

无线网络及安全

实验报告

实验名称: assignment2

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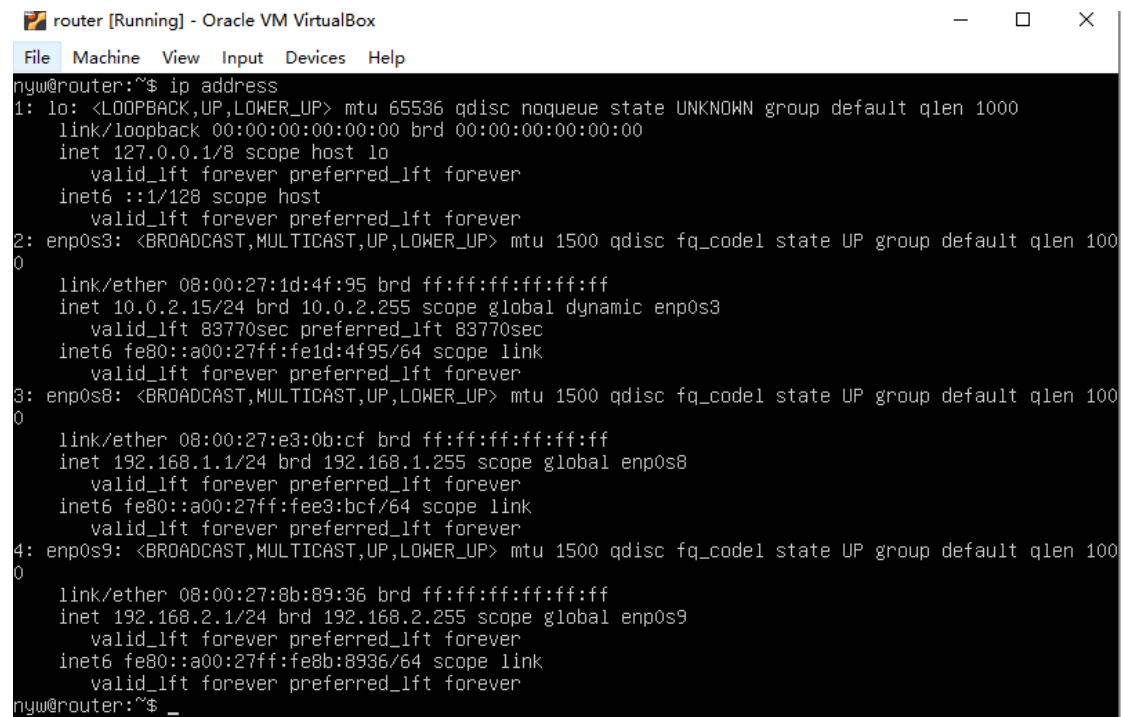
Email ID: nyw(213183189@seu.edu.cn)

Answer :

1. Network configuration

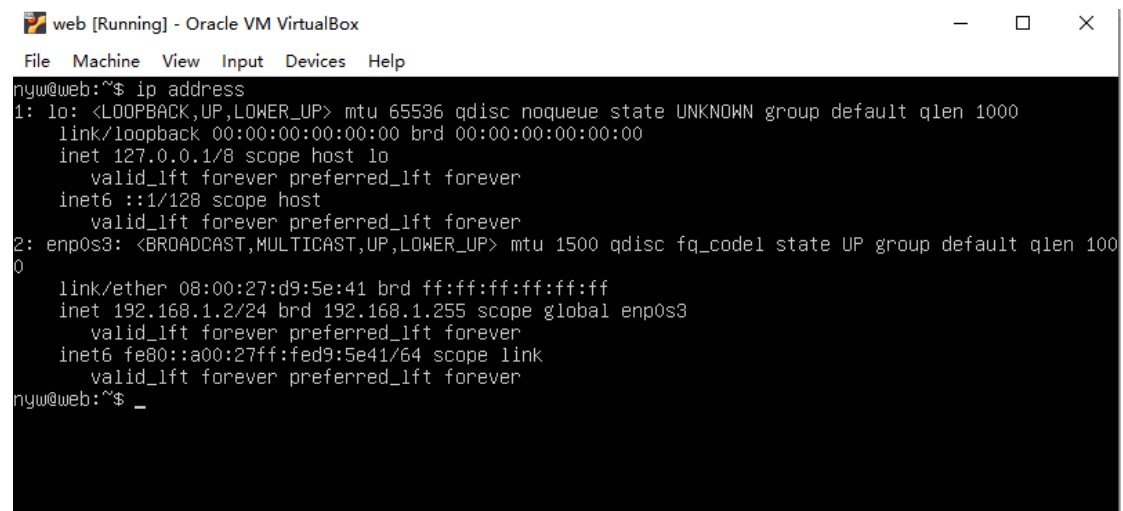
a. A screenshot of the output from the command `ip address` on the router, web, files and desktop machines, respectively.

router:



```
router [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
nyw@router:~$ ip address
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:1d:4f:95 brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic enp0s3
        valid_lft 83770sec preferred_lft 83770sec
    inet6 fe80::a00:27ff:fe1d:4f95/64 scope link
        valid_lft forever preferred_lft forever
3: enp0s8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:e3:0b:cf brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.1/24 brd 192.168.1.255 scope global enp0s8
        valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fee3:bcbf/64 scope link
        valid_lft forever preferred_lft forever
4: enp0s9: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:8b:89:36 brd ff:ff:ff:ff:ff:ff
    inet 192.168.2.1/24 brd 192.168.2.255 scope global enp0s9
        valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fe8b:8936/64 scope link
        valid_lft forever preferred_lft forever
nyw@router:~$ _
```

web:



```
web [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
nyw@web:~$ ip address
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:d9:5e:41 brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.2/24 brd 192.168.1.255 scope global enp0s3
        valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fed9:5e41/64 scope link
        valid_lft forever preferred_lft forever
nyw@web:~$ _
```

files:

```
nyw@files:~$ ip address
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:9e:ab:95 brd ff:ff:ff:ff:ff:ff
    inet 192.168.2.2/24 brd 192.168.2.255 scope global enp0s3
        valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fe9e:ab95/64 scope link
        valid_lft forever preferred_lft forever
nyw@files:~$
```

desktop:

```
nyw@desktop:~$ ip address
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:39:50:d6 brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.3/24 brd 192.168.1.255 scope global noprefixroute enp0s3
        valid_lft forever preferred_lft forever
    inet6 fe80::147:80dd:c871:20cb/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
nyw@desktop:~$
```

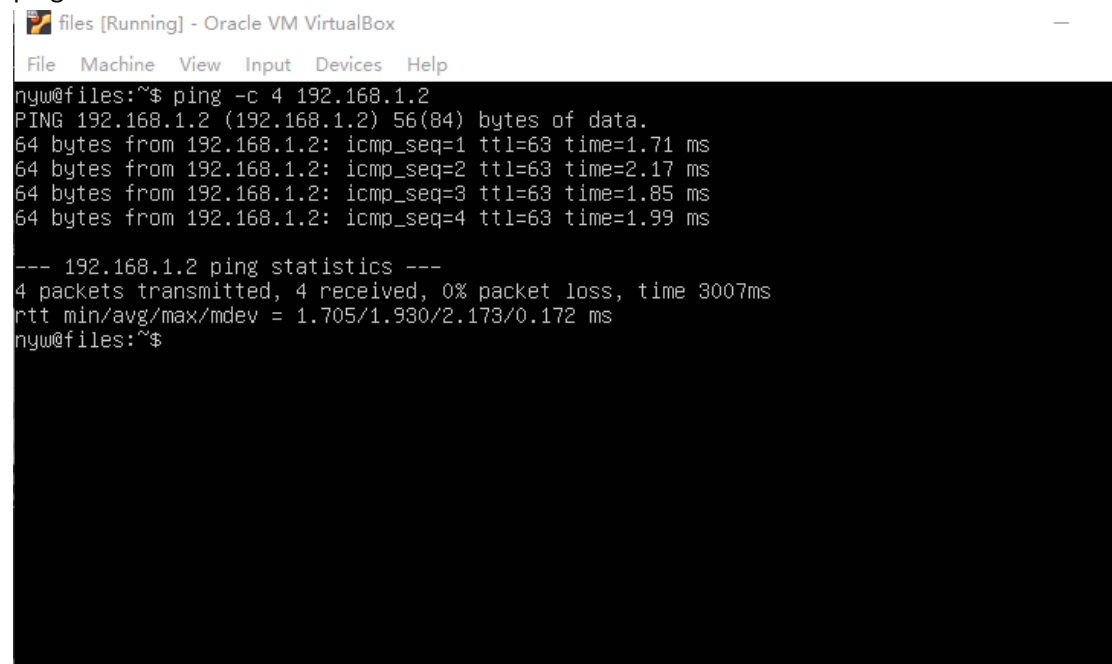
2. Routing configuration

a. A screenshot of the output from the command `cat /etc/iptables/rules.v4` on the router machine.

```
nyw@router:~$ sudo cat /etc/iptables/rules.v4
# Generated by iptables-save v1.8.4 on Fri Dec 18 02:40:43 2020
*filter
:INPUT ACCEPT [2:142]
:FORWARD ACCEPT [2:152]
:OUTPUT ACCEPT [2:262]
COMMIT
# Completed on Fri Dec 18 02:40:43 2020
# Generated by iptables-save v1.8.4 on Fri Dec 18 02:40:43 2020
*nat
:PREROUTING ACCEPT [31:2191]
:INPUT ACCEPT [5:599]
:OUTPUT ACCEPT [70:5519]
:POSTROUTING ACCEPT [12:997]
-A POSTROUTING -o enp0s3 -j MASQUERADE
COMMIT
# Completed on Fri Dec 18 02:40:43 2020
nyw@router:~$
```

b. A screenshot of the output from the command ping 192.168.1.2 on the files machine and ping 192.168.2.2 on the web machine, respectively.

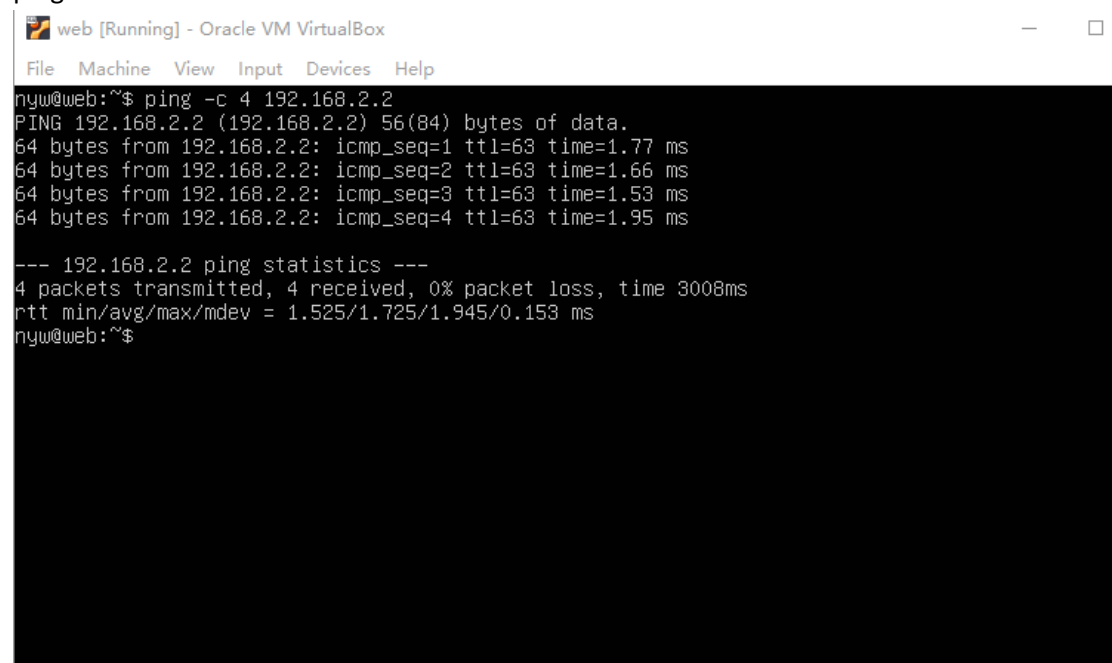
ping 192.168.1.2 on the files:



```
files [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
nyw@files:~$ ping -c 4 192.168.1.2
PING 192.168.1.2 (192.168.1.2) 56(84) bytes of data.
64 bytes from 192.168.1.2: icmp_seq=1 ttl=63 time=1.71 ms
64 bytes from 192.168.1.2: icmp_seq=2 ttl=63 time=2.17 ms
64 bytes from 192.168.1.2: icmp_seq=3 ttl=63 time=1.85 ms
64 bytes from 192.168.1.2: icmp_seq=4 ttl=63 time=1.99 ms

--- 192.168.1.2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3007ms
rtt min/avg/max/mdev = 1.705/1.930/2.173/0.172 ms
nyw@files:~$
```

ping 192.168.2.2 on the web:



```
web [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
nyw@web:~$ ping -c 4 192.168.2.2
PING 192.168.2.2 (192.168.2.2) 56(84) bytes of data.
64 bytes from 192.168.2.2: icmp_seq=1 ttl=63 time=1.77 ms
64 bytes from 192.168.2.2: icmp_seq=2 ttl=63 time=1.66 ms
64 bytes from 192.168.2.2: icmp_seq=3 ttl=63 time=1.53 ms
64 bytes from 192.168.2.2: icmp_seq=4 ttl=63 time=1.95 ms

--- 192.168.2.2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3008ms
rtt min/avg/max/mdev = 1.525/1.725/1.945/0.153 ms
nyw@web:~$
```

3. DNS service configuration

a. Content of the file `/etc/bind/named.conf.local` and all forward and reverse zone files.

`/etc/bind/named.conf.local`

```
router [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
nyw@router:~$ cat /etc/bind/named.conf.local
//
// Do any local configuration here
//
// Consider adding the 1918 zones here, if they are not used in your
// organization
//include "/etc/bind/zones.rfc1918";

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

zone "2.0.10.in-addr.arpa"{
    type master;
    notify no;
    file "/etc/bind/db.10";
};

zone "1.168.192.in-addr.arpa"{
    type master;
    notify no;
    file "/etc/bind/db.inet1";
};

zone "2.168.192.in-addr.arpa"{
    type master;
    notify no;
    file "/etc/bind/db.inet2";
};
nyw@router:~$
```

forward zone file `/etc/bind/db.mycompany.com`

```
router [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
nyw@router:~$ cat /etc/bind/db.mycompany.com
;
; BIND reverse data file for local loopback interface
;
$TTL      604800
@         IN      SOA      dns.mycompany.com. as1.seu.edu.cn. (
        2020121801      ; Serial
        604800          ; Refresh
        86400           ; Retry
        2419200         ; Expire
        604800 )        ; Negative Cache TTL
;
@         IN      NS       dns.mycompany.com.
@         IN      A        127.0.0.1
@         IN      AAAA     ::1

dns       IN      A        10.0.2.15
dns       IN      A        192.168.1.1
dns       IN      A        192.168.2.1
www       IN      A        192.168.1.2
home      IN      A        192.168.2.2
nyw@router:~$
```

reverse zone files:

/etc/bind/db.10

```
router [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
nyw@router:~$ cat /etc/bind/db.10
;
; BIND reverse data file for local loopback interface
;
$TTL      604800
@         IN      SOA      dns.mycompany.com. asl.seu.edu.cn. (
        2020121801      ; Serial
        604800          ; Refresh
        86400           ; Retry
        2419200         ; Expire
        604800 )        ; Negative Cache TTL
;
@         IN      NS       dns.mycompany.com.
15        IN      PTR      dns.mycompany.com.
nyw@router:~$ _
```

/etc/bind/db.inet1

```
router [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
nyw@router:~$ cat /etc/bind/db.inet1
;
; BIND reverse data file for local loopback interface
;
$TTL      604800
@         IN      SOA      dns.mycompany.com. asl.seu.edu.cn. (
        2020121801      ; Serial
        604800          ; Refresh
        86400           ; Retry
        2419200         ; Expire
        604800 )        ; Negative Cache TTL
;
@         IN      NS       dns.mycompany.com.
1         IN      PTR      dns.mycompany.com.
2         IN      PTR      www.mycompany.com.
nyw@router:~$
```

/etc/bind/db.inet2

```
router [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
nyw@router:~$ cat /etc/bind/db.inet2
;
; BIND reverse data file for local loopback interface
;
$TTL      604800
@         IN      SOA      dns.mycompany.com. asl.seu.edu.cn. (
        2020121801      ; Serial
        604800          ; Refresh
        86400           ; Retry
        2419200         ; Expire
        604800 )        ; Negative Cache TTL
;
@         IN      NS       dns.mycompany.com.
1         IN      PTR      dns.mycompany.com.
2         IN      PTR      home.mycompany.com.
nyw@router:~$
```

b. A screenshot of the output from the command `dig home.mycompany.com` on the web machine and `dig www.mycompany.com` on the files machine, respectively.

`dig home.mycompany.com` on the web

```
web [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
nyw@web:~$ dig home.mycompany.com

; <<>> DiG 9.16.1-Ubuntu <<>> home.mycompany.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 24375
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;home.mycompany.com.          IN      A

;; ANSWER SECTION:
home.mycompany.com.  604800 IN      A      192.168.2.2

;; Query time: 0 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Fri Dec 18 11:56:39 UTC 2020
;; MSG SIZE rcvd: 63

nyw@web:~$ _
```

`dig www.mycompany.com` on the files

```
files [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
nyw@files:~$ dig www.mycompany.com

; <<>> DiG 9.16.1-Ubuntu <<>> www.mycompany.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 48103
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

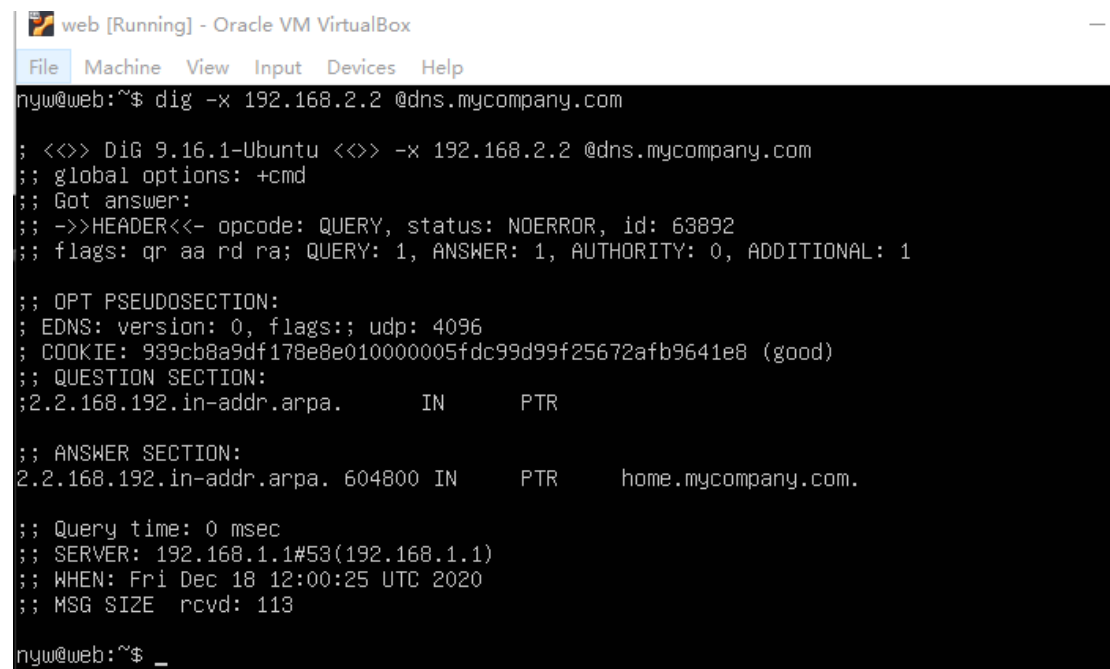
;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;www.mycompany.com.          IN      A

;; ANSWER SECTION:
www.mycompany.com.  604800 IN      A      192.168.1.2

;; Query time: 4 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Fri Dec 18 11:57:28 UTC 2020
;; MSG SIZE rcvd: 62

nyw@files:~$
```

c. A screenshot of the output from the command `dig -x 192.168.2.2 @dns.mycompany.com` on the web machine.



```
web [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
nyw@web:~$ dig -x 192.168.2.2 @dns.mycompany.com

; <<>> DiG 9.16.1-Ubuntu <<>> -x 192.168.2.2 @dns.mycompany.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 63892
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
; COOKIE: 939cb8a9df178e8e010000005fdc99d99f25672afb9641e8 (good)
;; QUESTION SECTION:
;2.2.168.192.in-addr.arpa.      IN      PTR

;; ANSWER SECTION:
2.2.168.192.in-addr.arpa. 604800 IN      PTR      home.mycompany.com.

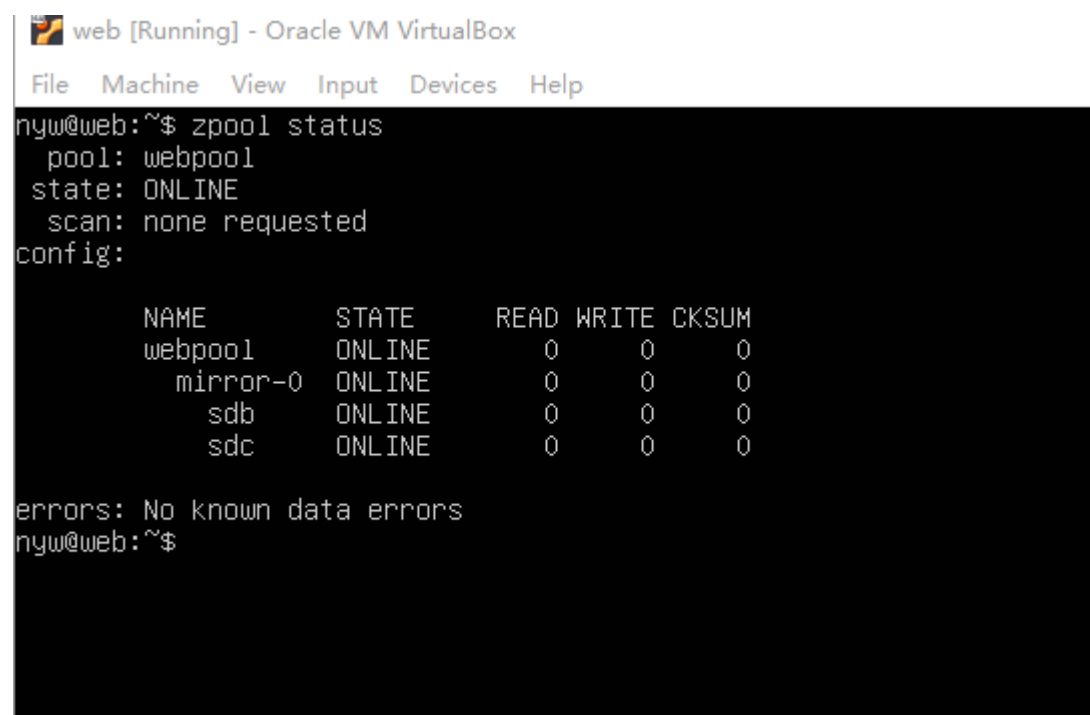
;; Query time: 0 msec
;; SERVER: 192.168.1.1#53(192.168.1.1)
;; WHEN: Fri Dec 18 12:00:25 UTC 2020
;; MSG SIZE rcvd: 113

nyw@web:~$ _
```

4. File system configuration

a. A screenshot of the output from the command `zpool status` on the web and files machines, respectively.

zpool status on the web

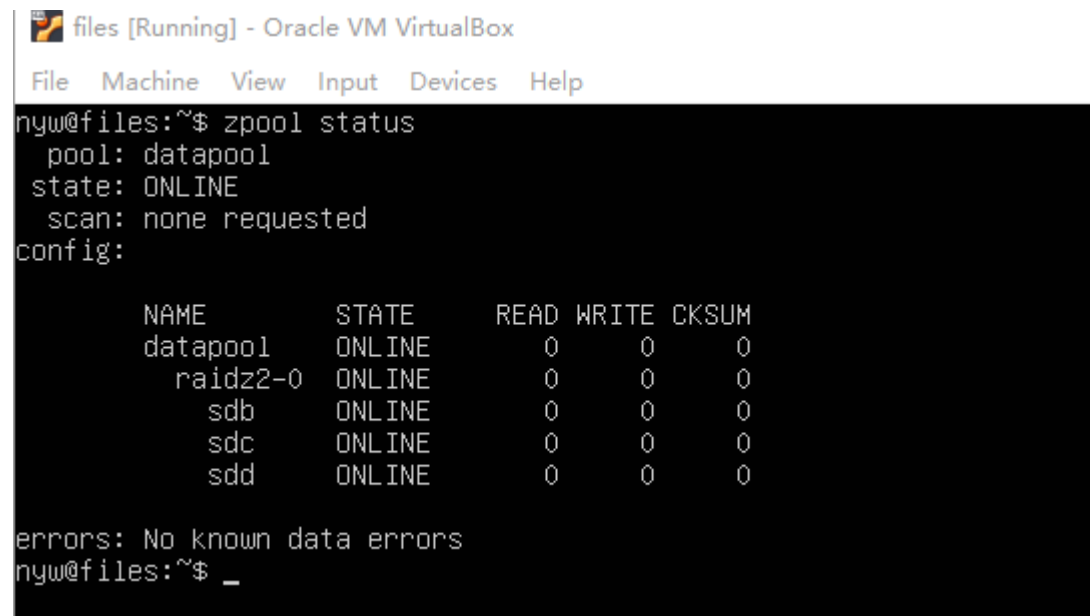


```
web [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
nyw@web:~$ zpool status
 pool: webpool
state: ONLINE
 scan: none requested
config:

   NAME        STATE      READ  WRITE CKSUM
   webpool     ONLINE      0     0     0
     mirror-0  ONLINE      0     0     0
       sdb     ONLINE      0     0     0
       sdc     ONLINE      0     0     0

errors: No known data errors
nyw@web:~$
```


zpool status on files



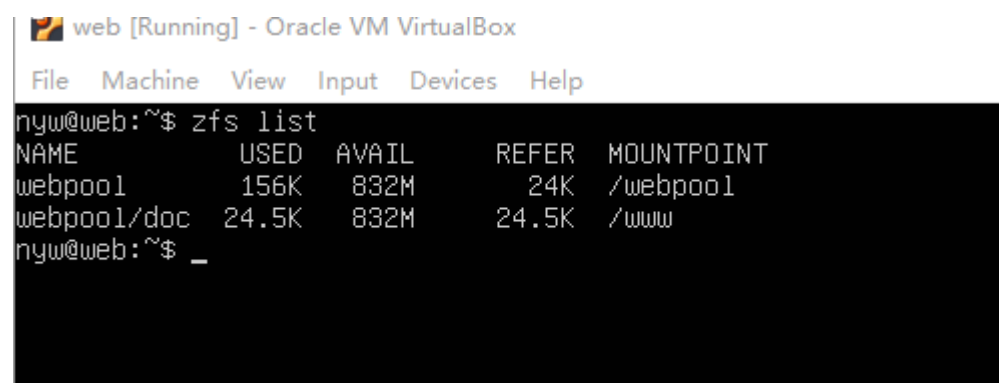
```
nyw@files:~$ zpool status
pool: datapool
state: ONLINE
scan: none requested
config:

    NAME        STATE      READ  WRITE CKSUM
    datapool    ONLINE    0      0     0
      raidz2-0  ONLINE    0      0     0
        sdb     ONLINE    0      0     0
        sdc     ONLINE    0      0     0
        sdd     ONLINE    0      0     0

errors: No known data errors
nyw@files:~$ _
```

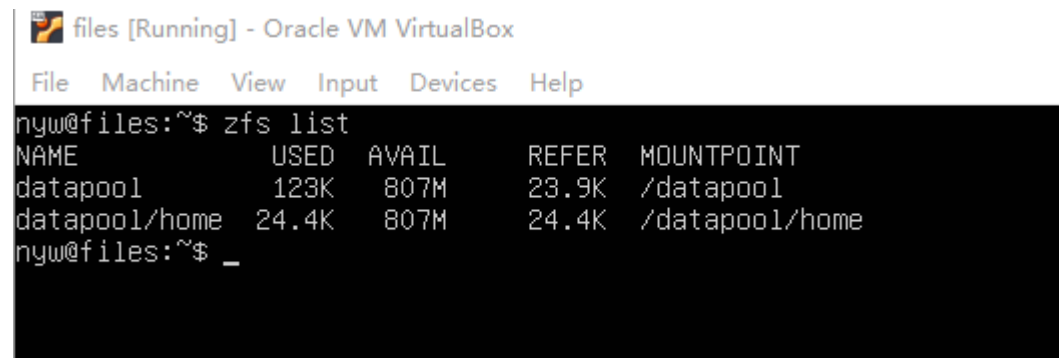
b. A screenshot of the output from the command `zfs list` on the web and files machines, respectively.

zfs list on the web



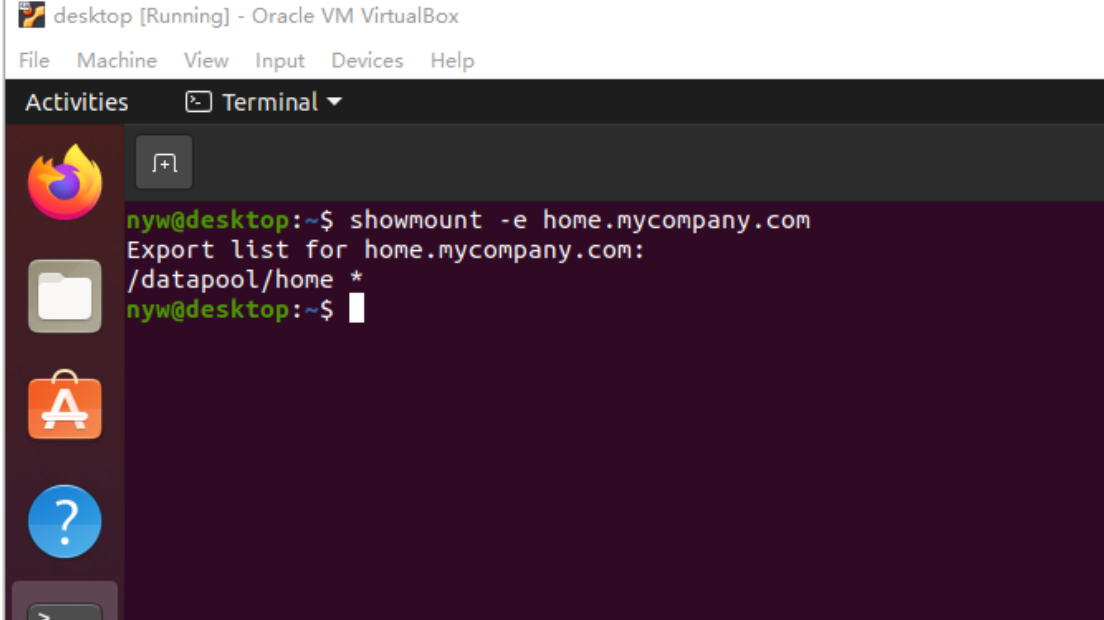
```
nyw@web:~$ zfs list
NAME          USED  AVAIL  REFER  MOUNTPOINT
webpool       156K  832M   24K    /webpool
webpool/doc   24.5K  832M  24.5K  /www
nyw@web:~$ _
```

zfs list on the files



```
nyw@files:~$ zfs list
NAME          USED  AVAIL  REFER  MOUNTPOINT
datapool      123K  807M   23.9K  /datapool
datapool/home 24.4K  807M   24.4K  /datapool/home
nyw@files:~$ _
```

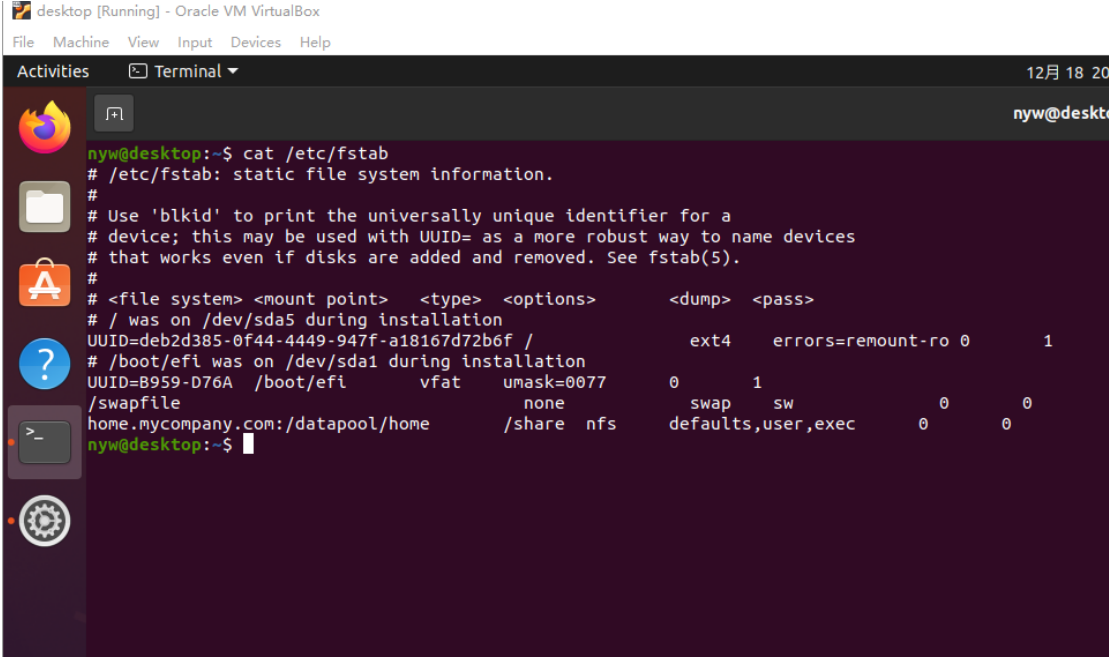
c. A screenshot of the output from the command `showmount -e home.mycompany.com` on the desktop machine.



The screenshot shows a terminal window titled "desktop [Running] - Oracle VM VirtualBox". The terminal output is as follows:

```
nyw@desktop:~$ showmount -e home.mycompany.com
Export list for home.mycompany.com:
/datapool/home *
```

d. A screenshot of the output from the command `cat /etc/fstab` on the desktop machines.

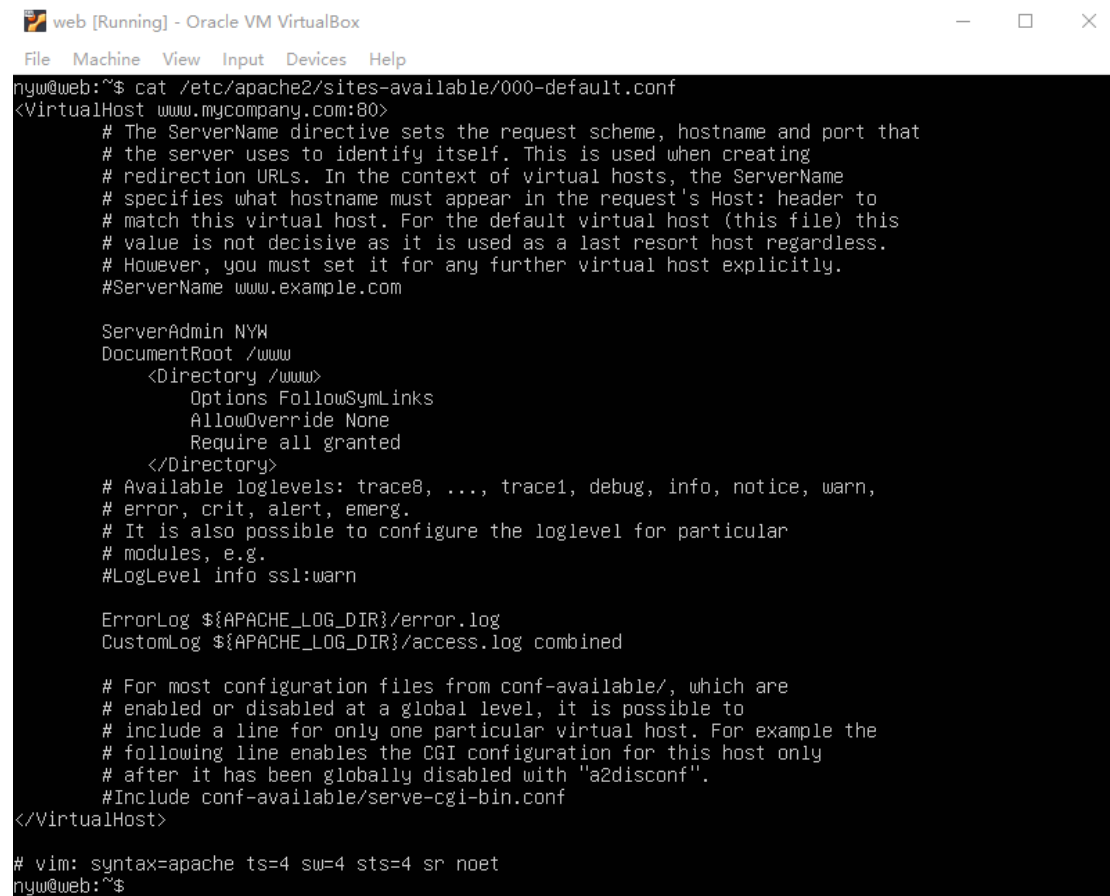


The screenshot shows a terminal window titled "desktop [Running] - Oracle VM VirtualBox". The terminal output is as follows:

```
nyw@desktop:~$ cat /etc/fstab
# /etc/fstab: static file system information.
#
# Use 'blkid' to print the universally unique identifier for a
# device; this may be used with UUID= as a more robust way to name devices
# that works even if disks are added and removed. See fstab(5).
#
# <file system> <mount point> <type> <options>          <dump>  <pass>
# / was on /dev/sda5 during installation
UUID=deb2d385-0f44-4449-947f-a18167d72b6f /          ext4      errors=remount-ro 0      1
# /boot/efi was on /dev/sda1 during installation
UUID=B959-D76A /boot/efi   vfat      umask=0077      0      1
/swapfile                                 none      swap        0      0
home.mycompany.com:/datapool/home        /share    nfs         defaults,user,exec 0      0
nyw@desktop:~$
```

5. Web service configuration

a. A screenshot of the output from the command `cat /etc/apache2/sites-available/000-default.conf` on the web machines.



```
web [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
nyw@web:~$ cat /etc/apache2/sites-available/000-default.conf
<VirtualHost www.mycompany.com:80>
    # The ServerName directive sets the request scheme, hostname and port that
    # the server uses to identify itself. This is used when creating
    # redirection URLs. In the context of virtual hosts, the ServerName
    # specifies what hostname must appear in the request's Host: header to
    # match this virtual host. For the default virtual host (this file) this
    # value is not decisive as it is used as a last resort host regardless.
    # However, you must set it for any further virtual host explicitly.
    #ServerName www.example.com

    ServerAdmin NYW
    DocumentRoot /www
    <Directory /www>
        Options FollowSymLinks
        AllowOverride None
        Require all granted
    </Directory>
    # Available loglevels: trace8, ..., trace1, debug, info, notice, warn,
    # error, crit, alert, emerg.
    # It is also possible to configure the loglevel for particular
    # modules, e.g.
    #LogLevel info ssl:warn

    ErrorLog ${APACHE_LOG_DIR}/error.log
    CustomLog ${APACHE_LOG_DIR}/access.log combined

    # For most configuration files from conf-available/, which are
    # enabled or disabled at a global level, it is possible to
    # include a line for only one particular virtual host. For example the
    # following line enables the CGI configuration for this host only
    # after it has been globally disabled with "a2disconf".
    #Include conf-available/serve-cgi-bin.conf
</VirtualHost>

# vim: syntax=apache ts=4 sw=4 sts=4 sr noet
nyw@web:~$
```

b. A screenshot of your assignment web page on Firefox pointing to `www.mycompany.com` on the desktop machine.

