2 months ago (Wednesday 10 June 2020, 05:13:53 PM)</u>.

Comments

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Add a comment



Bill Shan (/users/z5118180) <u>2 months ago (Tue Jun 23 2020 15:23:39 GMT+0800 (China Standard Time))</u>

Hi Professor, I just realized that I didn't name my file "Lab1" when I submitted it last week (and it seems it hasn't been marked, I can't find anything on Collect Submission). Will I lose the marks for this lab? Thanks

Reply



Ayda Valinezhad Orang (/users/z5195667) <u>2 months ago (Tue Jun 23 2020 15:36:54 GMT+0800 (China Standard Time))</u>

Dear Bill.

It is not necessarily required to name your submission "Lab1". If it has not been marked, may there are other issues with your submission. Please follow up this from your tutor as she/he marked your lab.

Regards,

Ayda

Reply



Cavinash Chelliah (/users/z3417347) <u>2 months ago (Mon Jun 22 2020 21:12:09 GMT+0800 (China Standard Time))</u>

Hi Proffessor, I just wanted to find out when we will recieve marks for Lab1?

Reply



Ayda Valinezhad Orang (/users/z5195667) <u>2 months ago (Tue Jun 23 2020 14:43:45 GMT+0800 (China Standard Time)</u>)

Dear Cavinash.

All grades are available, you just can check them via webcms.

Regards,

Ayda

Reply



Cavinash Chelliah (/users/z3417347) <u>2 months ago (Tue Jun 23 2020 22:50:39 GMT+0800 (China Standard Time)</u>)

Hi Ayda,

My submission still says it has not been marked.

Regards,

Cav

Reply



Ayda Valinezhad Orang (/users/z5195667) <u>2 months ago (Wed Jun 24 2020 13:09:25 GMT+0800 (China Standard Time)</u>)

Dear Cav,

Could you please let me know can you see your grade?

Regards,

Ayda

Reply



Cavinash Chelliah (/users/z3417347) <u>2 months ago (Wed Jun 24 2020 21:47:51 GMT+0800 (China Standard Time)</u>)

Hi Ayda,

Submissions still says it has not been marked.

Thanks,

Cav

Reply



Sidney Tandjiria (/users/z5272671) <u>2 months ago (Wed Jun 24 2020 23:11:18 GMT+0800 (China Standard Time))</u>

FYI, I found that I can see my mark via the 'Grades' icon on the sidebar, down the bottom next to your name (however it shows up as not marked in the collect submission tab). Hope that helps for anyone who is looking for it!

Reply



Manpreet Kaur (/users/z5301364) 2 months ago (Tue Jun 23 2020 15:41:31 GMT+0800 (China Standard Time))

Hi proffesor,

Even I am also unable to see my marks as it is shown that your submission has not been yet marked.

Reply



Ayda Valinezhad Orang (/users/z5195667) 2 months ago (Wed Jun 24 2020 13:10:17 GMT+0800 (China Standard Time))

Dear Manpreet,

Could you please follow up this from your tutor?

Regards,

Ayda

Reply



Xuan Truong (/users/z5200695) <u>2 months ago (Mon Jun 22 2020 14:57:02 GMT+0800 (China Standard Time))</u>

I have a question about rrt value in ping and traceroute. When I run those to commands, I notice that rrt in ping is usually or perhaps always a lot smaller than the total rrt of each host shown in traceroute report. I assume the path from my machine to the host doesnt change when I run ping and traceroute, then should rrt in ping equal to the sum of rrt in traceroute report? Even though there is delay in network, the different shouldnt be big right?

Reply



Ayda Valinezhad Orang (/users/z5195667) <u>2 months ago (Tue Jun 23 2020 15:23:40 GMT+0800</u> (China Standard Time))

Dear Xuan,

Basically, rtt is affected by the status of the network. If you find that rtt is bigger, it means that the network is busy. Also, if you try several times, you will receive different answers.

Regards,

Ayda

Reply



Xuehua Ma (/users/z5262637) <u>2 months ago (Wed Jun 17 2020 17:56:35 GMT+0800 (China Standard Time))</u>

hello,Professor

I am in Monday lab session. Actually I submitted the tar file of lab1 few days ago. However, I find some problems with the tar file now. Can I resubmit it again and will it be regarded as late submission since the deadline in my webcms system is still today morning?

Reply



Wen Hu (/users/z2260468) <u>2 months ago (Wed Jun 17 2020 21:00:20 GMT+0800 (China Standard Time))</u>

Hi Xuehua,

The deadline of Monday labs are on Thursdays (see https://webcms3.cse.unsw.edu.au/COMP3331/20T2/notices/). You may submit as many times as you like before the deadline, and we will make the last submission only.

Reply



Xuehua Ma (/users/z5262637) <u>2 months ago (Wed Jun 17 2020 21:40:33 GMT+0800 (China Standard Time)</u>), last modified <u>2 months ago (Wed Jun 17 2020 22:53:22 GMT+0800 (China Standard Time)</u>)

hello,

I made submission just now and run the check code. The result show that I made the submission today, however, the most recent submission is still few days ago. Does it mean that submission today failed?

Session: 20T2

Assignment: Lab1 Submission ID: 5262637

Current day and time: Wed Jun 17 21:36:36 2020 Assignment deadline: Wed Jun 17 09:45:00 2020

A submission now would be 12 hours late

Event Day and time Details

Submission Fri Jun 12 22:13:35 2020 5262637 mon16a Lab1 [3 days +11 hours early]

Submission Fri Jun 12 22:43:25 2020 5262637 mon16a Lab1 [3 days +11 hours early]

Submission Sun Jun 14 23:11:25 2020 5262637 mon16a Lab1 [1 day +10 hours early]

Submission Wed Jun 17 21:32:06 2020 5262637 mon16a Lab1 [12 hours late]

Most recent submission: -rw-r---- z5262637/z5262637 2672640 2020-06-14 23:10 Lab1.tar

Reply



Ayda Valinezhad Orang (/users/z5195667) <u>2 months ago (Thu Jun 18 2020 09:53:31 GMT+0800 (China Standard Time))</u>

Dear Xuehua,

I think it is fine. However, please double-check with your tutor to make sure your submission is ok.

Regards,

Ayda

Reply



Youfeng Chen (/users/z5198455) <u>2 months ago (Wed Jun 17 2020 13:28:47 GMT+0800 (China Standard Time))</u>

Hi Professor,

Today I want to submit my work but the page said that I don't have the permission to access the resource. Is it only my problem?

regards

Reply



Youfeng Chen (/users/z5198455) <u>2 months ago (Wed Jun 17 2020 13:54:47 GMT+0800 (China Standard Time))</u>

I just finished my submit, but it say the work is 5 hours late. It is matter?

Reply



Wen Hu (/users/z2260468) <u>2 months ago (Wed Jun 17 2020 20:57:27 GMT+0800 (China Standard Time))</u>

Which lab are you in?

Reply



Youfeng Chen (/users/z5198455) <u>2 months ago (Thu Jun 18 2020 00:11:51 GMT+0800 (China Standard Time)</u>)

Monday's lab

Reply



Wen Hu (/users/z2260468) 2 months ago (Thu Jun 18 2020 08:04:56 GMT+0800 (China Standard Time))

The deadline of Monday's labs are on Thursdays. If in double, please talk to your tutor.

Reply



Hui Cheng (/users/z5277919) <u>2 months ago (Tue Jun 16 2020 22:14:18 GMT+0800 (China Standard Time))</u>

Hi Professor,

My lab1 file is a little bigger than 3MB, but when I used the command line to tar this file and submit it, it was successful. Therefore, I am afraid that what would happen if the file is larger than 3 MB.

Regards,

Hui Cheng

Reply



Amirhossein Mosaddad (/users/z5217008) <u>2 months ago (Wed Jun 17 2020 11:12:35 GMT+0800 (China Standard Time))</u>

Hi, I just checked my submission and I noticed my tar file size is 3.3 MB. Just wondering if that would be alright.

Many thanks.

Reply



Wen Hu (/users/z2260468) 2 months ago (Wed Jun 17 2020 10:14:23 GMT+0800 (China Standard Time))

Hi Hui,

Please check with you tutor if your submission is successful.

Reply



Hejia Dong (/users/z5242843) <u>2 months ago (Tue Jun 16 2020 10:06:11 GMT+0800 (China Standard Time))</u>

Hello Professor,

I find there is a notice about extend deadline, and I just submit the tar document, it told me that the submission is 1hour late, will it matter?

Regards

Reply



Ayda Valinezhad Orang (/users/z5195667) <u>2 months ago (Tue Jun 16 2020 10:13:47 GMT+0800 (China Standard Time))</u>

Dear Hejia,

I just extended it, do not worry it won't have any penalty.

Regards,

Ayda

Reply



Bill Shan (/users/z5118180) <u>2 months ago (Wed Jun 17 2020 02:33:37 GMT+0800 (China Standard Time))</u>

Will the Monday lab submissions also be extended (i.e. to 19th)?

Reply



Qianhui Guo (/users/z5291528) <u>2 months ago (Thu Jun 18 2020 23:07:52 GMT+0800 (China Standard Time)</u>)

I am also confused about it:(

Reply



Ayda Valinezhad Orang (/users/z5195667) <u>2 months ago (Mon Jun 22 2020 14:30:33 GMT+0800 (China Standard Time)</u>)

Dear All,

I have changed your deadline in the Give, you can find it easily there.

Regards,

Ayda

Reply



Saksham Yadav (/users/z5164624) <u>2 months ago (Thu Jun 25 2020 18:51:12 GMT+0800 (China Standard Time))</u>

Hi Ayda,

I received 10/10 in lab1 although it says '[1 day +18 hours late]'. Can I be confident that the 10/10 is legitimate and won't be penalized at a later time? (i.e. when grading). Thank you :)

Reply



Ziyao Wang (/users/z5188105) <u>2 months ago (Tue Jun 16 2020 09:22:07 GMT+0800 (China Standard Time))</u>

Hello Professor,

I put my Lab1.pdf into Lab1.tar, and I just submit the Lab1.tar which including the Lab1.pdf and other material indicated above. Is that fine? Thanks!

Reply



Ayda Valinezhad Orang (/users/z5195667) <u>2 months ago (Tue Jun 16 2020 09:32:42 GMT+0800 (China Standard Time))</u>

Dear Ziyao,

Yes, that is all.

Regards,

Ayda

Reply



Peng Wang (/users/z5227348) <u>2 months ago (Tue Jun 16 2020 00:45:24 GMT+0800 (China Standard Time))</u>

Dear pro:

The cse server might be down, I can't submit my lab1, idk what to do, will I be punished for this.

With regards.

Reply



Xuan Wei (/users/z5280110) <u>2 months ago (Tue Jun 16 2020 05:18:15 GMT+0800 (China Standard Time))</u>, last modified <u>2 months ago (Tue Jun 16 2020 05:20:01 GMT+0800 (China Standard Time))</u>

I cannot login my vlab either, I have tried different ways

Reply



Juntai Chen (/users/z5128958) <u>2 months ago (Tue Jun 16 2020 00:58:31 GMT+0800 (China Standard Time)</u>)

I cannot login to CSE via Vlab. :((

Reply



Gaoming Li (/users/z5234806) <u>2 months ago (Tue Jun 16 2020 01:18:40 GMT+0800 (China Standard Time)</u>)

I can't submit my lab1 either.

Reply



Isura Nirmal (/users/z5262974) <u>2 months ago (Tue Jun 16 2020 08:17:32 GMT+0800 (China Standard Time)</u>)

Hi All, I've just checked and I can connect to vlab enironment (via tiger vnc and ssh) now. Please let us know if you still have issues so that we can escalate with ss.

Reply



Tao Ge (/users/z5193533) 2 months ago (Tue Jun 16 2020 00:29:35 GMT+0800 (China Standard Time))

Hello, professor.

I just wanted to resubmit my Lab1.pdf and when I click the "submit", there is no respond on the website. I also tried to use ssh to submit, but I could not log in. I do not know what is wrong with this and how to solve this.

Thanks

Reply



Juntai Chen (/users/z5128958) <u>2 months ago (Tue Jun 16 2020 00:58:59 GMT+0800 (China Standard Time))</u>

I think there are some problems with CSE at the moment as I cannot login to CSE via Vlab.

Reply



Isura Nirmal (/users/z5262974) <u>2 months ago (Tue Jun 16 2020 08:19:46 GMT+0800 (China Standard Time))</u>

Yes. Seems like there were some issues. We were not informed about this but now the issues seems to be fine. Please let us know if you are still having problems.

Reply

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