东北大学 秦皇岛分校

学院	计算机与通信工程学院
专业	计算机科学与技术
班级号	200523
学号	202012143
姓名	熊舟桐

Linux 操作系统及内核分析实验报告

Linux 基本命令

实验环境

Linux 版本

```
Linux northboat-nhx0dbde 6.1.12-1-MANJARO #1 SMP PREEMPT_DYNAMIC Tue Feb 14
21:59:10 UTC 2023 x86_64 GNU/Linux
```

ssh 版本

```
OpenSSH_9.2p1, OpenSSL 3.0.8 7 Feb 2023
```

目标机版本

```
Linux VM-0-17-debian 5.10.0-19-amd64 #1 SMP Debian 5.10.149-2 (2022-10-21) x86_64
GNU/Linux
```

实验内容

ssh 连接 Linux

在 `manjaro` 上连接 `debian` 服务器

```
ssh root@43.163.218.127
```

查看主机基本信息

查看网卡信息

文件管理命令

搜索文件

```
$    root@VM-0-17-debian    /home    cd ~        Fri 10 Mar 2023 08:28:01 AM CS
$    root@VM-0-17-debian    ~    find / -name "?asswd" | more
find: /etc/passwd
/etc/pam.d/passwd
'/proc/791538/task/791538/net': Invalid argument
find: '/proc/791538/net': Invalid argument
/usr/share/lintian/overrides/passwd
/usr/share/bash-completion/completions/passwd
/usr/share/doc/passwd
/usr/bin/passwd
$    root@VM-0-17-debian    ~        5.1s    Fri 10 Mar 2023 08:29:28 AM CS
```

查看文件内容

```
$    root@VM-0-17-debian    ~    cat /etc/passwd
root:x:0:0:root:/root:/usr/bin/fish
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
_apt:x:100:65534::/nonexistent:/usr/sbin/nologin
systemd-timesync:x:101:101:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin
systemd-network:x:102:103:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:103:104:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin
messagebus:x:104:110::/nonexistent:/usr/sbin/nologin
sshd:x:105:65534::/run/sshd:/usr/sbin/nologin
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
_chrony:x:106:112:Chrony daemon,,,:/var/lib/chrony:/usr/sbin/nologin
lighthouse:x:1000:1000::/home/lighthouse:/bin/bash
mysql:x:1001:1002::/home/mysql:/sbin/nologin
www:x:1002:1003::/home/www:/sbin/nologin
redis:x:1003:1004::/home/redis:/sbin/nologin
epmd:x:107:113::/run/epmd:/usr/sbin/nologin
rabbitmq:x:108:114:RabbitMQ messaging server,,,:/var/lib/rabbitmq:/usr/sbin/nologin
$    root@VM-0-17-debian    ~    __
```

通过管道过滤查找关键字

```
$    root@VM-0-17-debian    ~    cat /etc/passwd | grep "root"
root:x:0:0:root:/root:/usr/bin/fish
$    root@VM-0-17-debian    ~    __        Fri 10 Mar 2023 08:
```

创建目录

```
$    root@VM-0-17-debian    /    mkdir test1        Fri 10 Mar 2023 08:33:53 AM CS
$    root@VM-0-17-debian    /    mkdir test2        Fri 10 Mar 2023 08:33:57 AM CS
$    root@VM-0-17-debian    /    __        Fri 10 Mar 2023 08:34:00 AM CS
```

创建文本文件

```
$    root@VM-0-17-debian    /    cd test1
$    root@VM-0-17-debian    /test1    touch mytext
$    root@VM-0-17-debian    /test1    ls
mytext
$    root@VM-0-17-debian    /test1    __
```

编辑文件

```
$    root@VM-0-17-debian    /test1    mv mytext hello
$    root@VM-0-17-debian    /test1    vim hello        Fri 10
$    root@VM-0-17-debian    /test1    cat hello
echo "hello debain"
$    root@VM-0-17-debian    /test1    mv hello hello.sh
$    root@VM-0-17-debian    /test1    sh hello.sh
hello debain
```

复制文件

```
$   root@VM-0-17-debian   /test1    cp hello.sh ../test2/
$   root@VM-0-17-debian   /test1    cd ..      Fri 10 Mar 2023 08:41:48 AM CST
$   root@VM-0-17-debian   /    ls    Fri 10 Mar 2023 08:42:00 AM CST
bin@      home/      lib64@      opt/      srv/      tmp/
boot/     initrd.img@      libx32@      proc/      swapfile      usr
data/     initrd.img.old@      lost+found/      root/      sys/      var/
dev/      lib@      media/      run/      test1/      vmlinuz@
etc/      lib32@      mnt/      sbin@      test2/      vmlinuz.old@
$   root@VM-0-17-debian   /    cd test2    Fri 10 Mar 2023 08:42:01 AM CST
$   root@VM-0-17-debian   /test2    ls    Fri 10 Mar 2023 08:42:03 AM
hello.sh
```

删除文件

```
$   root@VM-0-17-debian   /test1    rm hello.sh
$   root@VM-0-17-debian   /test1    ls    Fri
$   root@VM-0-17-debian   /test1    Fri
```

删除目录

```
$   root@VM-0-17-debian   /    ls    Fri 10 Mar 2023 08:44:16 AM
bin@      home/      lib64@      opt/      srv/      tmp/
boot/     initrd.img@      libx32@      proc/      swapfile      usr
data/     initrd.img.old@      lost+found/      root/      sys/      var/
dev/      lib@      media/      run/      test1/      vmlinuz@
etc/      lib32@      mnt/      sbin@      test2/      vmlinuz.old@
$   root@VM-0-17-debian   /    rm -rf test1 test2
$   root@VM-0-17-debian   /    ls    Fri 10 Mar 2023 08:44:24 AM
bin@      etc/      lib@      lost+found/      proc/      srv/      usr/
boot/     home/      lib32@      media/      root/      swapfile      var/
data/     initrd.img@      lib64@      mnt/      run/      sys/      vmlinuz@
dev/      initrd.img.old@      libx32@      opt/      sbin@      tmp/      vmlinuz.old@
$   root@VM-0-17-debian   /    Fri 10 Mar 2023 08:44:25 AM
```

用户管理

新建用户

```
$   root@VM-0-17-debian   /    useradd northboat
$   root@VM-0-17-debian   /    passwd northboat    Fri 10 Mar 2023 08:45:46 AM CST
New password:
Retype new password:
passwd: password updated successfully
$   root@VM-0-17-debian   /    4498ms  Fri 10 Mar 2023 08:46:00 AM CST
```

切换并测试用户

```
$   root@VM-0-17-debian   /    su northboat    Fri 10 Mar 20
$ pwd
/
$ mkdir /test
mkdir: cannot create directory '/test': Permission denied
$ _
```

```
[northboat-nhx0dbde /]# su northboat
[northboat@northboat-nhx0dbde /]$ sudo mkdir /test
[northboat@northboat-nhx0dbde /]$ cd / & ls
[1] 6176
bin            home            opt            sbin            tmp
boot           lib             proc           srv             usr
desktopfs-pkgs.txt  lib64        root           sys             var
dev            lost+found      rootfs-pkgs.txt  test
etc            mnt             run            timeshift
[1]+  已完成                cd /
[northboat@northboat-nhx0dbde /]$ _
```

修改用户权限

```
$   root@VM-0-17-debian   /    addgroup wheel    Fri 10 Mar 202
Adding group `wheel' (GID 1006) ...
Done.
$   root@VM-0-17-debian   /    usermod -a -G wheel northboat
```

查看用户组

```
$  root@VM-0-17-debian  /  cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:
tty:x:5:
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
man:x:12:
proxy:x:13:
kmem:x:15:
dialout:x:20:
fax:x:21:
voice:x:22:
cdrom:x:24:
floppy:x:25:
tape:x:26:
sudo:x:27:
audio:x:29:
dip:x:30:
www-data:x:33:
backup:x:34:
```

删除用户

```
$  root@VM-0-17-debian  /  userdel -r northboat
userdel: northboat mail spool (/var/mail/northboat) not found
userdel: northboat home directory (/home/northboat) not found
```

文件解压缩

压缩文件 .tar

```
$  root@VM-0-17-debian  /home  ls          Fri 10 Mar 2023 09:00:00 AM CST
lighthouse/
$  root@VM-0-17-debian  /home  mkdir test  Fri 10 Mar 2023 09:00:02 AM CST
$  root@VM-0-17-debian  /home  tar -cvf test.tar test/
test/
$  root@VM-0-17-debian  /home  ls          Fri 10 Mar 2023 09:00:29 AM CST
lighthouse/   test/   test.tar
$  root@VM-0-17-debian  /home  _           Fri 10 Mar 2023 09:00:33 AM CST
```

解压文件

```
$  root@VM-0-17-debian  /home  rm -rf test  Fri 10 Mar 2023 09:00:33 AM CST
$  root@VM-0-17-debian  /home  tar -xvf test.tar
test/
$  root@VM-0-17-debian  /home  ls           Fri 10 Mar 2023 09:01:26 AM CST
lighthouse/   test/   test.tar
$  root@VM-0-17-debian  /home               Fri 10 Mar 2023 09:01:27 AM CST
```

压缩文件 .tar.gz

```
$  root@VM-0-17-debian  /home  tar -cvf test.tar.gz test/
test/
$  root@VM-0-17-debian  /home  ls           Fri 10 Mar 202
lighthouse/   test/   test.tar   test.tar.gz
```

解压文件

```
$   root@VM-0-17-debian   /home   tar -xvf test.tar.gz
test/
$   root@VM-0-17-debian   /home   ls          Fri 10 Mar 202
lighthouse/   test/   test.tar   test.tar.gz
$   root@VM-0-17-debian   /home   _          Fri 10 Mar 202
```

实验总结

debain 默认没有 wheel 组，在加入用户进 wheel 组时会报错：group wheel does not exist

需要新增组

```
groupadd wheel
```

再将用户加入组

```
usermod -a -G wheel northboat
```

删除组

```
groupdel wheel
```

通过查看组 `cat /etc/group` 发现存在 `root` 组，将用户加入 `root` 组

```
usermod -a -G root northboat
```

Linux 系统管理

实现环境

Linux 版本

```
Linux northboat-nhx0dbde 6.1.12-1-MANJARO #1 SMP PREEMPT_DYNAMIC Tue Feb 14
21:59:10 UTC 2023 x86_64 GNU/Linux
```

本地 Shell

实验内容

网络管理

> 设置静态 IP，manjaro 下，使用 netctl 实现

下载 netctl

```
yay -S netctl
```

查看网卡信息

```
[northboat@northboat-nhx0dbde Desktop]$ ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defaul
t 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: enp13s0f1: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc fq_codel state
DOWN group default qlen 1000
    link/ether 00:e0:4c:88:00:cb brd ff:ff:ff:ff:ff:ff
3: wlp12s0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP gr
oup default qlen 1000
    link/ether d8:c0:a6:1f:47:15 brd ff:ff:ff:ff:ff:ff
    inet 192.168.106.185/24 brd 192.168.106.255 scope global dynamic noprefixrou
te wlp12s0
       valid_lft 2595sec preferred_lft 2595sec
    inet6 2408:841d:2530:4acd:4ce3:5f9c:8087:8635/64 scope global dynamic nopref
ixroute
       valid_lft 2597sec preferred_lft 2597sec
    inet6 fe80::75aa:7519:2df4:7588/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
```

得知网卡名称 `enp13s0f1`

终止网络服务

```
sudo systemctl stop NetworkManager
sudo systemctl disable NetworkManager
```

复制 `netctl` 默认配置文件

```
sudo cp /etc/netctl/examples/ethernet-static /etc/netctl/enp13s0f1
```

编辑文件 `enp13s0f1`

```
                                        Northboat's Terminal
文件(F)  编辑(E)  视图(V)  终端(T)  标签(A)  帮助(H)
Description='A basic static ethernet connection'
Interface=eth0
Connection=ethernet
IP=static
Address=('192.168.1.23/24' '192.168.1.87/24')
#Routes=('192.168.0.0/24 via 192.168.1.2')
Gateway='192.168.1.1'
DNS=('192.168.1.1')

## For IPv6 autoconfiguration
#IP6=stateless

## For IPv6 static address configuration
#IP6=static
#Address6=('1234:5678:9abc:def::1/64' '1234:3456::123/96')
#Routes6=('abcd::1234')
#Gateway6='1234:0:123::abcd'
~
~
```

配置 DNS 解析

```
[northboat@northboat-nhx0dbde netctl]$ cat /etc/resolv.conf
# Generated by NetworkManager
nameserver 192.168.106.90
nameserver 2408:841d:2530:4acd::fd
```

重启网络服务

```
sudo systemctl start NetworkManager
sudo systemctl enable NetworkManager
```

查看网络连接状态

```
[northboat@northboat-nhx0dbde Desktop]$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 northboat-nhx0dbd:51736 20.198.162.78:https     ESTABLISHED
tcp        0      0 northboat-nhx0dbd:36594 47.93.247.194:https     ESTABLISHED
tcp        0      0 northboat-nhx0dbd:41698 server-13-227-62-:https  ESTABLISHED
tcp        0      0 northboat-nhx0dbd:55554 server-99-84-140-:https  TIME_WAIT
tcp        0      0 northboat-nhx0dbd:35086 121.29.38.32:https      ESTABLISHED
tcp        0      0 northboat-nhx0dbd:44170 51.104.15.252:https     ESTABLISHED
tcp        0      0 northboat-nhx0dbd:44158 51.104.15.252:https     ESTABLISHED
tcp        0      0 northboat-nhx0dbd:55554 server-99-84-140-:https  TIME_WAIT
tcp        0      0 northboat-nhx0dbd:35086 121.29.38.32:https      ESTABLISHED
tcp6       0      0 ipv6.localhost.cn:39046 ipv6.localhost.cn:https ESTABLISHED
tcp6       0      0 ipv6.localhost.cn:32880 ipv6.localhost.cn:https ESTABLISHED
tcp6       0      0 ipv6.localhost.cn:51934 ipv6.localhost:www-http ESTABLISHED
tcp6       0      0 ipv6.localhost.cn:51940 ipv6.localhost.cn:https ESTABLISHED
tcp6       0      0 ipv6.localhost.cn:39674 ipv6.localhost.cn:https ESTABLISHED
tcp6       0      0 ipv6.localhost.cn:47970 ipv6.localhost.cn:https ESTABLISHED
udp        0      0 northboat-nhx0db:bootpc _gateway:bootps         ESTABLISHED
udp6       0      0 ipv6.localhost.cn:55380 ipv6.localhost.cn:https ESTABLISHED
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags       Type       State         I-Node   Path
unix  3      [ ]         STREAM     CONNECTED     29163
unix  3      [ ]         STREAM     CONNECTED     31785
unix  3      [ ]         STREAM     CONNECTED     17228
unix  3      [ ]         STREAM     CONNECTED     987
unix  3      [ ]         STREAM     CONNECTED     27976    /run/user/1000/bus
unix  2      [ ]         DGRAM      CONNECTED     26628
unix  3      [ ]         STREAM     CONNECTED     34928    @/tmp/.X11-unix/X0
unix  3      [ ]         STREAM     CONNECTED     25066    /run/user/1000/at-spi/bus_0
unix  3      [ ]         STREAM     CONNECTED     25926    /run/user/1000/bus
unix  3      [ ]         STREAM     CONNECTED     27800
```

ping 通

```
[northboat@northboat-nhx0dbde Desktop]$ ping www.baidu.com
PING www.a.shifen.com (110.242.68.4) 56(84) 字节的数据。
64 字节，来自 110.242.68.4 (110.242.68.4): icmp_seq=1 ttl=53 时间=38.9 毫秒
64 字节，来自 110.242.68.4 (110.242.68.4): icmp_seq=2 ttl=53 时间=42.0 毫秒
64 字节，来自 110.242.68.4 (110.242.68.4): icmp_seq=3 ttl=53 时间=48.9 毫秒
64 字节，来自 110.242.68.4 (110.242.68.4): icmp_seq=4 ttl=53 时间=53.7 毫秒
64 字节，来自 110.242.68.4 (110.242.68.4): icmp_seq=5 ttl=53 时间=47.7 毫秒
64 字节，来自 110.242.68.4 (110.242.68.4): icmp_seq=6 ttl=53 时间=61.4 毫秒
^C
--- www.a.shifen.com ping 统计 ---
已发送 6 个包，已接收 6 个包，0% packet loss, time 5007ms
rtt min/avg/max/mdev = 38.877/48.762/61.366/7.384 ms
[northboat@northboat-nhx0dbde Desktop]$ __
```

进程管理

`ps` 命令查看进程

```
[northboat@northboat-nhx0dbde ~]$ ps
   PID TTY          TIME CMD
  5066 pts/1    00:00:00 bash
  5072 pts/1    00:00:00 ps
```

查看所有用户所有进程信息

```
[northboat@northboat-nhx0dbde netctl]$ ps -aux
USER          PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root            1  0.0  0.0 170320 14876 ?        Ss   11:46   0:01 /sbin/init
root            2  0.0  0.0      0     0 ?        S    11:46   0:00 [kthreadd]
root            3  0.0  0.0      0     0 ?        I<   11:46   0:00 [rcu_gp]
root            4  0.0  0.0      0     0 ?        I<   11:46   0:00 [rcu_par_gp]
root            5  0.0  0.0      0     0 ?        I<   11:46   0:00 [slub_flushwq
root            6  0.0  0.0      0     0 ?        I<   11:46   0:00 [netns]
root            8  0.0  0.0      0     0 ?        I<   11:46   0:00 [kworker/0:0H
root           10  0.0  0.0      0     0 ?        I<   11:46   0:00 [mm_percpu_wq
root           12  0.0  0.0      0     0 ?        I    11:46   0:00 [rcu_tasks_kt
root           13  0.0  0.0      0     0 ?        I    11:46   0:00 [rcu_tasks_ru
root           14  0.0  0.0      0     0 ?        I    11:46   0:00 [rcu_tasks_tr
root           15  0.0  0.0      0     0 ?        S    11:46   0:00 [ksoftirqd/0]
root           16  0.0  0.0      0     0 ?        I    11:46   0:00 [rcu_preempt]
root           17  0.0  0.0      0     0 ?        S    11:46   0:00 [rcub/0]
root           18  0.0  0.0      0     0 ?        S    11:46   0:00 [migration/0]
root           19  0.0  0.0      0     0 ?        S    11:46   0:00 [idle_inject/
root           21  0.0  0.0      0     0 ?        S    11:46   0:00 [cpuhp/0]
root           22  0.0  0.0      0     0 ?        S    11:46   0:00 [cpuhp/1]
root           23  0.0  0.0      0     0 ?        S    11:46   0:00 [idle_inject/
root           24  0.0  0.0      0     0 ?        S    11:46   0:00 [migration/1]
root           25  0.0  0.0      0     0 ?        S    11:46   0:00 [ksoftirqd/1]
root           27  0.0  0.0      0     0 ?        I<   11:46   0:00 [kworker/1:0H
root           28  0.0  0.0      0     0 ?        S    11:46   0:00 [cpuhp/2]
root           29  0.0  0.0      0     0 ?        S    11:46   0:00 [idle_inject/
root           30  0.0  0.0      0     0 ?        S    11:46   0:00 [migration/2]
root           31  0.0  0.0      0     0 ?        S    11:46   0:00 [ksoftirqd/2]
root           33  0.0  0.0      0     0 ?        I<   11:46   0:00 [kworker/2:0H
root           34  0.0  0.0      0     0 ?        S    11:46   0:00 [cpuhp/3]
root           35  0.0  0.0      0     0 ?        S    11:46   0:00 [idle_inject/
root           36  0.0  0.0      0     0 ?        S    11:46   0:00 [migration/3]
root           37  0.0  0.0      0     0 ?        S    11:46   0:00 [ksoftirqd/3]
root           39  0.0  0.0      0     0 ?        I<   11:46   0:00 [kworker/3:0H
root           40  0.0  0.0      0     0 ?        S    11:46   0:00 [cpuhp/4]
root           41  0.0  0.0      0     0 ?        S    11:46   0:00 [idle_inject/
```

进程信息排序

- 按内存占用

```
[northboat@northboat-nhx0dbde netctl]$ ps -auxw --sort=rss
USER          PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root            2  0.0  0.0      0     0 ?        S    11:46   0:00 [kthreadd]
root            3  0.0  0.0      0     0 ?        I<   11:46   0:00 [rcu_gp]
root            4  0.0  0.0      0     0 ?        I<   11:46   0:00 [rcu_par_gp]
root            5  0.0  0.0      0     0 ?        I<   11:46   0:00 [slub_flushwq]
root            6  0.0  0.0      0     0 ?        I<   11:46   0:00 [netns]
root            8  0.0  0.0      0     0 ?        I<   11:46   0:00 [kworker/0:0H-acpi_thermal_pm]
root           10  0.0  0.0      0     0 ?        I<   11:46   0:00 [mm_percpu_wq]
root           12  0.0  0.0      0     0 ?        I    11:46   0:00 [rcu_tasks_kthread]
root           13  0.0  0.0      0     0 ?        I    11:46   0:00 [rcu_tasks_rude_kthread]
root           14  0.0  0.0      0     0 ?        I    11:46   0:00 [rcu_tasks_trace_kthread]
root           15  0.0  0.0      0     0 ?        S    11:46   0:00 [ksoftirqd/0]
root           16  0.0  0.0      0     0 ?        I    11:46   0:00 [rcu_preempt]
root           17  0.0  0.0      0     0 ?        S    11:46   0:00 [rcub/0]
root           18  0.0  0.0      0     0 ?        S    11:46   0:00 [migration/0]
root           19  0.0  0.0      0     0 ?        S    11:46   0:00 [idle_inject/0]
root           21  0.0  0.0      0     0 ?        S    11:46   0:00 [cpuhp/0]
root           22  0.0  0.0      0     0 ?        S    11:46   0:00 [cpuhp/1]
root           23  0.0  0.0      0     0 ?        S    11:46   0:00 [idle_inject/1]
root           24  0.0  0.0      0     0 ?        S    11:46   0:00 [migration/1]
root           25  0.0  0.0      0     0 ?        S    11:46   0:00 [ksoftirqd/1]
root           27  0.0  0.0      0     0 ?        I<   11:46   0:00 [kworker/1:0H-events_highpri]
root           28  0.0  0.0      0     0 ?        S    11:46   0:00 [cpuhp/2]
root           29  0.0  0.0      0     0 ?        S    11:46   0:00 [idle_inject/2]
root           30  0.0  0.0      0     0 ?        S    11:46   0:00 [migration/2]
root           31  0.0  0.0      0     0 ?        S    11:46   0:00 [ksoftirqd/2]
root           33  0.0  0.0      0     0 ?        I<   11:46   0:00 [kworker/2:0H-events_highpri]
root           34  0.0  0.0      0     0 ?        S    11:46   0:00 [cpuhp/3]
root           35  0.0  0.0      0     0 ?        S    11:46   0:00 [idle_inject/3]
root           36  0.0  0.0      0     0 ?        S    11:46   0:00 [migration/3]
root           37  0.0  0.0      0     0 ?        S    11:46   0:00 [ksoftirqd/3]
root           39  0.0  0.0      0     0 ?        I<   11:46   0:00 [kworker/3:0H-events_highpri]
root           40  0.0  0.0      0     0 ?        S    11:46   0:00 [cpuhp/4]
root           41  0.0  0.0      0     0 ?        S    11:46   0:00 [idle_inject/4]
root           42  0.0  0.0      0     0 ?        S    11:46   0:00 [migration/4]
root           43  0.0  0.0      0     0 ?        S    11:46   0:00 [ksoftirqd/4]
root           44  0.0  0.0      0     0 ?        I    11:46   0:00 [kworker/4:0-cgroup_destroy]
root           45  0.0  0.0      0     0 ?        I<   11:46   0:00 [kworker/4:0H-events_highpri]
root           46  0.0  0.0      0     0 ?        S    11:46   0:00 [cpuhp/5]
```

- 按 CPU 占用

```
[northboat@northboat-nhx0dbde netctl]$ ps -auxw --sort=%cpu
USER        PID  %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root          1   0.0  0.0 170320 14876 ?        Ss   11:46   0:01 /sbin/init
root          2   0.0  0.0      0     0 ?        S    11:46   0:00 [kthreadd]
root          3   0.0  0.0      0     0 ?        I<   11:46   0:00 [rcu_gp]
root          4   0.0  0.0      0     0 ?        I<   11:46   0:00 [rcu_par_gp]
root          5   0.0  0.0      0     0 ?        I<   11:46   0:00 [slub_flushwq]
root          6   0.0  0.0      0     0 ?        I<   11:46   0:00 [netns]
root          8   0.0  0.0      0     0 ?        I<   11:46   0:00 [kworker/0:0H-acpi_thermal_pm]
root         10   0.0  0.0      0     0 ?        I<   11:46   0:00 [mm_percpu_wq]
root         12   0.0  0.0      0     0 ?        I    11:46   0:00 [rcu_tasks_kthread]
root         13   0.0  0.0      0     0 ?        I    11:46   0:00 [rcu_tasks_rude_kthread]
root         14   0.0  0.0      0     0 ?        I    11:46   0:00 [rcu_tasks_trace_kthread]
root         15   0.0  0.0      0     0 ?        S    11:46   0:00 [ksoftirqd/0]
root         16   0.0  0.0      0     0 ?        I    11:46   0:00 [rcu_preempt]
root         17   0.0  0.0      0     0 ?        S    11:46   0:00 [rcub/0]
root         18   0.0  0.0      0     0 ?        S    11:46   0:00 [migration/0]
root         19   0.0  0.0      0     0 ?        S    11:46   0:00 [idle_inject/0]
root         21   0.0  0.0      0     0 ?        S    11:46   0:00 [cpuhp/0]
root         22   0.0  0.0      0     0 ?        S    11:46   0:00 [cpuhp/1]
root         23   0.0  0.0      0     0 ?        S    11:46   0:00 [idle_inject/1]
root         24   0.0  0.0      0     0 ?        S    11:46   0:00 [migration/1]
root         25   0.0  0.0      0     0 ?        S    11:46   0:00 [ksoftirqd/1]
root         27   0.0  0.0      0     0 ?        I<   11:46   0:00 [kworker/1:0H-events_highpri]
root         28   0.0  0.0      0     0 ?        S    11:46   0:00 [cpuhp/2]
root         29   0.0  0.0      0     0 ?        S    11:46   0:00 [idle_inject/2]
root         30   0.0  0.0      0     0 ?        S    11:46   0:00 [migration/2]
root         31   0.0  0.0      0     0 ?        S    11:46   0:00 [ksoftirqd/2]
root         33   0.0  0.0      0     0 ?        I<   11:46   0:00 [kworker/2:0H-events_highpri]
root         34   0.0  0.0      0     0 ?        S    11:46   0:00 [cpuhp/3]
root         35   0.0  0.0      0     0 ?        S    11:46   0:00 [idle_inject/3]
root         36   0.0  0.0      0     0 ?        S    11:46   0:00 [migration/3]
root         37   0.0  0.0      0     0 ?        S    11:46   0:00 [ksoftirqd/3]
root         39   0.0  0.0      0     0 ?        I<   11:46   0:00 [kworker/3:0H-events_highpri]
root         40   0.0  0.0      0     0 ?        S    11:46   0:00 [cpuhp/4]
root         41   0.0  0.0      0     0 ?        S    11:46   0:00 [idle_inject/4]
root         42   0.0  0.0      0     0 ?        S    11:46   0:00 [migration/4]
root         43   0.0  0.0      0     0 ?        S    11:46   0:00 [ksoftirqd/4]
root         44   0.0  0.0      0     0 ?        I    11:46   0:00 [kworker/4:0-cgroup_destroy]
```

动态查看进程信息

```
[northboat@northboat-nhx0dbde netctl]$ top
top - 12:23:45 up 37 min,  1 user,  load average: 0.87, 0.63, 0.52
任务: 323 total,    1 running, 322 sleeping,    0 stopped,    0 zombie
%Cpu(s):  1.7 us,  0.9 sy,  0.0 ni, 97.0 id,  0.0 wa,  0.3 hi,  0.2 si,  0.0 st
MiB Mem : 15821.4 total, 10135.8 free,   2682.1 used,   3003.5 buff/cache
MiB Swap: 17405.8 total, 17405.8 free,      0.0 used.  11881.3 avail Mem

 进程号 USER      PR  NI    VIRT    RES    SHR   %CPU  %MEM     TIME+ COMMAND
   894 root      20   0   26.1g 166568  94908 S  16.3   1.0   2:25.21 Xorg
  1381 northbo+  20   0  738664  78820  53076 S   8.6   0.5   0:13.83 panel-1+
  1337 northbo+  20   0 1735468 107708  72328 S   5.0   0.7   0:27.11 xfwm4
   883 mysql     20   0 2307672 420644  35268 S   0.7   2.6   0:14.71 mysqld
  2414 northbo+  20   0   37.1g 176480 118860 S   0.7   1.1   1:04.34 Typora
  4011 northbo+  20   0 1130.1g 199904 139536 S   0.7   1.2   0:12.83 electron
  4313 northbo+  20   0 1125.3g 203460 121720 S   0.7   1.3   0:33.33 msedge
  5312 northbo+  20   0   14044   4520   3400 R   0.7   0.0   0:00.05 top
    93 root      20   0       0      0      0 I   0.3   0.0   0:00.67 kworker+
   231 root       0 -20       0      0      0 I   0.3   0.0   0:00.21 kworker+
  1645 northbo+  20   0 1694228  98364  57036 S   0.3   0.6   0:01.76 xdg-des+
  1923 northbo+  20   0   32.9g 157884  88584 S   0.3   1.0   0:17.93 msedge
  2487 northbo+  20   0   41.1g 738748 626296 S   0.3   4.6   3:06.62 Typora
```

终止进程

```
# 根据 pid 杀死进程
kill -9 pid

# 根据进程名查找 pid
pgrep -f name

# 根据进程名杀死进程
pkill -f name
```

磁盘管理

查看已挂载磁盘总容量、已使用、剩余容量

```
[northboat@northboat-nhx0dbde netctl]$ df -h
文件系统               大小    已用    可用   已用%  挂载点
dev                  7.8G      0    7.8G    0%  /dev
run                  7.8G   1.7M    7.8G    1%  /run
/dev/sda2            452G    139G    290G   33%  /
tmpfs                7.8G   560M    7.2G    8%  /dev/shm
tmpfs                7.8G   5.6M    7.8G    1%  /tmp
/dev/sda1            300M   308K    300M    1%  /boot/efi
tmpfs                1.6G    88K    1.6G    1%  /run/user/1000
```

查看目录或文件所占空间

```
[northboat@northboat-nhx0dbde file]$ ls
ai   bash   c   compiler   fe   java   python   reco   school
[northboat@northboat-nhx0dbde file]$ du -s java/
212780    java/
[northboat@northboat-nhx0dbde file]$ _
```

```
[northboat@northboat-nhx0dbde reco]$ du -s pull.sh
4          pull.sh
[northboat@northboat-nhx0dbde reco]$ _
```

实验总结

修改静态 IP 可以方便局域网内对本机进行访问，感觉用处不大，之前使用系统提供的配置文件对静态 IP 进行过修改，但每次重启或重新联网后都会重置该 IP，后采用 `netctl` 对静态 IP 进行统一管理，解决了问题

Linux 服务器配置

实现环境

centos7

```
Linux VM-0-17-centos 3.10.0-1160.88.1.el7.x86_64 #1 SMP Tue Mar 7 15:41:52 UTC
2023 x86_64 x86_64 x86_64 GNU/Linux
```

ssh

实验内容

下载 Nginx 服务器

通过 wget 在 nginx 官网下载

```
wget http://nginx.org/download/nginx-1.17.6.tar.gz
```

安装必要依赖

```
yum -y install gcc pcre pcre-devel zlib zlib-devel openssl openssl-devel
```

创建目录

```
mkdir /usr/local/nginx
```

解压 nginx 压缩包

```
tar -zxvf nginx-1.17.6.tar.gz -C /usr/local/nginx
```
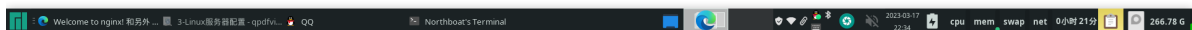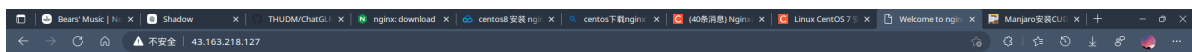
编译 nginx

```
cd /usr/local/nginx/nginx-1.17.6
./configure
make
make install
```

启动 nginx

```
cd /usr/local/nginx
./nginx
```

查看启动情况，浏览器进入 `http://43.163.218.127/`

下载 MariaDB

通过 yum 安装

```
yum install mariadb-server
```

启动 mariadb

```
systemctl start mariadb   # 开启服务
systemctl enable mariadb   # 设置为开机自启动服务
```

数据库配置

```
mysql_secure_installation
```

```
Enter current password for root (enter for none):   # 输入数据库超级管理员root的密码(注
意不是系统root的密码)，第一次进入还没有设置密码则直接回车
```

```
 Set root password? [Y/n]  # 设置密码，y

 New password:  # 新密码
 Re-enter new password:  # 再次输入密码

 Remove anonymous users? [Y/n]  # 移除匿名用户，y

 Disallow root login remotely? [Y/n]  # 拒绝root远程登录，n，不管y/n，都会拒绝root远程登
 录

 Remove test database and access to it? [Y/n]  # 删除test数据库，y：删除。n：不删除，数
 据库中会有一个test数据库，一般不需要

 Reload privilege tables now? [Y/n]  # 重新加载权限表，y。或者重启服务也许
```

登录

```
[root@VM-0-17-centos ~]# mysql -u root -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 7
Server version: 5.5.68-MariaDB MariaDB Server

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> exit
Bye
```

下载 Redis

wget 下载

```
wget https://github.com/redis/redis/archive/redis-7.0.9.tar.gz
```

解压

```
tar -zvxf redis-7.0.9.tar.gz -C /usr/local/redis
```

编译

```
cd /usr/local/redis/redis/redis-7.0.9
make
```

安装

```
make PREFIX=/usr/local/redis install
```

复制默认配置文件

```
cp redis.conf ../bin
```

启动

```
cd /usr/local/redis/bin
.redis-server& ./redis.conf
```

```
446:M 17 Mar 2023 23:02:00.967 * monotonic clock: POSIX clock_gettime
                _._
           _.-``__ ''-._
      _.-``    `.  `_.  ''-._           Redis 7.0.9 (00000000/0) 64 bit
  .-`` .-```.  ```\/    _.,_ ''-._
 (    '      ,       .-`  | `,    )     Running in standalone mode
 |`-._`-...-` __...-.``-._|'` _.-'|     Port: 6379
 |    `-._   `._    /     _.-'    |     PID: 446
  `-._    `-._  `-./  _.-'    _.-'
 |`-._`-._    `-.__.-'    _.-'_.-'|
 |    `-._`-._        _.-'_.-'    |           https://redis.io
  `-._    `-._`-.__.-'_.-'    _.-'
 |`-._`-._    `-.__.-'    _.-'_.-'|
 |    `-._`-._        _.-'_.-'    |
  `-._    `-._`-.__.-'_.-'    _.-'
      `-._    `-.__.-'    _.-'
          `-._        _.-'
              `-.__.-'

446:M 17 Mar 2023 23:02:00.968 # WARNING: The TCP backlog setting of 511 cannot
be enforced because /proc/sys/net/core/somaxconn is set to the lower value of 12
8.
```

安装 OpenJDK17

wget 下载最新的 jdk17

```
wget https://download.oracle.com/java/17/latest/jdk-17_linux-x64_bin.tar.gz
```

解压

```
tar xf jdk-17_linux-x64_bin.tar.gz
```

移动位置

```
mv jdk-17.0.6/ /usr/lib/jvm/jdk-17.0.6
```

修改环境配置

```
vim /etc/profile
```

添加以下内容

```
export JAVA_HOME=/usr/lib/jvm/jdk-17.0.6
export CLASSPATH=$JAVA_HOME/lib:$JRE_HOME/lib:$CLASSPATH
export PATH=$JAVA_HOME/bin:$JRE_HOME/bin:$PATH
```

重新加载配置

```
source /etc/profile
```

测试安装

```
java -version
```

```
[root@VM-0-17-centos lib]# java -version
java version "17.0.6" 2023-01-17 LTS
Java(TM) SE Runtime Environment (build 17.0.6+9-LTS-190)
Java HotSpot(TM) 64-Bit Server VM (build 17.0.6+9-LTS-190, mixed mode, sharing)
[root@VM-0-17-centos lib]# _
```

安装 RabbitMQ

安装 Erlang 环境 , yum 下载

安装依赖

```
curl -s
https://packagecloud.io/install/repositories/rabbitmq/erlang/script.rpm.sh | sudo
bash
```

下载 erlang

```
yum install -y erlang
```

测试安装

```
erl -version
```

```
[root@VM-0-17-centos local]# erl -version
Erlang (SMP,ASYNC_THREADS,HIPE) (BEAM) emulator version 11.2.2.10
[root@VM-0-17-centos local]# _
```

安装 RabbitMQ

导入 key

```
rpm --import https://packagecloud.io/rabbitmq/rabbitmq-server/gpgkey
rpm --import https://packagecloud.io/gpg.key
```

安装依赖

```
curl -s https://packagecloud.io/install/repositories/rabbitmq/rabbitmq-
server/script.rpm.sh | sudo bash
```

wget 下载 rabbitmq

```
wget https://github.com/rabbitmq/rabbitmq-
server/releases/download/v3.8.5/rabbitmq-server-3.8.5-1.el7.noarch.rpm
```

直接安装将报错

```
rpm -ivh rabbitmq-server-3.8.5-1.el7.noarch.rpm

warning: rabbitmq-server-3.8.5-1.el7.noarch.rpm: Header V4 RSA/SHA256 Signature,
key ID 6026dfca: NOKEY
error: Failed dependencies:
    socat is needed by rabbitmq-server-3.8.5-1.el7.noarch
```

导入 key

```
rpm --import https://www.rabbitmq.com/rabbitmq-release-signing-key.asc
```

安装 socat

```
yum -y install epel-release
yum -y install socat
```

重新安装

```
rpm -ivh rabbitmq-server-3.8.5-1.el7.noarch.rpm
```

启用 rabbitmq 插件

```
rabbitmq-plugins enable rabbitmq_management
```

启动 rabbitmq

```
systemctl start rabbitmq-server
```

创建用户
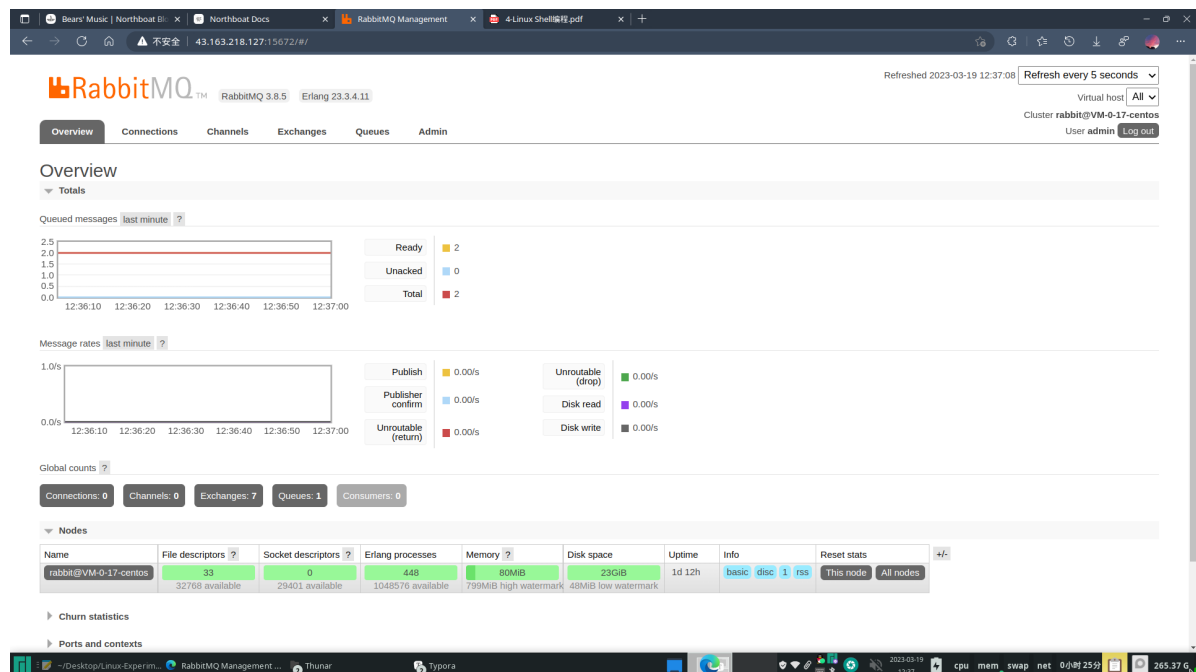
```
rabbitmqctl add_user admin 011026
```

设置超级管理员权限

```
rabbitmqctl set_user_tags admin administrator
```

重启 rabbitmq

```
systemctl restart rabbitmq-server
```

查看可视化界面：`43.163.218.127:15672`
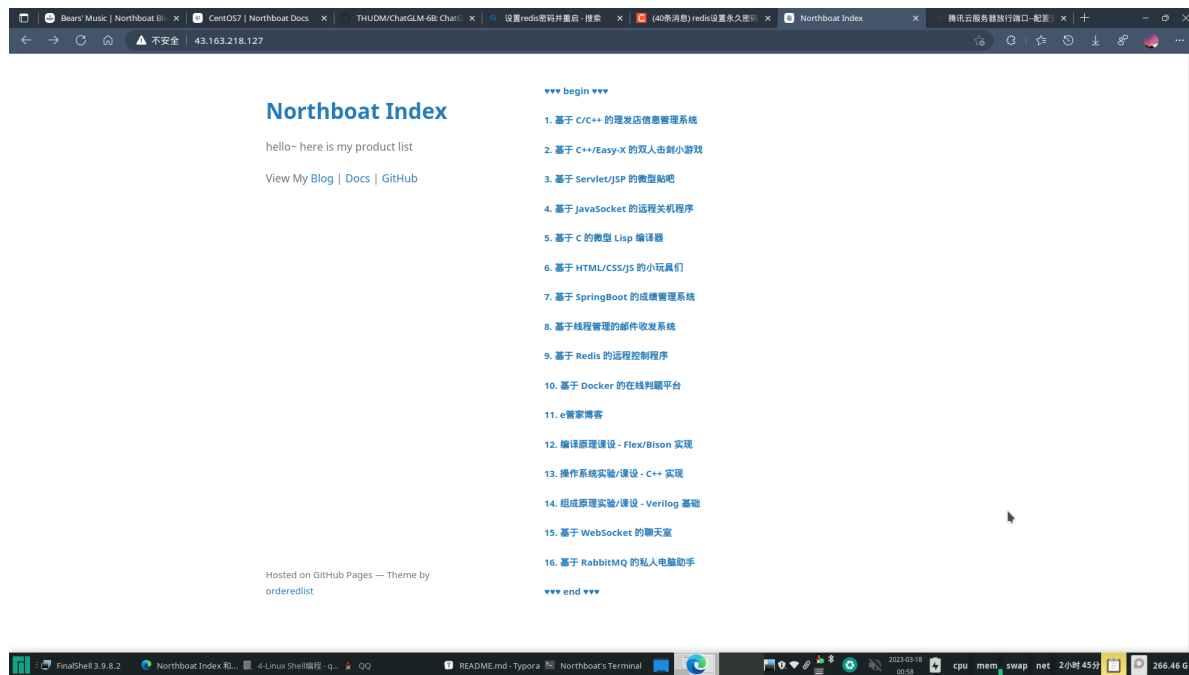
服务器使用

使用 ftp 工具上传文件

- 一个前端网页
- 一个 jar 包

将 nginx 目录下 html 文件夹内容替换为上传的 `index.html`，并将资源放在相应目录下

配置 nginx.conf 文件，设置端口及负载均衡

启动 jar 包

```
nohup java -jar Shadow-0.0.1-SNAPSHOT.jar &
```

访问 `43.163.218.127:80`

实验总结

好麻烦，宁愿用宝塔一键安装

Linux Shell 编程

实现环境

manjaro 本地 shell

```
Linux northboat-nhx0dbde 6.1.12-1-MANJARO #1 SMP PREEMPT_DYNAMIC Tue Feb 14
21:59:10 UTC 2023 x86_64 GNU/Linux
```

实验内容

第一个 Shell 脚本

hello.sh

```
echo "Hello World!"
```

```
[northboat@northboat-nhx0dbde shell]$ vim hello
[northboat@northboat-nhx0dbde shell]$ cat hello
echo "Hello World!"
[northboat@northboat-nhx0dbde shell]$ chmod 777 hello
[northboat@northboat-nhx0dbde shell]$ ./hello
Hello World!
[northboat@northboat-nhx0dbde shell]$ sh hello
Hello World!
```

利用脚本获取系统信息

```
echo System time: `date "+%Y-%m-%d %H:%M:%S"`
echo Running time: `uptime -p`
echo Load average: `cat /proc/loadavg | awk '{print $1,$2,$3}'`
totalMem=`free -h | grep 内存 | awk '{print $2}'`
usedMem=`free -h | grep 内存 | awk '{print $3}'`
echo used memory: $usedMem / $totalMem
```

```
[northboat@northboat-nhx0dbde shell]$ vim system_info
[northboat@northboat-nhx0dbde shell]$ cat system_info
echo System time: `date "+%Y-%m-%d %H:%M:%S"`
echo Running time: `uptime -p`
echo Load average: `cat /proc/loadavg | awk '{print $1,$2,$3}'`
totalMem=`free -h | grep 内存 | awk '{print $2}'`
usedMem=`free -h | grep 内存 | awk '{print $3}'`
echo used memory: $usedMem / $totalMem
[northboat@northboat-nhx0dbde shell]$ chmod 777 system_info
[northboat@northboat-nhx0dbde shell]$ ./system_info
System time: 2023-03-19 12:19:19
Running time: up 7 minutes
Load average: 0.32 0.50 0.28
used memory: 2.5Gi / 15Gi
```

获取网卡信息

network_monitor.sh

```
echo IP: `ifconfig wlp12s0 | grep -w inet | awk '{print $2}'`

# get receive bytes 10 seconds ago
inputBytes1=`cat /proc/net/dev | grep wlp12s0 | awk -F: '{print $2}' | awk
'{print $1}'`

# get transmit bytes 10 seconds ago
outputBytes1=`cat /proc/net/dev | grep wlp12s0 | awk -F: '{print $2}' | awk
'{print $9}'`

echo Input bytes1: $inputBytes1 Output bytes1: $outputBytes1

sleep 10

# get receive bytes 10s later
inputBytes2=`cat /proc/net/dev | grep wlp12s0 | awk -F: '{print $2}'|awk '{print
$1}'`
```

```bash
# get transmit bytes 10s later
outputBytes2=`cat /proc/net/dev | grep wlp12s0 | awk -F: '{print $2}'|awk '{print $9}'`

echo Input bytes2: $inputBytes2 Output bytes2: $outputBytes2

# evaluate the network
if [ $inputBytes1 -le $inputBytes2 ]
    then
    echo Network traffic is on the rise.
    else
    echo Network traffic is on the falling.
fi
```

```
[northboat@northboat-nhx0dbde shell]$ ./network_monitor
IP: 192.168.17.185
Input bytes1: 976723881 Output bytes1: 36754668
Input bytes2: 977488153 Output bytes2: 36863239
Network traffic is on the rise.
[northboat@northboat-nhx0dbde shell]$
```

监控 CPU 负载

cpu_monitor.sh

```bash
#Function: monitor load average of cpu, and write to file
#Author:Mr.Yu
# create file
if [ -f cpu_monitor.txt ]
    then
    touch cpu_monitor.txt
fi

# modify file permission
if [ -w cpu_monitor.txt ]
    then
    chmod 755 cpu_monitor.txt
fi

# write cpu infomation
cat /proc/cpuinfo | grep "model name" > cpu_monitor.txt
cat /proc/cpuinfo | grep "cpu cores" >> cpu_monitor.txt

echo " " >> cpu_monitor.txt
echo Total data: >> cpu_monitor.txt
echo user nice system idle iowait irq softirq >> cpu_monitor.txt

#write cpu infomation every 2s
for ((i=0;i<=50;i++))
    do
    cat /proc/stat | grep 'cpu ' | awk '{print $2" "$3" "$4" "$5" "$6" "$7" "$8}' >> cpu_monitor.txt
    sleep 2
done
```

```
[northboat@northboat-nhx0dbde shell]$ chmod 777 cpu_monitor.sh
[northboat@northboat-nhx0dbde shell]$ ./cpu_monitor.sh
[northboat@northboat-nhx0dbde shell]$
```

```
 1 model name       : Intel(R) Core(TM) i7-10750H CPU @ 2.60GHz
 2 model name       : Intel(R) Core(TM) i7-10750H CPU @ 2.60GHz
 3 model name       : Intel(R) Core(TM) i7-10750H CPU @ 2.60GHz
 4 model name       : Intel(R) Core(TM) i7-10750H CPU @ 2.60GHz
 5 model name       : Intel(R) Core(TM) i7-10750H CPU @ 2.60GHz
 6 model name       : Intel(R) Core(TM) i7-10750H CPU @ 2.60GHz
 7 model name       : Intel(R) Core(TM) i7-10750H CPU @ 2.60GHz
 8 model name       : Intel(R) Core(TM) i7-10750H CPU @ 2.60GHz
 9 model name       : Intel(R) Core(TM) i7-10750H CPU @ 2.60GHz
10 model name       : Intel(R) Core(TM) i7-10750H CPU @ 2.60GHz
11 model name       : Intel(R) Core(TM) i7-10750H CPU @ 2.60GHz
12 model name       : Intel(R) Core(TM) i7-10750H CPU @ 2.60GHz
13 cpu cores        : 6
14 cpu cores        : 6
15 cpu cores        : 6
16 cpu cores        : 6
17 cpu cores        : 6
18 cpu cores        : 6
19 cpu cores        : 6
20 cpu cores        : 6
21 cpu cores        : 6
22 cpu cores        : 6
23 cpu cores        : 6
24 cpu cores        : 6
25
26 Total data:
27 user nice system idle iowait irq softirq
28 31667 38 14098 1441101 5672 1879 2536
29 31706 38 14117 1443446 5672 1882 2539
30 31733 38 14134 1445792 5672 1885 2542
31 31760 38 14142 1448157 5673 1887 2543
32 31808 38 14160 1450479 5673 1890 2547
33 31884 38 14182 1452770 5674 1895 2551
34 31925 38 14194 1455117 5674 1898 2553
35 31992 38 14215 1457419 5674 1902 2556
36 32079 38 14250 1459697 5675 1907 2561
37 32187 38 14275 1461956 5675 1913 2565
38 32225 38 14292 1464296 5675 1916 2568
39 32297 38 14320 1466581 5675 1921 2572
40 32367 38 14351 1468874 5675 1925 2576
41 32441 38 14372 1471173 5675 1929 2581
42 32495 38 14392 1473488 5675 1933 2584
43 32599 38 14428 1475745 5675 1938 2589
44 32666 38 14440 1478075 5676 1941 2590
45 32735 38 14463 1480385 5677 1945 2593
46 32832 43 14486 1482641 5677 1950 2596
47 32929 43 14500 1484926 5677 1954 2599
48 33017 43 14519 1487196 5677 1959 2603
49 33080 43 14531 1489520 5677 1962 2605
50 33150 43 14551 1491817 5678 1966 2609
51 33238 43 14569 1494085 5678 1970 2612
52 33336 43 14614 1496348 5679 1975 2615
53 33436 43 14638 1498636 5679 1980 2618
54 33537 43 14662 1500910 5680 1984 2621
55 33640 43 14698 1503169 5680 1989 2625
56 33714 43 14726 1505464 5681 1993 2629
57 33800 43 14751 1507758 5681 1998 2633
58 33870 43 14774 1510061 5681 2001 2636
59 33989 48 14805 1512300 5681 2007 2639
```

实验总结

注意很多命令的空格，命令后一定要有，加参数后一定要接空格，否则报错