Brandon Vo

Domain Name Server (DNS)

Instructions

You will set up two DNS servers on R1 and R2 that will host a primary and secondary zone, respectively.

R1 will be configured as the primary DNS server which will host the primary zone “cn.” This zone will contain R1, R2, and Kali. R2 will host the secondary zone, “second.cn.”, that will contain R2, R3, R4 and Ubuntu.

*Please note that the zone names should be named with a period (.) at the end.

Your goal is to configure a DNS server using BIND9 such that each machine can ping another by name. (e.g. ping Kali).

Part 1: Setup DNS Resolution

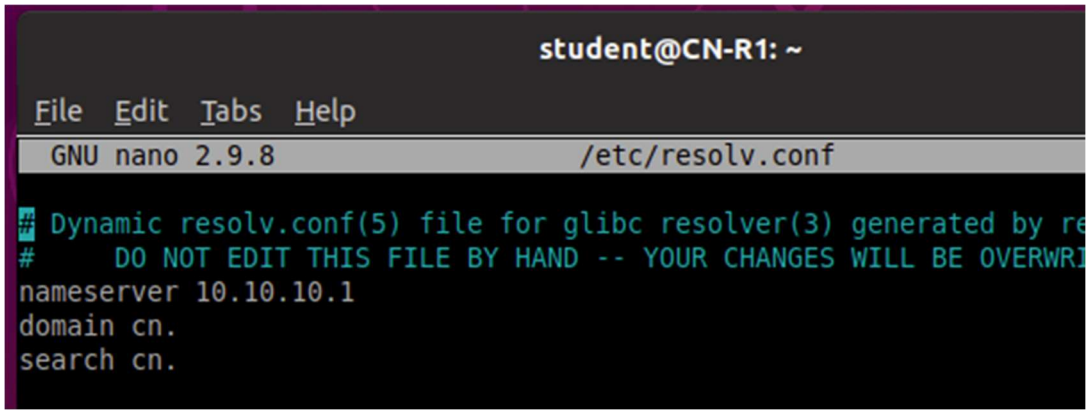
Prior to configuring our DNS servers, you need to setup our DNS resolution.

For each machine in Area 0, go to /etc/resolv.conf and replace any existing configuration directives with the following:

nameserver<eth1 interface address of R1>

domain <name of primary zone>

search <name of primary zone>



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Part 2:

On R1, edit /etc/bind/named.conf.local to include forward and reverse DNS zone names to BIND9.

Using the below template, name the primary zone, “cn.” and the forward zone file as “db.cn”:

zone "<primary zone>" {

type master;

file "/etc/bind/db.example";

};

Create another entry for the reverse zone, but this time you will name it according to the first three octets of our primary zone server; that is, “10.10.10.” and “db.10.10.10” for the reverse zone name and the reverse zone file, respectively.

Next, you will need to create and edit the forward and reverse zone files. The below command will allow you to copy an existing template:

sudo cp /etc/bind/db.local /etc/bind/db.cn

Edit this file by adding A records for R1, R2, and Kali.

You will do the same steps with the Reverse zone file which allows the DNS to resolve an address to a name. The above steps are roughly equivalent, except that you should create pointers for each A record that you configured in the forward zone file.

A pointer should be formatted like so:

10.X.X.X IN PTR <machine>.cn.

Once you’ve configured the forward and reverse zone files, restart the DNS service on R1.

sudo systemctl restart bind9.service

At this stage, you should be able to ping each machine by name from any machine in Area 0.

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```
                                                    student@CN-R1: /etc/bind
 File  Edit  Tabs  Help
  GNU nano 2.9.8                                          named.conf.local

//
// Do any local configuration here
//

zone "cn." {
        type master;
        file "/etc/bind/db.cn";
};

zone "10.10.10.in-addr.arpa"{
        type master;
        file "/etc/bind/db.10.10.10";
};
```

```
student@CN-R1:/etc/bind$ sudo nano db.10.10.10
student@CN-R1:/etc/bind$ sudo nano db.10.10.10.
student@CN-R1:/etc/bind$ named-checkzone 10. /etc/bind/db.10.10.10
/etc/bind/db.10.10.10:6: ignoring out-of-zone data (cn)
/etc/bind/db.10.10.10:14: ignoring out-of-zone data (cn)
/etc/bind/db.10.10.10:15: ignoring out-of-zone data (10.10.10.1.cn)
/etc/bind/db.10.10.10:17: ignoring out-of-zone data (10.10.10.2.cn)
/etc/bind/db.10.10.10:18: ignoring out-of-zone data (10.10.10.3.cn)
zone 10/IN: has 0 SOA records
zone 10/IN: has no NS records
zone 10/IN: not loaded due to errors.
student@CN-R1:/etc/bind$ named-checkzone 10. /etc/bind/db.10.10.10.
zone 10/IN: loaded serial 2
OK
student@CN-R1:/etc/bind$ named-checkzone cn. /etc/bind/db.10.10.10
zone cn/IN: NS 'cn' has no address records (A or AAAA)
zone cn/IN: not loaded due to errors.
student@CN-R1:/etc/bind$
```

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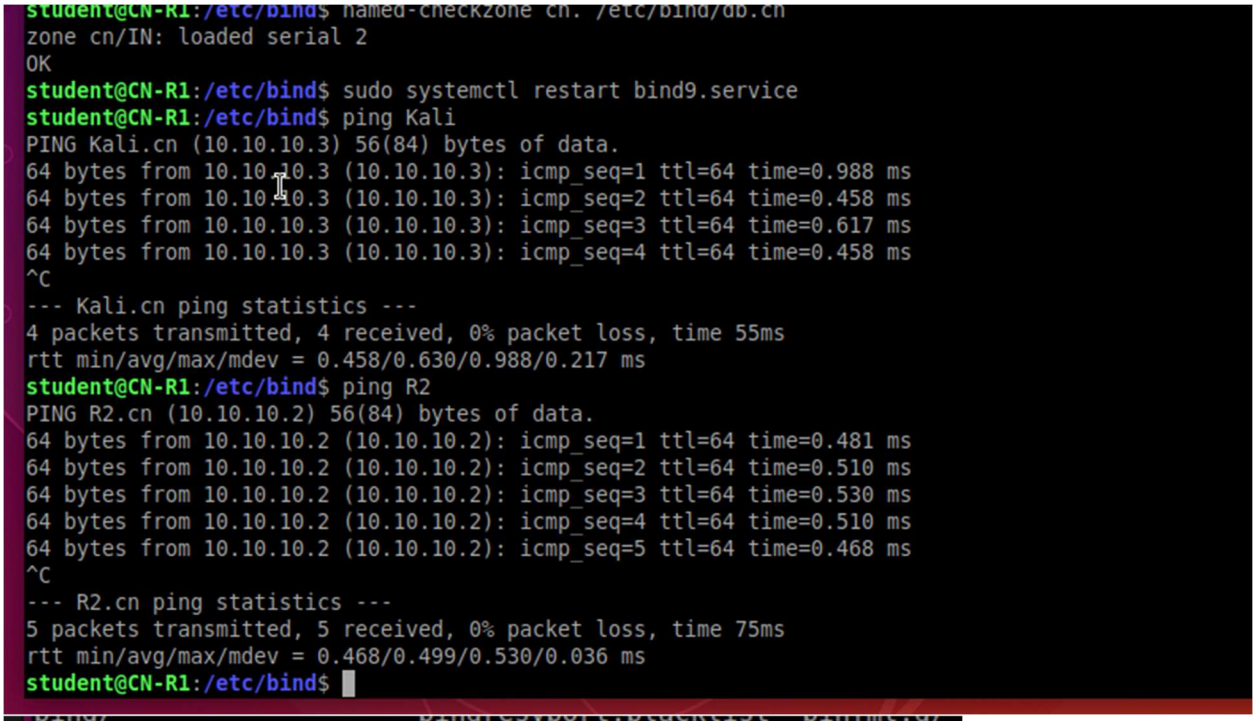
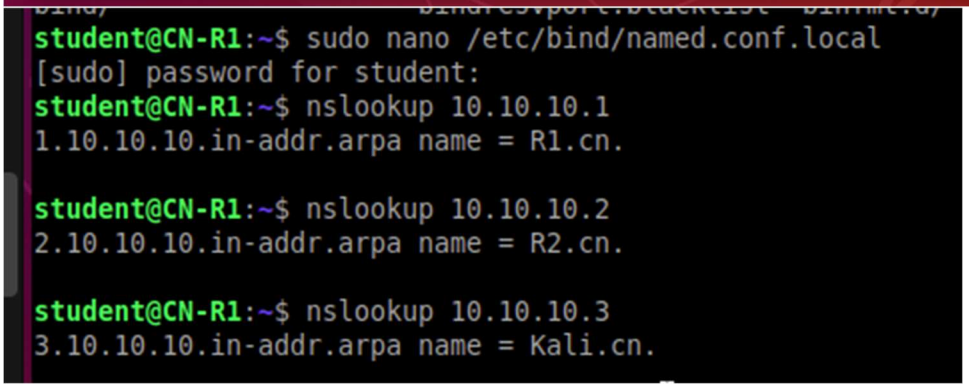

student@CN-R1:/etc/bind$ named-checkzone cn. /etc/bind/db.cn
zone cn/IN: loaded serial 2
OK
student@CN-R1:/etc/bind$ sudo systemctl restart bind9.service
student@CN-R1:/etc/bind$ ping Kali
PING Kali.cn (10.10.10.3) 56(84) bytes of data.
64 bytes from 10.10.10.3 (10.10.10.3): icmp_seq=1 ttl=64 time=0.988 ms
64 bytes from 10.10.10.3 (10.10.10.3): icmp_seq=2 ttl=64 time=0.458 ms
64 bytes from 10.10.10.3 (10.10.10.3): icmp_seq=3 ttl=64 time=0.617 ms
64 bytes from 10.10.10.3 (10.10.10.3): icmp_seq=4 ttl=64 time=0.458 ms
^C
--- Kali.cn ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 55ms
rtt min/avg/max/mdev = 0.458/0.630/0.988/0.217 ms
student@CN-R1:/etc/bind$ ping R2
PING R2.cn (10.10.10.2) 56(84) bytes of data.
64 bytes from 10.10.10.2 (10.10.10.2): icmp_seq=1 ttl=64 time=0.481 ms
64 bytes from 10.10.10.2 (10.10.10.2): icmp_seq=2 ttl=64 time=0.510 ms
64 bytes from 10.10.10.2 (10.10.10.2): icmp_seq=3 ttl=64 time=0.530 ms
64 bytes from 10.10.10.2 (10.10.10.2): icmp_seq=4 ttl=64 time=0.510 ms
64 bytes from 10.10.10.2 (10.10.10.2): icmp_seq=5 ttl=64 time=0.468 ms
^C
--- R2.cn ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 75ms
rtt min/avg/max/mdev = 0.468/0.499/0.530/0.036 ms
student@CN-R1:/etc/bind$


student@CN-R1:~$ sudo nano /etc/bind/named.conf.local
[sudo] password for student:
student@CN-R1:~$ nslookup 10.10.10.1
1.10.10.10.in-addr.arpa name = R1.cn.
student@CN-R1:~$ nslookup 10.10.10.2
2.10.10.10.in-addr.arpa name = R2.cn.
student@CN-R1:~$ nslookup 10.10.10.3
3.10.10.10.in-addr.arpa name = Kali.cn.

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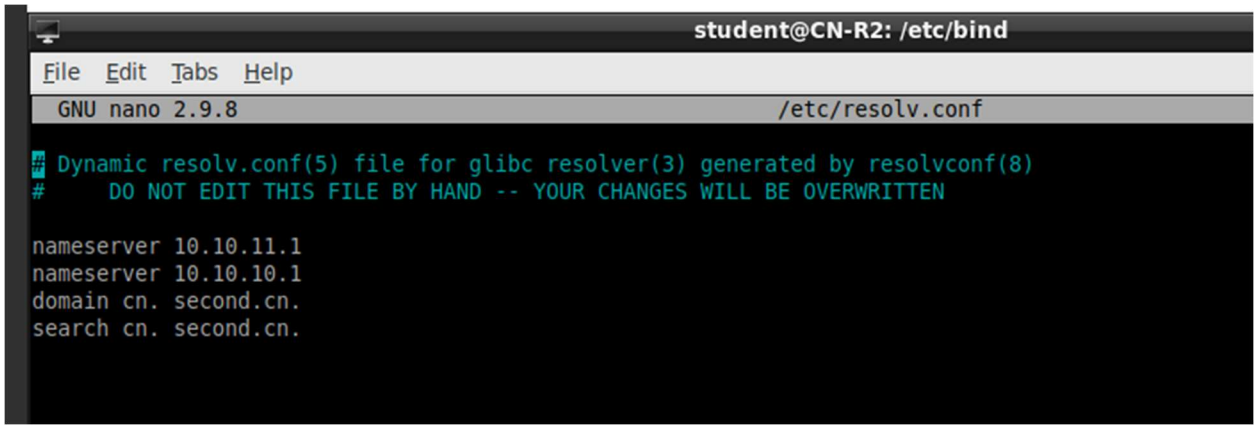
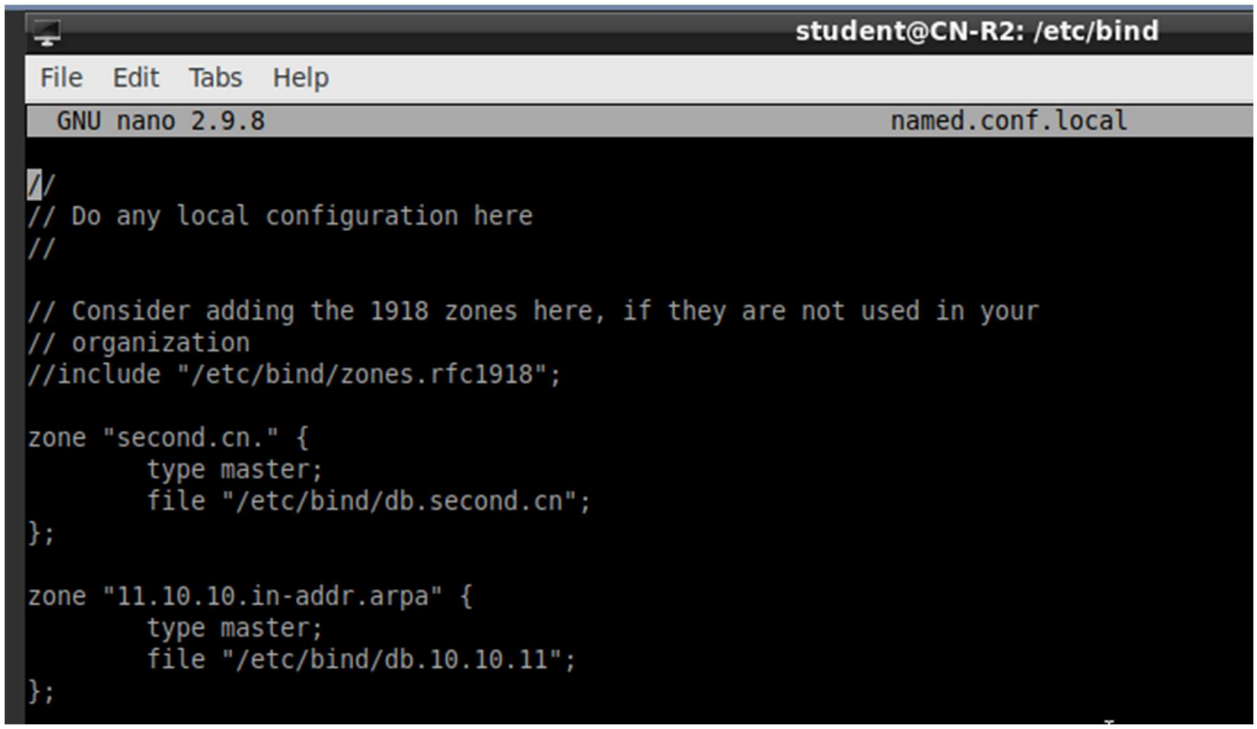
Part 3:

You will follow roughly the same steps in Parts 1 and 2 to configure the forward and reverse zone files for the secondary zone on R2. You will name the secondary zone second.cn. and use the IP interface configurations for R3, R4 and Ubuntu in the forward zone file.

Remember that your reverse zone file must be named according to the first 3 octets of your zone name.

You should be able to ping R2, R3, R4, and Ubuntu from any machine in Area 1. To link the subzone (second.cn.) to the main zone (cn.) add a NS record to the cn. zone file (/etc/bind/db.cn) which points to the address (R2) which hosts the second.cn. zone file.





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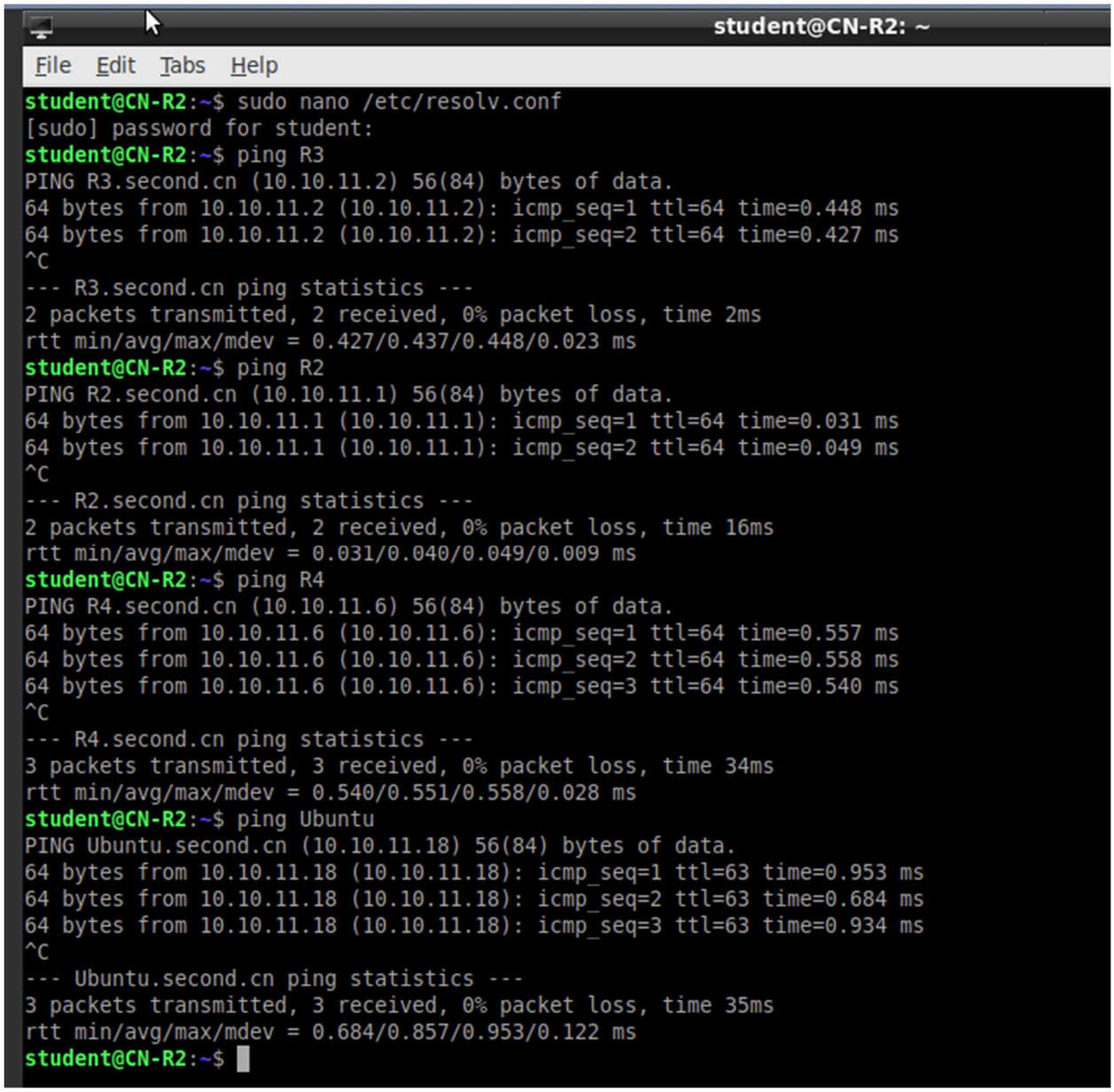
student@CN-R2: ~
File Edit Tabs Help
student@CN-R2:~$ sudo nano /etc/resolv.conf
[sudo] password for student:
student@CN-R2:~$ ping R3
PING R3.second.cn (10.10.11.2) 56(84) bytes of data.
64 bytes from 10.10.11.2 (10.10.11.2): icmp_seq=1 ttl=64 time=0.448 ms
64 bytes from 10.10.11.2 (10.10.11.2): icmp_seq=2 ttl=64 time=0.427 ms
^C
--- R3.second.cn ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 2ms
rtt min/avg/max/mdev = 0.427/0.437/0.448/0.023 ms
student@CN-R2:~$ ping R2
PING R2.second.cn (10.10.11.1) 56(84) bytes of data.
64 bytes from 10.10.11.1 (10.10.11.1): icmp_seq=1 ttl=64 time=0.031 ms
64 bytes from 10.10.11.1 (10.10.11.1): icmp_seq=2 ttl=64 time=0.049 ms
^C
--- R2.second.cn ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 16ms
rtt min/avg/max/mdev = 0.031/0.040/0.049/0.009 ms
student@CN-R2:~$ ping R4
PING R4.second.cn (10.10.11.6) 56(84) bytes of data.
64 bytes from 10.10.11.6 (10.10.11.6): icmp_seq=1 ttl=64 time=0.557 ms
64 bytes from 10.10.11.6 (10.10.11.6): icmp_seq=2 ttl=64 time=0.558 ms
64 bytes from 10.10.11.6 (10.10.11.6): icmp_seq=3 ttl=64 time=0.540 ms
^C
--- R4.second.cn ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 34ms
rtt min/avg/max/mdev = 0.540/0.551/0.558/0.028 ms
student@CN-R2:~$ ping Ubuntu
PING Ubuntu.second.cn (10.10.11.18) 56(84) bytes of data.
64 bytes from 10.10.11.18 (10.10.11.18): icmp_seq=1 ttl=63 time=0.953 ms
64 bytes from 10.10.11.18 (10.10.11.18): icmp_seq=2 ttl=63 time=0.684 ms
64 bytes from 10.10.11.18 (10.10.11.18): icmp_seq=3 ttl=63 time=0.934 ms
^C
--- Ubuntu.second.cn ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 35ms
rtt min/avg/max/mdev = 0.684/0.857/0.953/0.122 ms
student@CN-R2:~$

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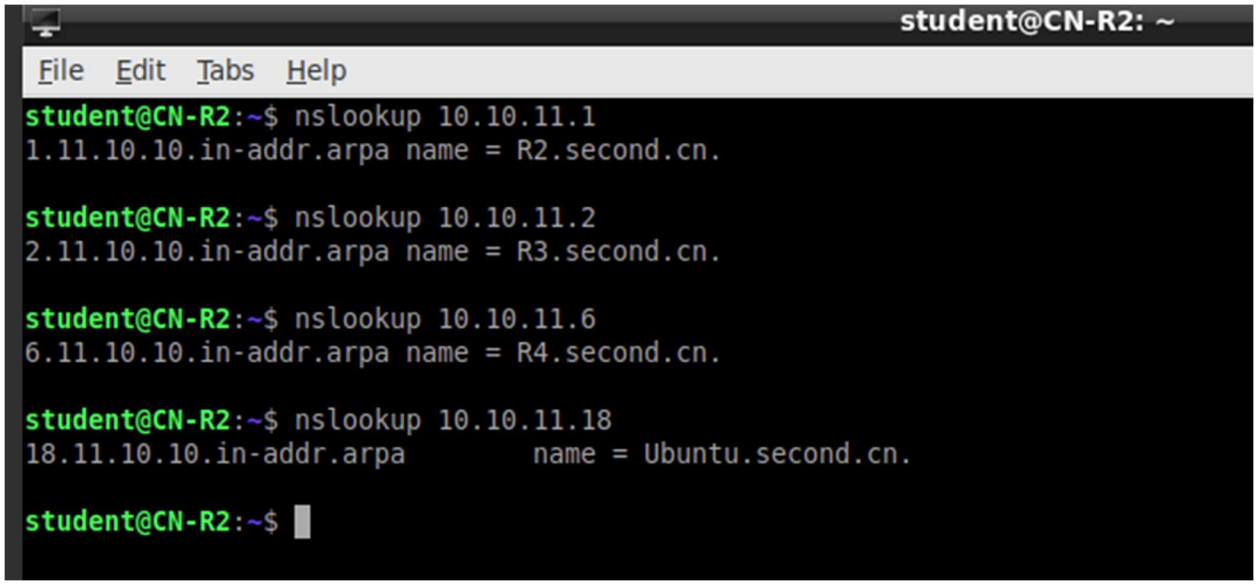
student@CN-R2: ~
File Edit Tabs Help
student@CN-R2:~$ nslookup 10.10.11.1
1.11.10.10.in-addr.arpa name = R2.second.cn.
student@CN-R2:~$ nslookup 10.10.11.2
2.11.10.10.in-addr.arpa name = R3.second.cn.
student@CN-R2:~$ nslookup 10.10.11.6
6.11.10.10.in-addr.arpa name = R4.second.cn.
student@CN-R2:~$ nslookup 10.10.11.18
18.11.10.10.in-addr.arpa name = Ubuntu.second.cn.
student@CN-R2:~$

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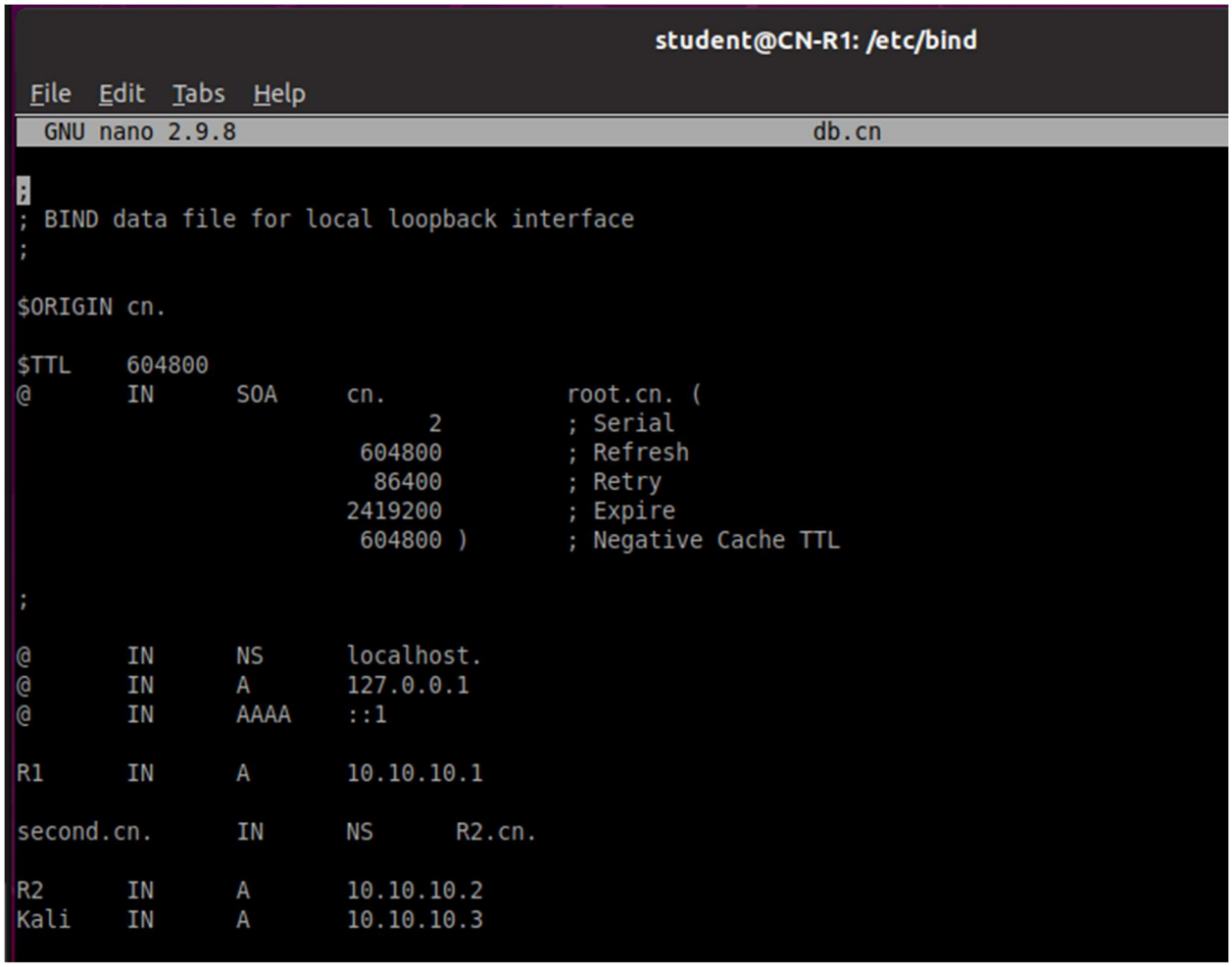
Submissions

[20 points] Forward and Reverse zone files for primary DNS server.

Primary



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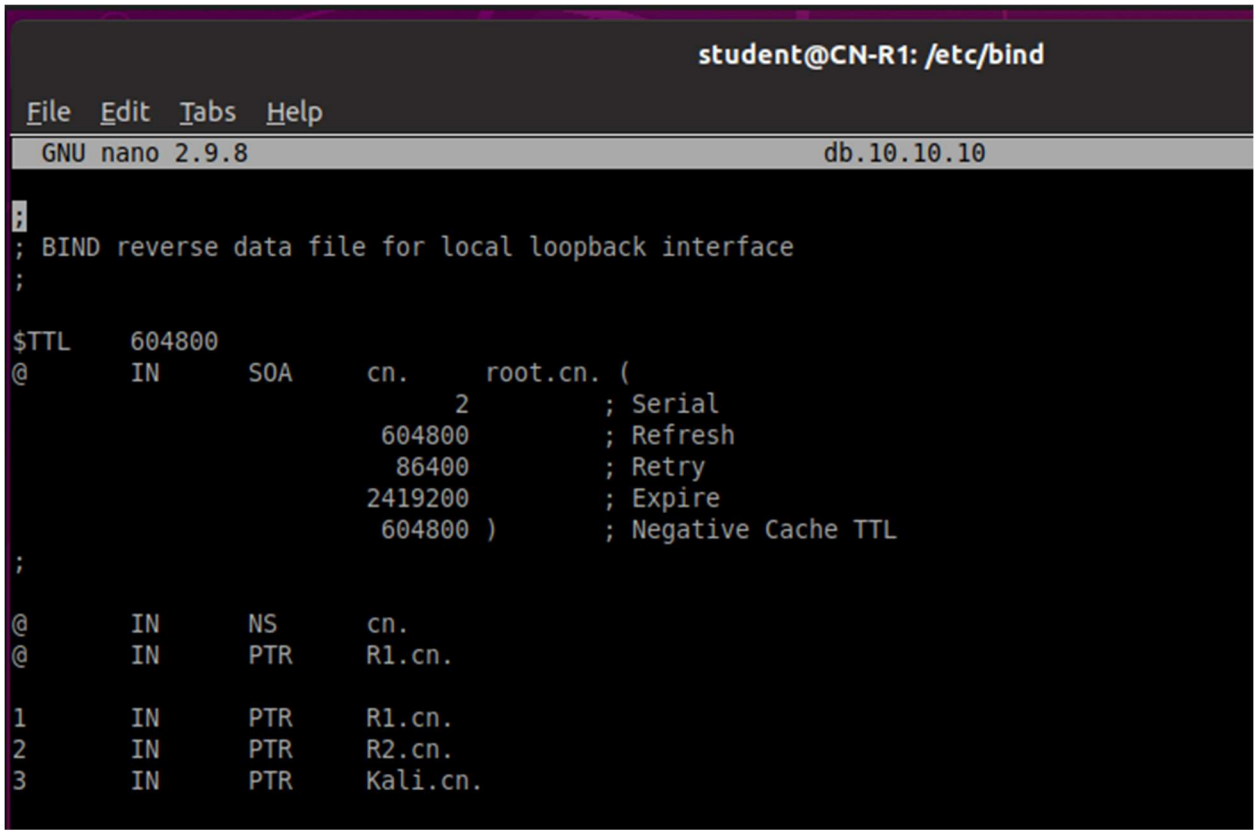
Reverse DNS zone



[30 points] Forward and Reverse zone files for secondary DNS server

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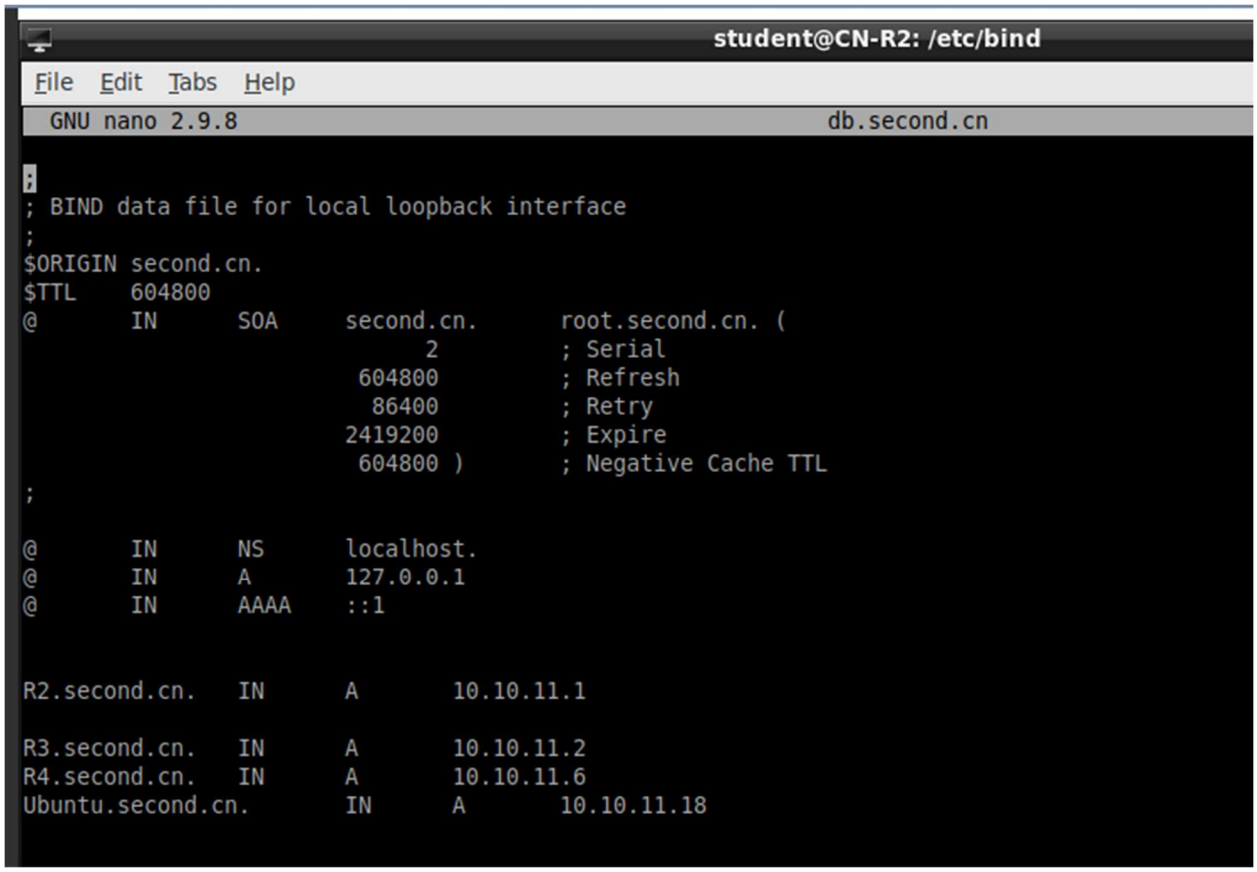
Primary zone file



Reverse zone file

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```
student@CN-R2: /etc/bind
File  Edit  Tabs  Help
 GNU nano 2.9.8                                  db.10.10.11

;
; BIND data file for local loopback interface
;
$TTL    604800
@       IN      SOA     second.cn.      root.second.cn. (
                              1         ; Serial
                         604800         ; Refresh
                          86400         ; Retry
                        2419200         ; Expire
                         604800 )       ; Negative Cache TTL
;
@       IN      NS      localhost.
@       IN      A       127.0.0.1
@       IN      AAAA    ::1

1       IN      PTR     R2.second.cn.

2       IN      PTR     R3.second.cn.
6       IN      PTR     R4.second.cn.
18      IN      PTR     Ubuntu.second.cn.
```

[20 points] Screenshots of R1 pinging R2 and Kali

```
student@CN-R1: ~
File  Edit  Tabs  Help
student@CN-R1:~$ ping R2
PING R2.cn (10.10.10.2) 56(84) bytes of data.
64 bytes from 10.10.10.2 (10.10.10.2): icmp_seq=1 ttl=64 time=0.292 ms
64 bytes from 10.10.10.2 (10.10.10.2): icmp_seq=2 ttl=64 time=0.578 ms
64 bytes from 10.10.10.2 (10.10.10.2): icmp_seq=3 ttl=64 time=0.472 ms
64 bytes from 10.10.10.2 (10.10.10.2): icmp_seq=4 ttl=64 time=0.307 ms
64 bytes from 10.10.10.2 (10.10.10.2): icmp_seq=5 ttl=64 time=0.430 ms
64 bytes from 10.10.10.2 (10.10.10.2): icmp_seq=6 ttl=64 time=0.512 ms
^C
--- R2.cn ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 124ms
rtt min/avg/max/mdev = 0.292/0.431/0.578/0.107 ms
student@CN-R1:~$ ping Kali
PING Kali.cn (10.10.10.3) 56(84) bytes of data.
64 bytes from 10.10.10.3 (10.10.10.3): icmp_seq=1 ttl=64 time=0.973 ms
64 bytes from 10.10.10.3 (10.10.10.3): icmp_seq=2 ttl=64 time=0.451 ms
64 bytes from 10.10.10.3 (10.10.10.3): icmp_seq=3 ttl=64 time=0.466 ms
64 bytes from 10.10.10.3 (10.10.10.3): icmp_seq=4 ttl=64 time=0.462 ms
^C
--- Kali.cn ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 61ms
rtt min/avg/max/mdev = 0.451/0.588/0.973/0.222 ms
```

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```
student@CN-R1:/etc/bind$ ping R2.second.cn.
PING R2.second.cn (10.10.11.1) 56(84) bytes of data.
64 bytes from 10.10.11.1 (10.10.11.1): icmp_seq=1 ttl=64 time=0.401 ms
64 bytes from 10.10.11.1 (10.10.11.1): icmp_seq=2 ttl=64 time=0.367 ms
^C
--- R2.second.cn ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 2ms
rtt min/avg/max/mdev = 0.367/0.384/0.401/0.017 ms
student@CN-R1:/etc/bind$ ping R2.second.cn.
```

```
                                                    student@CN-R1: ~
File  Edit  Tabs  Help
student@CN-R1:~$ ping R3.second.cn.
PING R3.second.cn (10.10.11.2) 56(84) bytes of data.
64 bytes from 10.10.11.2 (10.10.11.2): icmp_seq=1 ttl=63 time=2.21 ms
64 bytes from 10.10.11.2 (10.10.11.2): icmp_seq=2 ttl=63 time=0.670 ms
^C
--- R3.second.cn ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 3ms
rtt min/avg/max/mdev = 0.670/1.440/2.210/0.770 ms
student@CN-R1:~$ ping R4.second.cn.
PING R4.second.cn (10.10.11.6) 56(84) bytes of data.
64 bytes from 10.10.11.6 (10.10.11.6): icmp_seq=9 ttl=63 time=0.640 ms
64 bytes from 10.10.11.6 (10.10.11.6): icmp_seq=10 ttl=63 time=1.05 ms
64 bytes from 10.10.11.6 (10.10.11.6): icmp_seq=11 ttl=63 time=0.691 ms
64 bytes from 10.10.11.6 (10.10.11.6): icmp_seq=12 ttl=63 time=0.691 ms
^C
--- R4.second.cn ping statistics ---
12 packets transmitted, 4 received, 66.6667% packet loss, time 214ms
rtt min/avg/max/mdev = 0.640/0.767/1.047/0.164 ms
student@CN-R1:~$ ping Ubuntu.second.cn.
PING Ubuntu.second.cn (10.10.11.18) 56(84) bytes of data.
64 bytes from 10.10.11.18 (10.10.11.18): icmp_seq=5 ttl=62 time=1.24 ms
64 bytes from 10.10.11.18 (10.10.11.18): icmp_seq=6 ttl=62 time=6.99 ms
^C
--- Ubuntu.second.cn ping statistics ---
6 packets transmitted, 2 received, 66.6667% packet loss, time 105ms
rtt min/avg/max/mdev = 1.235/4.112/6.989/2.877 ms
student@CN-R1:~$
```

[30 points] Screenshots of R2 pinging R3, R4, and Ubuntu

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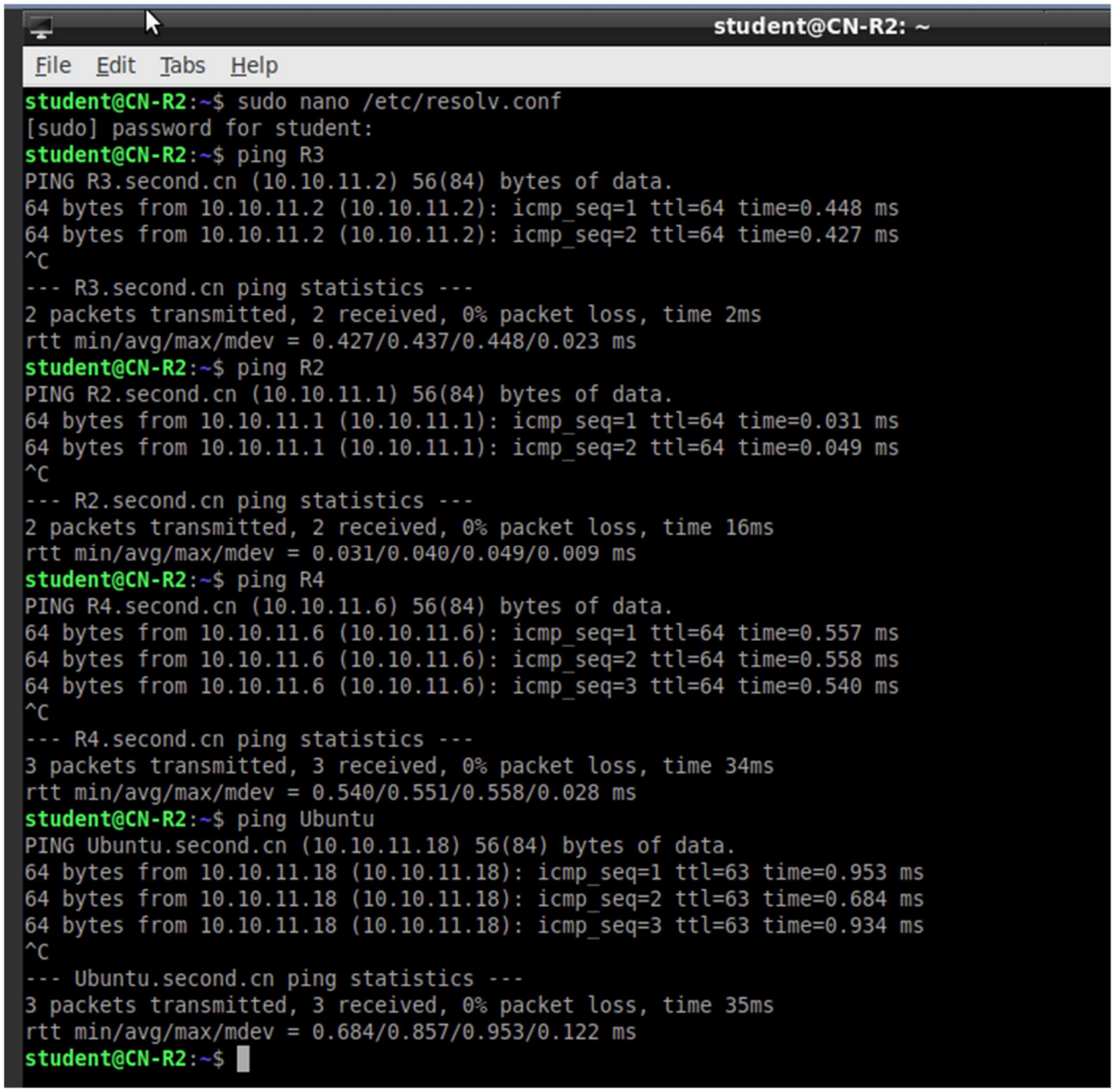
student@CN-R2: ~
File Edit Tabs Help
student@CN-R2:~$ sudo nano /etc/resolv.conf
[sudo] password for student:
student@CN-R2:~$ ping R3
PING R3.second.cn (10.10.11.2) 56(84) bytes of data.
64 bytes from 10.10.11.2 (10.10.11.2): icmp_seq=1 ttl=64 time=0.448 ms
64 bytes from 10.10.11.2 (10.10.11.2): icmp_seq=2 ttl=64 time=0.427 ms
^C
--- R3.second.cn ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 2ms
rtt min/avg/max/mdev = 0.427/0.437/0.448/0.023 ms
student@CN-R2:~$ ping R2
PING R2.second.cn (10.10.11.1) 56(84) bytes of data.
64 bytes from 10.10.11.1 (10.10.11.1): icmp_seq=1 ttl=64 time=0.031 ms
64 bytes from 10.10.11.1 (10.10.11.1): icmp_seq=2 ttl=64 time=0.049 ms
^C
--- R2.second.cn ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 16ms
rtt min/avg/max/mdev = 0.031/0.040/0.049/0.009 ms
student@CN-R2:~$ ping R4
PING R4.second.cn (10.10.11.6) 56(84) bytes of data.
64 bytes from 10.10.11.6 (10.10.11.6): icmp_seq=1 ttl=64 time=0.557 ms
64 bytes from 10.10.11.6 (10.10.11.6): icmp_seq=2 ttl=64 time=0.558 ms
64 bytes from 10.10.11.6 (10.10.11.6): icmp_seq=3 ttl=64 time=0.540 ms
^C
--- R4.second.cn ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 34ms
rtt min/avg/max/mdev = 0.540/0.551/0.558/0.028 ms
student@CN-R2:~$ ping Ubuntu
PING Ubuntu.second.cn (10.10.11.18) 56(84) bytes of data.
64 bytes from 10.10.11.18 (10.10.11.18): icmp_seq=1 ttl=63 time=0.953 ms
64 bytes from 10.10.11.18 (10.10.11.18): icmp_seq=2 ttl=63 time=0.684 ms
64 bytes from 10.10.11.18 (10.10.11.18): icmp_seq=3 ttl=63 time=0.934 ms
^C
--- Ubuntu.second.cn ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 35ms
rtt min/avg/max/mdev = 0.684/0.857/0.953/0.122 ms
student@CN-R2:~$

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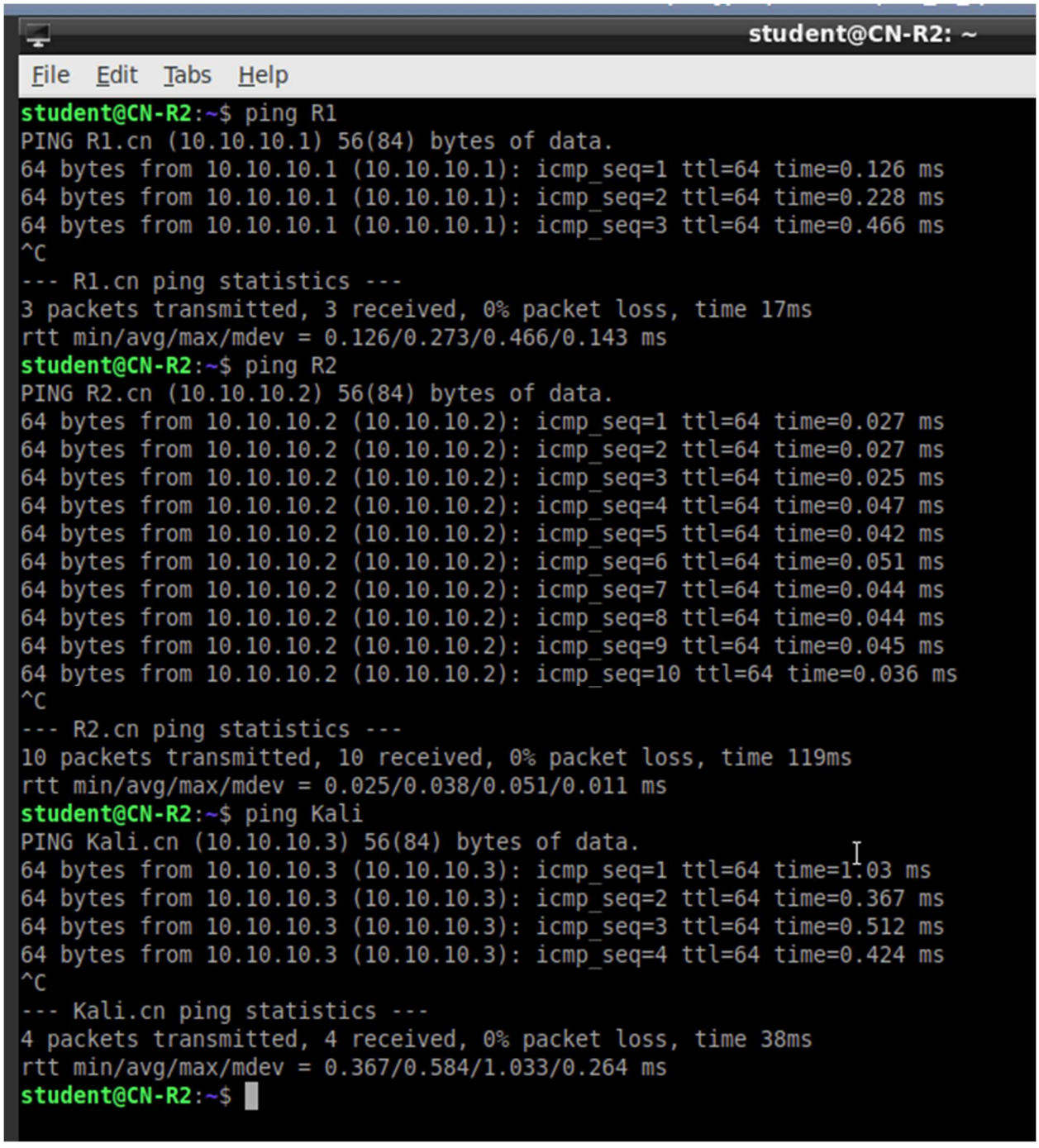
student@CN-R2: ~
File Edit Tabs Help
student@CN-R2:~$ ping R1
PING R1.cn (10.10.10.1) 56(84) bytes of data.
64 bytes from 10.10.10.1 (10.10.10.1): icmp_seq=1 ttl=64 time=0.126 ms
64 bytes from 10.10.10.1 (10.10.10.1): icmp_seq=2 ttl=64 time=0.228 ms
64 bytes from 10.10.10.1 (10.10.10.1): icmp_seq=3 ttl=64 time=0.466 ms
^C
--- R1.cn ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 17ms
rtt min/avg/max/mdev = 0.126/0.273/0.466/0.143 ms
student@CN-R2:~$ ping R2
PING R2.cn (10.10.10.2) 56(84) bytes of data.
64 bytes from 10.10.10.2 (10.10.10.2): icmp_seq=1 ttl=64 time=0.027 ms
64 bytes from 10.10.10.2 (10.10.10.2): icmp_seq=2 ttl=64 time=0.027 ms
64 bytes from 10.10.10.2 (10.10.10.2): icmp_seq=3 ttl=64 time=0.025 ms
64 bytes from 10.10.10.2 (10.10.10.2): icmp_seq=4 ttl=64 time=0.047 ms
64 bytes from 10.10.10.2 (10.10.10.2): icmp_seq=5 ttl=64 time=0.042 ms
64 bytes from 10.10.10.2 (10.10.10.2): icmp_seq=6 ttl=64 time=0.051 ms
64 bytes from 10.10.10.2 (10.10.10.2): icmp_seq=7 ttl=64 time=0.044 ms
64 bytes from 10.10.10.2 (10.10.10.2): icmp_seq=8 ttl=64 time=0.044 ms
64 bytes from 10.10.10.2 (10.10.10.2): icmp_seq=9 ttl=64 time=0.045 ms
64 bytes from 10.10.10.2 (10.10.10.2): icmp_seq=10 ttl=64 time=0.036 ms
^C
--- R2.cn ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 119ms
rtt min/avg/max/mdev = 0.025/0.038/0.051/0.011 ms
student@CN-R2:~$ ping Kali
PING Kali.cn (10.10.10.3) 56(84) bytes of data.
64 bytes from 10.10.10.3 (10.10.10.3): icmp_seq=1 ttl=64 time=1.03 ms
64 bytes from 10.10.10.3 (10.10.10.3): icmp_seq=2 ttl=64 time=0.367 ms
64 bytes from 10.10.10.3 (10.10.10.3): icmp_seq=3 ttl=64 time=0.512 ms
64 bytes from 10.10.10.3 (10.10.10.3): icmp_seq=4 ttl=64 time=0.424 ms
^C
--- Kali.cn ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 38ms
rtt min/avg/max/mdev = 0.367/0.584/1.033/0.264 ms
student@CN-R2:~$