

# Homework 10

This assignment is due on November 18th at 9AM.

For this assignment, you will find it useful to connect to the command line interface of your operating system.

In Windows, one interface is the "Command Window" -- run the program "cmd."

In MacOS, you will want to open the "Terminal" -- usually in your Applications folder.

In Linux/Unix, you will want to open a terminal or shell -- the way to do this varies on the version of Linux, and you are probably familiar with it.

(1) Read this article and find your local IP address: <http://lifehacker.com/5833108/how-to-find-your-local-and-external-ip-address>

(2) Note that your local IP address will vary depending on which network you connect to. It may change each time you connect to a WiFi network. Start your Python script by prompting the user to enter his/her current IP address, e.g.:

```
What is your IP address: 192.168.1.23
```

Make sure you check the input to make sure it is in reasonable form (an IPv4 address consists of four numerical values, each between 0 and 255, and they are delimited by periods.)

In some cases your local IP address will be the same as your public IP address. However, in other cases (such as when you are behind a router using "network address translation") they will be different. Use your local address.

(3) Explore in your operating system the documentation for the ping command. Here are some starting places:

Windows:

<https://www.microsoft.com/resources/documentation/windows/xp/all/proddocs/en-us/ping.mspix?mfr=true>

MacOS: <https://developer.apple.com/library/mac/documentation/Darwin/Reference/ManPages/man8/ping.8.html>

Linux/Unix:

[http://linux.about.com/od/commands/l/blcmdl8\\_ping.htm](http://linux.about.com/od/commands/l/blcmdl8_ping.htm)

Check for your specific OS implementation. Practice using the ping command with a count of 2 (usually `-n` on Windows, `-c` on Unix/Linux/macOS) and notice the format of its output with both IP addresses that exist and IP addresses that do not exist. (To see different formats of failure pings, try pinging 0.0.0.0, 1.1.1.1, and 255.255.255.255.)

Note that when pinging your local neighborhood, you will find many machines do not respond to a ping. But at least your own machine should respond to a ping from itself, and probably some other devices will respond too (such as some printers, or some routers).

(4) Read the Python documentation on the subprocess module:

<https://docs.python.org/2/library/subprocess.html#module-subprocess>

(5) Read the Python documentation on the threading module:

<https://docs.python.org/2/library/threading.html>

(6) Extend your python script in (2) to be an unthreaded script that sequentially pings all 256 IP addresses in the /24 neighborhood of your IP address as provided in part (2) above. (Hint: you will find `subprocess.call()` to be useful for this purpose.) For example, if your IP address is 192.168.1.23, you would ping 192.168.1.0, 192.168.1.1, 192.168.1.2, ... , 192.168.1.255.

For each address, analyze whether it is reachable or not. Print the results in sorted, order, i.e.,

```
My IP address is 192.168.1.23
IP address 192.168.1.0 is unreachable
IP address 192.168.1.1 is reachable
IP address 192.168.1.2 is reachable
IP address 192.168.1.3 is unreachable
...
IP address 192.168.1.254 is reachable
IP address 192.168.1.255 is unreachable
```

Time your program and see how long it takes to execute. To time your program, use `time.clock()`. Your code can look like this:

```
import time
starttime = time.clock()
```

# Put your code to ping IPs here

```
finishtime = time.clock()  
print "Elapsed time is ", (finishtime - starttime)  
Save your script in HW10.seq.<lastname>.py
```

(7) Now convert your script above to be a threaded version that launches a separate thread for each ping command and runs the threads simultaneously. Have the program produce the same output. Time your program (as in part (6)) -- you should see a dramatic performance improvement.

Save your script in HW10.thr.<lastname>.py

(8) Produce a transcript of both scripts running on your system (How you do this will depend on your version of Python. For example, in IPython, you would use the %save command.) Save this in a file HW10.script.<lastname>.txt. Make sure that the timings are in those transcripts.

(9) Submit your homework using the usual method.

## EXTRA CREDIT

Instead of parts (1) and (2) above, do the following:

(1) Read the documentation of netifaces, and install the package: <https://pypi.python.org/pypi/netifaces>

(2) Write a python script to find the IP address of your computer, and print it out, e.g.:

My IP address is 192.168.1.23

You may find the discussion here helpful: <http://stackoverflow.com/questions/270745/how-do-i-determine-all-of-my-ip-addresses-when-i-have-multiple-nics>

hw10