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### Working with Remote UNIX Machines

1. What is a “host name”?  
**A computer/system’s name on a network**
2. Find the “host name” of a Linux machine  
**hostname**
3. Find the IP address(s) of the Linux machine you are on  
**New way: ip addr | Old way: ifconfig**
4. Use the ping command to check if a remote system is alive  
**ping {ipaddress}**
5. Use the traceroute command to find the routing path between your computer and Google  
**traceroute google.com**
6. Use secure shell to log into a lab machine “mct263s01.cs.ship.edu”  
**ssh {username}@mct263s01.cs.ship.edu**
7. The UNIX ssh command supports “escape sequences,” describe how you would use the escape sequence to terminate an SSH command  
**Escape sequences are only really used for pseudo terminals, and they are accessed through the ~ key. SSH can be terminated using ~.**
8. Use secure shell to run the “/bin/ls” command on a remote Linux machine  
**Once logged in via ssh, just type “ls” and hit enter**

## UNIX Remote Commands

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9. When you sign in to a department machine, where are your files stored?

**On the SoE's server. More specifically, according to web.engr.ship.edu, home directories are stored on the FSERV file server**

10. What is your "home directory" on our machines?

**A virtualized version of the home directory that is on the department server that Appears under /home/{username}/**

11. How much space are you using in your home directory? (see #22 on previous assignment)

**Once logged in, run "du -h" I am currently using 4.3G**

12. How do you access your files stored on our server from your personal machine?

**I personally use sshfs to mount my files into a local directory using the command: sshfs {username}@sloop.engr.ship.edu:/home/{username} {localdirectory}/ There are numerous other options available though.**

13. How do you change your UNIX password if you are on Sloop or any of our other machines?

**adpasswd or passwd**

14. If you use the same password on Sloop and our other UNIX machines, where do you think your password is stored?

**It is most likely in /etc/shadow on the department server as passwords are typically stored there on linux machines**

15. How can you list the network connections on a machine?

**netstat or ss**

16. SSH allows a technique called port-forwarding. Show the command line that would enable a program, such as a webserver running on port 80 on YOUR machine be served by sloop as port 9999.

**ssh -R 9999:127.0.0.1:80 {username}@sloop.engr.ship.edu**

**But this only works if GatewayPorts is enabled.**

**In the man page:**

Specifying a remote bind\_address will only succeed if the server's GatewayPorts option is enabled

17. I am sitting in a classroom with a high-performance UNIX workstation, probably 16-core, 4GHz computer, with 32GB of RAM, and a fast NVMe drive. Our systems administrator works hard to keep all of our Linux systems configured the same. I have this workstation all to myself. My professor says I'm supposed to do everything on Sloop, why is this silly? (see #9 and #10)

**If you're logged in on a lab machine, it is already connected to the department server. Therefore, logging in through sloop would be completely redundant.**

18. Describe what the "rsync" command does

**It is a file copying tool that can work over remote shells. It is famous for its delta-transfer algorithm that only sends differences between source files and destination files, according to the man page.**

19. How would use it to copy all of the files in your home directory to your personal machine?  
**rsync -avz {username}@sloop.engr.ship.edu:/home/{username}/ {localdirectory}**  
**-a → archive(recurse and save permissions etc.) -v → verbose -z → compress**

20. The secure-shell environment also includes the "sftp" command, which allows you to select files, one by one. Show an example of how you would transfer a file "readme.md" from your computer to a remote computer:

**sftp {username}@{remote}**  
**put readme.md /path/to/file/destination/**  
**bye**

21. The sftp command also transfers files using wildcards. Show how you would download a whole directory using sftp.

**sftp {username}@{remote}**  
**get directory/\***  
**bye**

22. Use the 'nslookup' command to find the IP address of a hostname, such as [www.google.com](http://www.google.com)  
**nslookup is considered deprecated on Arch linux since 2013, as were dig and host commands. All 3 were replaced by drill, and the command is "drill www.google.com" The nslookup equivalent was "nslookup www.google.com"**

23. Use the 'nslookup' command to find the host name for an IP address, such as: 8.8.8.8

**nslookup 8.8.8.8**  
**or now:**  
**drill -x 8.8.8.8**

24. Use the 'whois' command to find out who the administrative point of contact for "ship.edu" is:  
**whois ship.edu**

**Gives: "Domain Admin" abd@ship.edu**

25. Use the finger utility on sloop or clipper to "finger" someone in this class:  
**finger {username}**

26. Suppose you want to run eclipse on a Linux station. It requires graphics (known as X11 in UNIX). How would you enable SSH to "forward" your X11 session?  
**-X enables X11 forwarding, and -Y enables trusted X11 forwarding, so:**  
**ssh -X {username}@{domain/machine}.engr.ship.edu**

27. Sometimes engineers need to use a web browser from "outside" to test how their application will work. Show how you can run "firefox" from a Linux computer and have its graphical display appear on your computer:  
**ssh -X {username}@{domain/machine}.engr.ship.edu**  
**firefox**

28. Lookup the "wget" command, and show how you would download a web page to a text file.  
**wget {url} -O {filename}**

29. Lookup the "wget" command, show how you download all of the files on a web page, recursively, to "mirror" or "spider" an entire site (and profit!)  
**wget -r {url}**

### So, you want to be an engineer?

Show the commands to do the following: compile a C program on your local machine. If you are using our machines, you can just ssh into the remote machine, or else you'll need to rsync the files over. Then, on the remote machine, use "gdb server" to start running the program remotely, and back on your local machine, use gdb to connect to the remote server, and run and debug the program. *Note: this is a common interview question in today's internet enabled world -for all CS, SE, CE, and EE. CE & EE students typically have to do this with different architectures (e.g. debug a program on MIPS from an Intel machine), while CS & SE will probably have to do this on an AWS or Azure or Docker image.*

**If necessary, connect over vpn to network when not local.**

#### Terminal 1

```
ssh {username}@sloop.cs.ship.edu
ip addr (need ip address)
cd to program directory
gcc -o foo foo.c
gdbserver localhost:5000 foo
```

#### Terminal 2

```
cd to program directory
gcc -o foo foo.c
gdb foo
> target remote {ipaddr}:5000
(sloop's ip was 157.160.36.12, so I ran
>target remote 157.160.36.12:5000)
```