Assignment 7 Report
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DHCP Server:

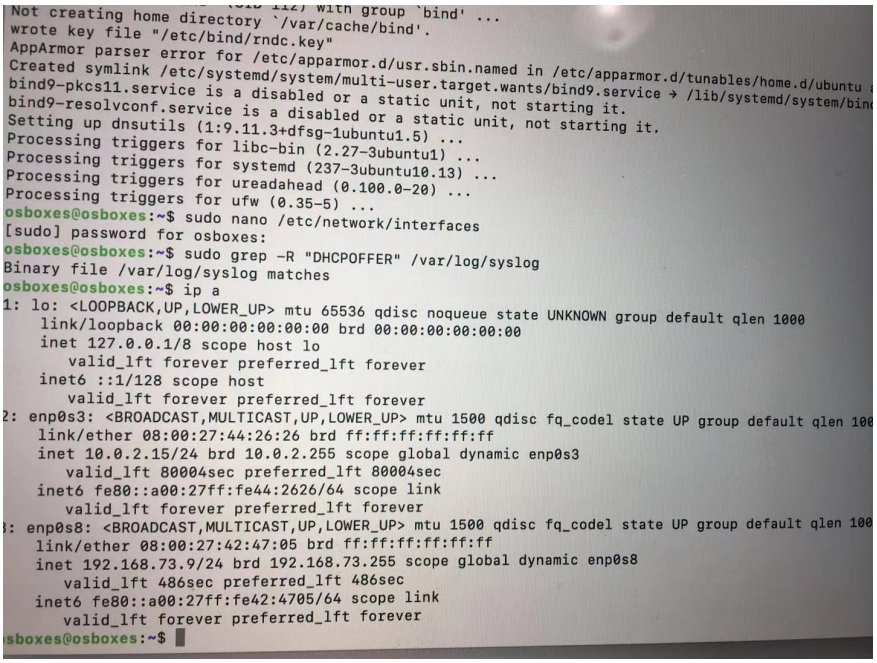
For this exercise, I followed the video that from youtube: https://www.youtube.com/watch?v=j3wsYskgdAs
I firstly installed the dhcp server with isc-dhcp-server, then followed the video to modify
/etc/default/isc-dhcp-server
/etc/dhcp/dhcpd.conf
(all in week7 folder)
Then start the dhcp service and check the status of dhcp server:

```
osboxes@osboxes:/etc/bind$ sudo systemctl status isc-dhcp-server
● isc-dhcp-server.service - ISC DHCP IPv4 server
   Loaded: loaded (/lib/systemd/system/isc-dhcp-server.service; enabled; vendor preset: enabled)
   Active: active (running) since Sat 2019-02-23 06:30:17 UTC; 1h 21min ago
     Docs: man:dhcpd(8)
 Main PID: 1346 (dhcpd)
    Tasks: 1 (limit: 4662)
   CGroup: /system.slice/isc-dhcp-server.service
           └─1346 dhcpd -user dhcpd -group dhcpd -f -4 -pf /run/dhcp-server/dhcpd.pid -cf /etc/dhcp/dhcpd.co

Feb 23 07:34:44 osboxes dhcpd[1346]: DHCPREQUEST for 192.168.73.52 from 08:00:27:a0:90:52 via enp0s8: unknow
Feb 23 07:35:41 osboxes dhcpd[1346]: DHCPREQUEST for 192.168.73.96 from 08:00:27:56:2c:b9 via enp0s8: unknow
Feb 23 07:38:00 osboxes dhcpd[1346]: DHCPREQUEST for 192.168.73.59 from 08:00:27:42:47:05 via enp0s8: unknow
Feb 23 07:39:02 osboxes dhcpd[1346]: DHCPREQUEST for 192.168.73.145 from 08:00:27:0b:0d:3a via enp0s8: unkno
Feb 23 07:42:32 osboxes dhcpd[1346]: DHCPREQUEST for 192.168.73.59 from 08:00:27:54:69:e7 via enp0s8: unknow
Feb 23 07:44:25 osboxes dhcpd[1346]: DHCPREQUEST for 192.168.73.96 from 08:00:27:56:2c:b9 via enp0s8: unknow
Feb 23 07:46:43 osboxes dhcpd[1346]: DHCPREQUEST for 192.168.73.59 from 08:00:27:42:47:05 via enp0s8: unknow
Feb 23 07:47:46 osboxes dhcpd[1346]: DHCPREQUEST for 192.168.73.145 from 08:00:27:0b:0d:3a via enp0s8: unkno
Feb 23 07:51:14 osboxes dhcpd[1346]: DHCPREQUEST for 192.168.73.59 from 08:00:27:54:69:e7 via enp0s8: unknow
Feb 23 07:51:26 osboxes dhcpd[1346]: DHCPREQUEST for 192.168.73.52 from 08:00:27:a0:90:52 via enp0s8: unknow
lines 1-19/19 (END)
```

After the configuration, Zahra and I both checked the ip a status, and I found that I could receive the ip address from her, and she also got the ip address that I assigned. In order to refuse other clients, we used “deny unknown clients” in the configuration.

```
01:38:33.435959 IP 192.168.73.32.68 > 192.168.73.9.67: BOOTP/DHCP, Request from 08:00:27:c8:23:93, length 289
01:38:33.450563 IP 192.168.73.9.67 > 192.168.73.32.68: BOOTP/DHCP, Reply, length 300
```



```
osboxes@osboxes:~$ sudo tcpdump -i enp0s8 port 67 -nn
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s8, link-type EN10MB (Ethernet), capture size 262144 bytes
01:37:53.814045 IP 0.0.0.0.68 > 255.255.255.255.67: BOOTP/DHCP, Request from 08:00:27:56:2c:b9, length 289
01:38:33.074441 IP 0.0.0.0.68 > 255.255.255.255.67: BOOTP/DHCP, Request from 08:00:27:42:47:05, length 289
01:38:33.091150 IP 192.168.73.32.67 > 192.168.73.9.68: BOOTP/DHCP, Reply, length 300
01:38:33.435959 IP 192.168.73.32.68 > 192.168.73.9.67: BOOTP/DHCP, Request from 08:00:27:c8:23:93, length 289
01:38:33.450563 IP 192.168.73.9.67 > 192.168.73.32.68: BOOTP/DHCP, Reply, length 300
01:39:07.350998 IP 192.168.73.52.68 > 255.255.255.255.67: BOOTP/DHCP, Request from 08:00:27:a0:90:52, length 300
01:39:16.034911 IP 192.168.73.52.68 > 255.255.255.255.67: BOOTP/DHCP, Request from 08:00:27:a0:90:52, length 300
01:39:22.391496 IP 192.168.73.52.68 > 255.255.255.255.67: BOOTP/DHCP, Request from 08:00:27:a0:90:52, length 300
01:39:28.927093 IP 192.168.73.52.68 > 255.255.255.255.67: BOOTP/DHCP, Request from 08:00:27:a0:90:52, length 300
01:39:37.803596 IP 192.168.73.52.68 > 255.255.255.255.67: BOOTP/DHCP, Request from 08:00:27:a0:90:52, length 300
01:39:43.196968 IP 192.168.73.52.68 > 255.255.255.255.67: BOOTP/DHCP, Request from 08:00:27:a0:90:52, length 300
01:39:44.307052 IP 192.168.73.52.68 > 255.255.255.255.67: BOOTP/DHCP, Request from 08:00:27:a0:90:52, length 300
01:39:52.236427 IP 192.168.73.52.68 > 255.255.255.255.67: BOOTP/DHCP, Request from 08:00:27:a0:90:52, length 300
01:39:57.958656 IP 192.168.73.52.68 > 255.255.255.255.67: BOOTP/DHCP, Request from 08:00:27:a0:90:52, length 300
01:39:58.267595 IP 0.0.0.0.68 > 255.255.255.255.67: BOOTP/DHCP, Request from 08:00:27:5b:c8:2d, length 289
01:39:58.268178 IP 192.168.73.65.67 > 255.255.255.255.68: BOOTP/DHCP, Reply, length 300
01:39:58.269114 IP 0.0.0.0.68 > 255.255.255.255.67: BOOTP/DHCP, Request from 08:00:27:5b:c8:2d, length 295
01:39:58.269821 IP 0.0.0.0.68 > 255.255.255.255.67: BOOTP/DHCP, Request from 08:00:27:5b:c8:2d, length 301
01:40:01.377744 IP 192.168.73.52.68 > 255.255.255.255.67: BOOTP/DHCP, Request from 08:00:27:a0:90:52, length 300
01:40:04.661335 IP 192.168.73.52.68 > 255.255.255.255.67: BOOTP/DHCP, Request from 08:00:27:a0:90:52, length 300
01:40:12.799271 IP 192.168.73.52.68 > 255.255.255.255.67: BOOTP/DHCP, Request from 08:00:27:a0:90:52, length 300
01:40:13.331529 IP 0.0.0.0.68 > 255.255.255.255.67: BOOTP/DHCP, Request from 08:00:27:a0:90:52, length 300
01:40:13.334571 IP 0.0.0.0.68 > 255.255.255.255.67: BOOTP/DHCP, Request from 08:00:27:a0:90:52, length 300
01:40:13.824091 IP 0.0.0.0.68 > 255.255.255.255.67: BOOTP/DHCP, Request from 08:00:27:a0:90:52, length 300
01:40:13.827642 IP 0.0.0.0.68 > 255.255.255.255.67: BOOTP/DHCP, Request from 08:00:27:a0:90:52, length 300
01:40:13.905994 IP 0.0.0.0.68 > 255.255.255.255.67: BOOTP/DHCP, Request from 08:00:27:a0:90:52, length 300
01:40:13.908634 IP 0.0.0.0.68 > 255.255.255.255.67: BOOTP/DHCP, Request from 08:00:27:a0:90:52, length 300
```

Domain Name System (DNS)
Exercise2 and Exercise3:

For this exercise, I followed the instruction from the website to modify zone files(in the week7 folder)
https://www.linuxtechi.com/install-configure-bind-9-dns-server-ubuntu-debian/
I have inserted the DNS records of both (cs.uoregon.edu and unusualname.com, testunusual.com which is the final one) domains, configured the forwarding in named.conf.options file, and here are the dig results:

```
osboxes@osboxes:/etc/bind$ sudo systemctl restart bind9
osboxes@osboxes:/etc/bind$ sudo systemctl enable bind9
Synchronizing state of bind9.service with SysV service script with /lib/systemd/systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable bind9
osboxes@osboxes:/etc/bind$ sudo ufw allow 10092
Rules updated
Rules updated (v6)
osboxes@osboxes:/etc/bind$ cd ~
osboxes@osboxes:~$ sudo named-checkconf /etc/bind/named.conf.local
/etc/bind/named.conf.local:14: '{' expected near 'master'
osboxes@osboxes:~$ sudo vim /etc/bind/named.conf.local
osboxes@osboxes:~$ sudo named-checkconf /etc/bind/named.conf.local
osboxes@osboxes:~$ sudo named-checkzone cs.uoregon.edu /etc/bind/forward.cs.uoregon.edu
zone cs.uoregon.edu/IN: loaded serial 2
OK
osboxes@osboxes:~$ sudo named-checkzone cs.uoregon.edu /etc/bind/reverse.cs.uoregon.edu
zone cs.uoregon.edu/IN: loaded serial 1
OK
osboxes@osboxes:~$
```

```
osboxes@osboxes:~$ nslookup
> primary.testunusual.com
Server:         192.168.73.10
Address:        192.168.73.10#53

Name:   primary.testunusual.com
Address: 192.168.73.10
> mail.testunusual.com
Server:         192.168.73.10
Address:        192.168.73.10#53

Name:   mail.testunusual.com
Address: 192.168.73.40
> ftp.testunusual.com
Server:         192.168.73.10
Address:        192.168.73.10#53
```

```
osboxes@osboxes:~$ dig www.amazon.com

; <<>> DiG 9.11.3-1ubuntu1.5-Ubuntu <<>> www.amazon.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 13921
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 13, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
; COOKIE: 18539946cf09271e54d4d9915c724177227a87eb9ddfd624 (good)
;; QUESTION SECTION:
;www.amazon.com.                        IN      A

;; ANSWER SECTION:
www.amazon.com.         468     IN      CNAME   www.cdn.amazon.com.
www.cdn.amazon.com.     41      IN      CNAME   d3ag4hukkh62yn.cloudfront.net.
d3ag4hukkh62yn.cloudfront.net. 59 IN    A       99.84.75.146

;; AUTHORITY SECTION:
.                       74530   IN      NS      j.root-servers.net.
.                       74530   IN      NS      g.root-servers.net.
.                       74530   IN      NS      e.root-servers.net.
.                       74530   IN      NS      h.root-servers.net.
.                       74530   IN      NS      l.root-servers.net.
.                       74530   IN      NS      d.root-servers.net.
.                       74530   IN      NS      c.root-servers.net.
.                       74530   IN      NS      f.root-servers.net.
.                       74530   IN      NS      b.root-servers.net.
.                       74530   IN      NS      k.root-servers.net.
.                       74530   IN      NS      i.root-servers.net.
.                       74530   IN      NS      a.root-servers.net.
.                       74530   IN      NS      m.root-servers.net.

;; Query time: 212 msec
;; SERVER: 192.168.73.10#53(192.168.73.10)
;; WHEN: Sun Feb 24 07:02:15 UTC 2019
;; MSG SIZE  rcvd: 360
```

For the fake ip address, I added one more zone for amazon.com and the zone file is "forward.fake". After I restart the bind9 and dig amazon.com, it shows the fake ip address:

```
osboxes@osboxes:/etc/bind$ dig www.amazon.com

; <<>> DiG 9.11.3-1ubuntu1.5-Ubuntu <<>> www.amazon.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 6165
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 1, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
; COOKIE: 13c9cd9ccf2f0a3ce866f35a5c72591c7866a85c836c6139 (good)
;; QUESTION SECTION:
;www.amazon.com.                        IN      A

;; ANSWER SECTION:
www.amazon.com.         604800  IN      A       192.168.111.111

;; AUTHORITY SECTION:
amazon.com.             604800  IN      NS      www.amazon.com.

;; Query time: 0 msec
;; SERVER: 192.168.73.10#53(192.168.73.10)
;; WHEN: Sun Feb 24 08:43:08 UTC 2019
;; MSG SIZE  rcvd: 101
```

Exercise4:

For this exercise, firstly I installed dnsperf and downloaded the AlexaNoRank,txt. I have written the url.sh to solve all the URLs, but it replied that the format is incorrect. I found that some of my classmates in Piazza said they add "A" after every lines, and I did that with the command "sed 's/$/ A/' AlexaNoRank.txt > AlexaNoRank1.txt". Then I retry the url.sh and it works. The CDF of resolution latency values for the second round performance smaller.

```
Statistics:

  Queries sent:         500
  Queries completed:    500 (100.00%)
  Queries lost:         0 (0.00%)

  Response codes:       NOERROR 136 (27.20%), SERVFAIL 23 (4.60%), NXDOMAIN 341 (68.20%)
  Average packet size:  request 40, response 141
  Run time (s):         11.091943
  Queries per second:   45.077765

  Average Latency (s):  0.629221 (min 0.000804, max 10.067253)
  Latency StdDev (s):   1.723674
```

```
Statistics:

  Queries sent:         500
  Queries completed:    500 (100.00%)
  Queries lost:         0 (0.00%)

  Response codes:       NOERROR 136 (27.20%), SERVFAIL 22 (4.40%), NXDOMAIN 342 (68.40%)
  Average packet size:  request 40, response 142
  Run time (s):         10.119922
  Queries per second:   49.407495

  Average Latency (s):  0.308718 (min 0.000094, max 10.015912)
  Latency StdDev (s):   1.593365
```