CMPS 3620 Yang, Jonathan Lab 01

Command Line Networking Tools

1. For this Lab assignment, the tools DIG, PING, TRACEROUTE, TRACEPATH, TELNET, NSLOOKUP, and NETSTAT were tested. DIG and NSLOOKUP seemed to provide the most useful information regarding information about the server, while PING, TRACEROUTE/TRACEPATH, and NETSTAT provided information about how well the connection between the client and server is operating. TELNET seems to have more utility if one is able to connect to the host directly. All of the tools were able to work on both google.com and cs.csub.edu.

2.

Output for dig www.cs.csub.edu

Output for dig soa www.cs.csub.edu

The difference between the two commands can be found in the AUTHORITY SECTION of the two outputs. With 'soa' included as a tag, the tool reveals the Start of Authority record including the primary name server (sleipnir.cs.csubak.edu), the responsible party (postmaster.cs.csubak.edu), and the time that the domain was last updated.

3. The command dig soa 224.9.209.in-addr.arpa will find the Start of Authority record. In-addr.arpa is used to determine which IP address is associated with a host name through reverse mapping the inverse address.

4. If the error message includes --- unknown host ---, the likely problem is that while trying to PING ftp.foo.com, the host server does not have their DNS properly configured. This could be investigated with the NSLOOKUP command in order to test the host name resolution and check DNS server registration

5. If the error message includes '... Connection timed out', a connection possibly via TELNET, SSH, or TELNET was not able to be formed. This could be an error caused by the host server being down or not existing at that domain and could be also checked by NSLOOKUP to check if the domain exists or is down.

```
jyang@odin: ~ — — X

Trying 208.207.151.35...
telnet: Unable to connect to remote host:
Connection timed out
jyang@odin: ~ $
```

```
jyang@odin:~\$ nslookup 208.207.151.35
Server: 136.168.201.100
Address: 136.168.201.100#53

** server can't find 35.151.207.208.in-addr.arpa: NXDOMAIN
jyang@odin:~\$
```

Conclusion:

DIG is clearly the most versatile tool of those used, while PING and NSLOOKUP provide very quick valuable information. The importance of TRACEROUTE/TRACEPATH and NETSTAT is not yet known to me yet, but I am sure it will be heavily used in the future due to the large stream of data to be had with those searches.

ADDITIONAL SCREENSHOTS OF COMMANDS

DIG

```
jyang@odin: ~
 yang@odin:~$ dig www.cs.csub.edu
<<>> DiG 9.10.3-P4-Debian <<>> www.cs.csub.edu
; global options: +cmd
; Got answer:
   ->>HEADER<-- opcode: QUERY, status: NOERROR, id: 19387
flags: qr aa rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 4, ADDITIONAL: 5
; OPT PSEUDOSECTION:
EDNS: version: 0, flags:; udp: 4096
; QUESTION SECTION:
 www.cs.csub.edu.
                                                             ΙN
; ANSWER SECTION:
www.cs.csub.edu.
odin.cs.csub.edu.
                                                                            CNAME
                                                                                            odin.cs.csub.edu.
136.168.201.110
; AUTHORITY SECTION:
                                                                                            ns1.csub.edu.
ns0.csub.edu.
sleipnir.cs.csubak.edu.
tux.cs.csubak.edu.
                                                                            NS
NS
NS
s.csub.edu.
s.csub.edu.
                                             86400
                                                             IN
IN
IN
                                             86400
86400
s.csub.edu.
s.csub.edu.
; ADDITIONAL SECTION:
, Abbirtional Section.

$0.csub.edu. 275

$1.csub.edu. 275

ux.cs.csubak.edu. 86400

leipnir.cs.csubak.edu. 86400
                                                                                            136.168.1.4
136.168.1.91
136.168.201.117
136.168.201.100
ns0.csub.edu.
ns1.csub.edu.
 ; Query time: 1 msec
; SERVER: 136.168.201.100#53(136.168.201.100)
; WHEN: Sat Jan 26 00:12:30 PST 2019
; MSG SIZE rcvd: 230
yang@odin:~$
```

PING

TRACEROUTE

```
traceroute to www.google.com (216.58.195.228), 30 hops max, 60 byte packets

1 136.168.201.1 (136.168.201.1) 0.948 ms 0.897 ms 0.898 ms
2 bak-11-r100a-rbofv_lethip2.csub.edu (136.168.201.1) 2.72 ms 1.665 ms 1.694 ms
3 bak-2ng2-rsubkers*[inched] 1.60 to 1.605 ms 1.
```

```
jyang@odin:~$ traceroute cs.csub.edu
traceroute to cs.csub.edu (136.168.201.110), 30 hops max, 60 byte packets
1 odin.cs.csubak.edu (136.168.201.110) 0.031 ms 0.012 ms 0.011 ms
jyang@odin:~$ traceroute -n cs.csub.edu
traceroute to cs.csub.edu (136.168.201.110), 30 hops max, 60 byte packets
1 136.168.201.110 0.029 ms 0.012 ms 0.011 ms
jyang@odin:~$ traceroute 136.168.201.110
traceroute to 136.168.201.110 (136.168.201.110), 30 hops max, 60 byte packets
1 odin.cs.csubak.edu (136.168.201.110) 0.032 ms 0.013 ms 0.010 ms
jyang@odin:~$
```

TRACEPATH

```
jyang@odin:~

jyang@odin:~
tracepath cs.csub.edu
1: odin.cs.csubak.edu
    Resume: pmtu 65535 hops 1 back 1
jyang@odin:~
tracepath -n cs.csub.edu
1: 136.168.201.110
    Resume: pmtu 65535 hops 1 back 1
jyang@odin:~

0.062ms reached
iyang@odin:~
$
```

```
| Tyang@odin:-5 traceroute -n google.com | Traceroute to google.com (172.217.11.78), 30 hops max, 60 byte packets | 1 336.168.201.1 0.879 ms 0.870 ms 0.855 ms | 2 136.168.204.1 1.715 ms 1.689 ms 1.646 ms | 3 136.168.248.1 1.715 ms 1.689 ms 1.646 ms | 3 136.168.248.1 1.875 ms 1.973 ms 2.086 ms | 4 137.164.49.246 6.498 ms 6.521 ms 6.581 ms | 6 137.164.49.246 6.498 ms 6.521 ms 6.561 ms | 6 137.164.222.56 10.690 ms 10.681 ms 137.164.11.2 12.084 ms | 7 72.14.222.56 10.607 ms 10.410 ms 74.125.49.165 10.410 ms | 8 108.170.247.225 10.389 ms 108.170.247.193 11.594 ms 108.170.247.225 10.389 ms 108.170.247.193 11.594 ms 108.170.247.225 10.530 ms | 9 108.170.247.225 10.480 ms 108.170.247.193 10.450 ms 10.425 ms | 10.2217.11.78 10.285 ms 10.333 ms | 10.2217.11.78 10.285 ms 10.333 ms | 10.425 ms | 10.
```

TELNET

```
iyang@odin:~$ telnet google.com 443
Trying 172.217.11.78...
Connected to google.com.
Escape character is 'A]'.
A]
telnet> quit
Connection closed.
jyang@odin:~$ telnet cs.csub.edu 443
Trying 136.168.201.110...
Connected to cs.csub.edu.
Escape character is 'A]'.
A]
telnet> quit
Connection closed.
jyang@odin:~$ telnet google.com 444
Trying 172.217.11.78...
Trying 2607:f8b0:4007:802::200e...
telnet: Unable to connect to remote host: Network is unreachable
jyang@odin:~$
```

NSLOOKUP

```
jyang@odin:~$ nslookup google.com
Server: 136.168.201.100
Address: 136.168.201.100#53

Non-authoritative answer:
Name: google.com
Address: 172.217.11.78

jyang@odin:~$ nslookup 172.217.11.78

Server: 136.168.201.100
Address: 136.168.201.100
Address: 136.168.201.100#53

Non-authoritative answer:
78.11.217.172.in-addr.arpa name = lax17s34-in-f14.1e100.net.

Authoritative answers can be found from:
217.172.in-addr.arpa nameserver = ns1.google.com.
217.172.in-addr.arpa nameserver = ns4.google.com.
217.172.in-addr.arpa nameserver = ns2.google.com.
217.172.in-addr.arpa nameserver = ns3.google.com.
ns1.google.com internet address = 216.239.32.10
ns1.google.com internet address = 216.239.34.10
ns2.google.com has AAAA address 2001:4860:4802:32::a
ns2.google.com internet address = 216.239.34.10
ns3.google.com internet address = 216.239.36.10
ns3.google.com internet address = 216.239.38.10
ns4.google.com internet address = 216.239.38.10
ns4.google.com has AAAA address 2001:4860:4802:38::a
jyang@odin:~$
```

```
| jyang@odin:~\$ jyang@odin:~\$ nslookup cs.csub.edu | Server: 136.168.201.100 | Address: 136.168.201.100 | Address: 136.168.201.100 | Server: 136.168.201.110 | Jyang@odin:~\$ nslookup 136.168.201.110 | Server: 136.168.201.100 | Address: 136.168.201.100 | Address: 136.168.201.100 | Address: 136.168.201.100#53 | Address: 136.168.201.10
```

jyang@odin:	~	- □ X
Active Intern	netstat cs.csub.edu net connections (w/o servers) Send-Q Local Address	Foreign Address
tcp 0	200 odin.cs.csubak.edu:ssh	107-144-229-20.re:54181
tcp 0	0 odin.cs.cs:zabbix-agent	blowfish.cs.csuba:38854
TIME_WAIT tcp 0	0 odin.cs.cs:zabbix-agent	blowfish.cs.csuba:39186
TIME_WAIT tcp 0	0 odin.cs.cs:zabbix-agent	blowfish.cs.csuba:39120
TIME_WAIT tcp 0	0 odin.cs.cs:zabbix-agent	blowfish.cs.csuba:38978
TIME_WAIT tcp 0	0 odin.cs.cs:zabbix-agent	blowfish.cs.csuba:38980
TIME_WAIT tcp 0	0 odin.cs.cs:zabbix-agent	blowfish.cs.csuba:38840
TIME_WAIT tcp 0	0 odin.cs.cs:zabbix-agent	blowfish.cs.csuba:38896
TIME_WAIT tcp 0	0 odin.cs.cs:zabbix-agent	blowfish.cs.csuba:38846
TIME_WAIT tcp 0	0 odin.cs.cs:zabbix-agent	blowfish.cs.csuba:38946
TIME_WAIT tcp 0	0 odin.cs.cs:zabbix-agent	blowfish.cs.csuba:39134
TIME_WAIT tcp 0	0 odin.cs.cs:zabbix-agent	blowfish.cs.csuba:39192
TIME_WAIT tcp 0	0 odin.cs.cs:zabbix-agent	blowfish.cs.csuba:38936
TIME_WAIT tcp 0	0 odin.cs.cs:zabbix-agent	blowfish.cs.csuba:38806
TIME_WAIT tcp 0	0 odin.cs.csubak.edu:ssh	serpent.cs.csubak:34938
tcp 0	0 odin.cs.csubak.edu:ssh	creek.cs.csubak.e:33708
tcp 0	0 odin.cs.cs:zabbix-agent	blowfish.cs.csuba:38928
TIME_WAIT tcp 0	0 odin.cs.cs:zabbix-agent	blowfish.cs.csuba:39176
TIME_WAIT tcp 0	0 odin.cs.cs:zabbix-agent	blowfish.cs.csuba:38886
TIME_WAIT tcp 0	0 odin.cs.csubak.edu:ssh	serpent.cs.csubak:34566
tcp 0	0 odin.cs.cs:zabbix-agent	blowfish.cs.csuba:38912
TIME_WAIT tcp 0	0 odin.cs.cs:zabbix-agent	blowfish.cs.csuba:38984
TIME_WAIT		~

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tcp	0	0	odin cs cs:zab	hix-agent b	lowfish.cs.csuba:39172 TIME_WAIT	^
tcp	ŏ				07-144-229-20.re:62195 ESTABLISHED	
tcp	ŏ				erpent.cs.csubak:34934 ESTABLISHED	
tcp	ŏ	ŏ	odin cs cs:zab	hix-agent b	lowfish.cs.csuba:39432 TIME_WAIT	
tcp6		ň	odin cs csubak	ed https n	inja-crawler20.w:41768 ESTABLISHED	
		omain	ockets (w/o se	rvers)	mja cramici zo.m. 11700 ESTABETSHED	
	o RefCnt		Type	State	I-Node Path	
unix		ГТ	DGRAM	Jeace	754498073 /run/user/10271/systemd/notify	
unix		† †	DGRAM		22108444 /run/user/1002/systemd/notify	
unix		F 1	DGRAM		859687208 /run/user/10192/systemd/notify	
unix		řί	DGRAM		10359 /run/systemd/journal/socket	
unix		Ìή	DGRAM		20095 /run/systemd/notify	
unix		<u>ት</u> 1	DGRAM		20097 /run/systemd/cgroups-agent	
unix		Ìί	DGRAM		734455440 /run/user/10050/systemd/notify	
unix		Ìί	DGRAM		20114 /run/systemd/journal/syslog	
unix		Ìί	DGRAM		20127 /run/systemd/journal/dev-log	
unix		ΪÍ	DGRAM		803823784 /run/user/10167/systemd/notify	
unix		ΪÍ	DGRAM		97667503 /run/user/10086/systemd/notify	
unix		ΪÍ	DGRAM		127551158 /run/user/10126/systemd/notify	
unix		Ϊĺ	DGRAM		828161723 /run/user/1001/systemd/notify	
unix		Ϊĺ	DGRAM		764742081 /run/user/10042/systemd/notify	
unix		ΪÍ	DGRAM		859872725 /run/user/10486/systemd/notify	
unix	2	ΪÍ	DGRAM		24024 /run/user/1000/systemd/notify	
unix		Ϊĺ	DGRAM		858242787 /run/user/10105/systemd/notify	
unix		ΪÍ	DGRAM		858745828 /run/user/10067/systemd/notify	
unix	2	ΪÍ	DGRAM		247397610 /run/user/10454/systemd/notify	
unix	2	Ϊĺ	DGRAM		546501112 /run/user/10082/systemd/notify	
unix		Ϊĺ	DGRAM		642018045 /run/user/10196/systemd/notify	
unix		[j	STREAM	CONNECTED		
unix	3	ĪĪ	STREAM	CONNECTED	760116210 /var/run/dbus/system_bus_socket	
unix		[]	STREAM	CONNECTED		
unix	2	ΓĪ	STREAM	CONNECTED	839131589	\sim