

Q0: 基础实验环境说明：

(1) 操作系统:CentOS6.5 VMWare虚拟机环境

```
→ examUse tree ./
./
├── elephaht_examhos
│   ├── Enmoedu_Hadoop_CentOS_6.5_CDH_5.6.vmdk
│   └── Enmoedu_Hadoop_CentOS_6.5_CDH_5.6.vmx
└── monkey_exam
    ├── Enmoedu_Hadoop_CentOS_6.5_CDH_5.6.vmdk
    └── Enmoedu_Hadoop_CentOS_6.5_CDH_5.6.vmx
```

(2) 局域网环境，网卡设置为桥接模式，主从两节点(elephant/monkey)

```
[enmoedu@bogon ~]$ hostname
elephant
[enmoedu@bogon ~]$ ifconfig | grep 10
    inet addr:10.8.2.157  Bcast:10.8.2.255  Mask:255.255.255.0
    collisions:0 txqueuelen:1000
    RX packets:10 errors:0 dropped:0 overruns:0 frame:0
    TX packets:10 errors:0 dropped:0 overruns:0 carrier:0

[enmoedu@bogon ~]$ hostname
monkey
[enmoedu@bogon ~]$ ifconfig | grep 10
    inet addr:10.8.2.168  Bcast:10.8.2.255  Mask:255.255.255.0
    collisions:0 txqueuelen:1000
```

(3) 关闭主从节点的防火墙和 SELinux

以下所有操作默认使用 su 切换到 root 用户

```
# change to root user
[root@elephant enmoedu]# service iptables stop
iptables: Setting chains to policy ACCEPT: filter      [ OK ]
iptables: Flushing firewall rules:                    [ OK ]
iptables: Unloading modules:                          [ OK ]

# edit selinux configure file
[root@elephant enmoedu]# vim /etc/selinux/config

# change `enforcing` to `disabled`
SELINUX=disabled
```

```
2. enmoedu@monkey:/home/enmoedu (ssh)
enmoedu@monkey:/home/enmoedu

[root@monkey enmoedu]# service iptables stop
iptables: Setting chains to policy ACCEPT: filter      [ OK ]
iptables: Flushing firewall rules:                    [ OK ]
iptables: Unloading modules:                          [ OK ]
[root@monkey enmoedu]# vim /etc/se
securetty      security/      selinux/      services      sestatus.conf  setuptool.d/
[root@monkey enmoedu]# vim /etc/se
securetty      security/      selinux/      services      sestatus.conf  setuptool.d/
[root@monkey enmoedu]# vim /etc/selinux/config
[root@monkey enmoedu]# vim /etc/selinux/config
[root@monkey enmoedu]# cat /etc/selinux/config

# This file controls the state of SELinux on the system.
# SELINUX= can take one of these three values:
#   enforcing - SELinux security policy is enforced.
#   permissive - SELinux prints warnings instead of enforcing.
#   disabled - No SELinux policy is loaded.
SELINUX=disabled
# SELINUXTYPE= can take one of these two values:
#   targeted - Targeted processes are protected,
#   mls - Multi Level Security protection.
SELINUXTYPE=targeted

enmoedu@elephant:/home/enmoedu (ssh)

[root@elephant enmoedu]# service iptables stop
iptables: Setting chains to policy ACCEPT: filter      [ OK ]
iptables: Flushing firewall rules:                    [ OK ]
iptables: Unloading modules:                          [ OK ]
[root@elephant enmoedu]# vim /etc/se
securetty      security/      selinux/      services      sestatus.conf  setuptool.d/
[root@elephant enmoedu]# vim /etc/se
securetty      security/      selinux/      services      sestatus.conf  setuptool.d/
[root@elephant enmoedu]# vim /etc/selinux/config
[root@elephant enmoedu]# vim /etc/selinux/config
[root@elephant enmoedu]# cat /etc/selinux/config

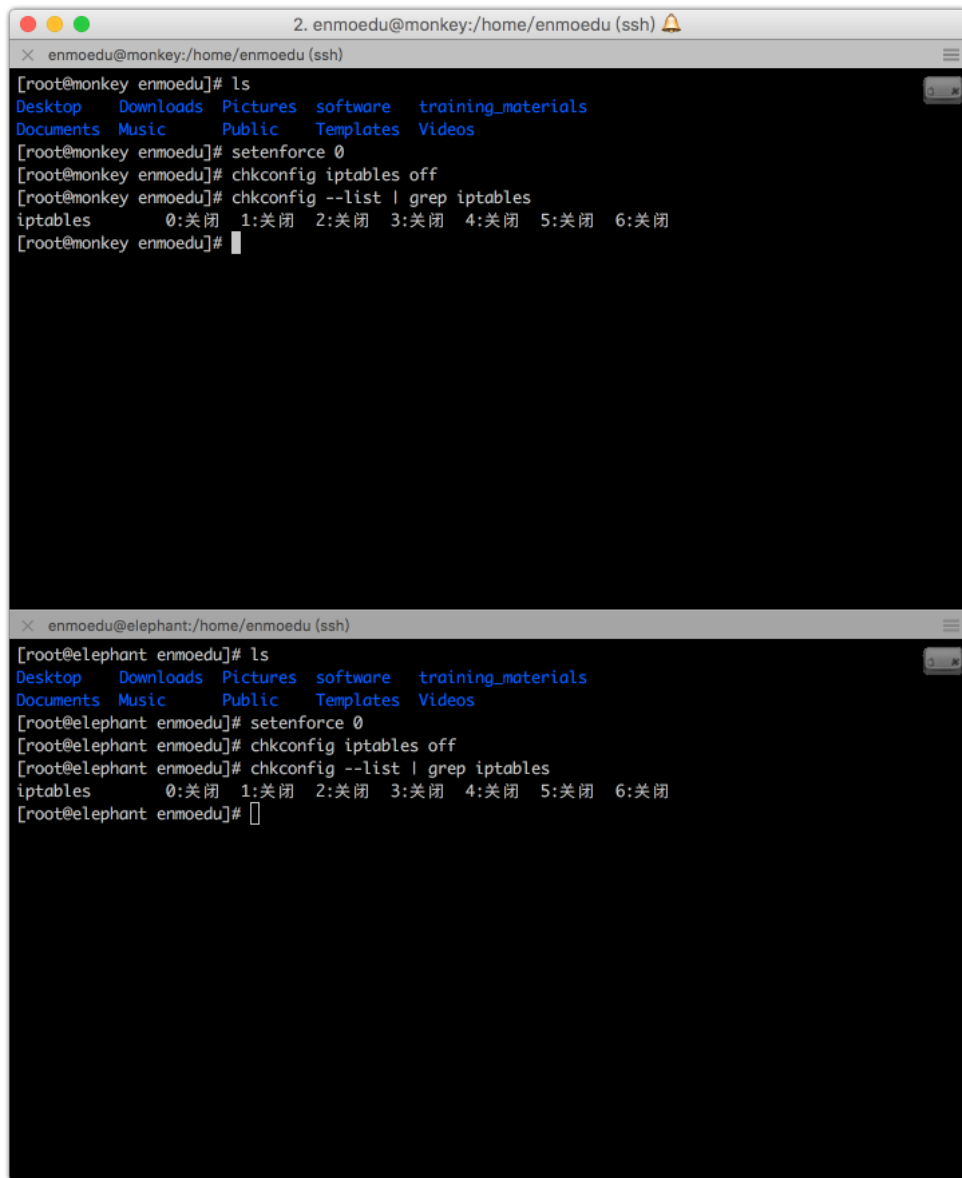
# This file controls the state of SELinux on the system.
# SELINUX= can take one of these three values:
#   enforcing - SELinux security policy is enforced.
#   permissive - SELinux prints warnings instead of enforcing.
#   disabled - No SELinux policy is loaded.
SELINUX=disabled
# SELINUXTYPE= can take one of these two values:
#   targeted - Targeted processes are protected,
#   mls - Multi Level Security protection.
SELINUXTYPE=targeted
```

设置关闭防火墙和SELinux的行为永久生效:

```
# shutdown selinux forever
[root@monkey enmoedu]# setenforce 0

# deny iptables restart when system reboot
[root@monkey enmoedu]# chkconfig iptables off

# check iptables setting
[root@monkey enmoedu]# chkconfig --list | grep iptables
iptables      0:关闭    1:关闭    2:关闭    3:关闭    4:关闭    5:关闭    6:关闭
[root@monkey enmoedu]#
```



Q1. 查看Linux操作系统kernel 版本参考命令

- `uname -a` 显示系统信息一般习惯使用 `uname` 指令, `2.6.32-431.el6.x86_64` 便是系统内核版本号

```
[enmoedu@monkey ~]$ uname -a  
Linux monkey 2.6.32-431.el6.x86_64 #1 SMP Fri Nov 22 03:15:09 UTC 2013 x86_64 x86_64 x86_64 GNU/Linux
```

- `/proc/version` 文件里也可以查阅到内核版本号

```
[enmoedu@monkey ~]$ cat /proc/version  
Linux version 2.6.32-431.el6.x86_64 (mockbuild@c6b8.bsys.dev.centos.org) (gcc version 4.4.7 20120313 (Red Hat 4.4.7-4) (GCC) ) #1 SMP Fri Nov 22 03:15:09 UTC 2013
```

Q2. 在 Linux 操作系统上搭建NTP 时间服务器。能够利用 同步主机时间。

(1) 检查主从节点时间

```
# date  
2017年 04月 12日 星期三 03:27:10 PDT
```

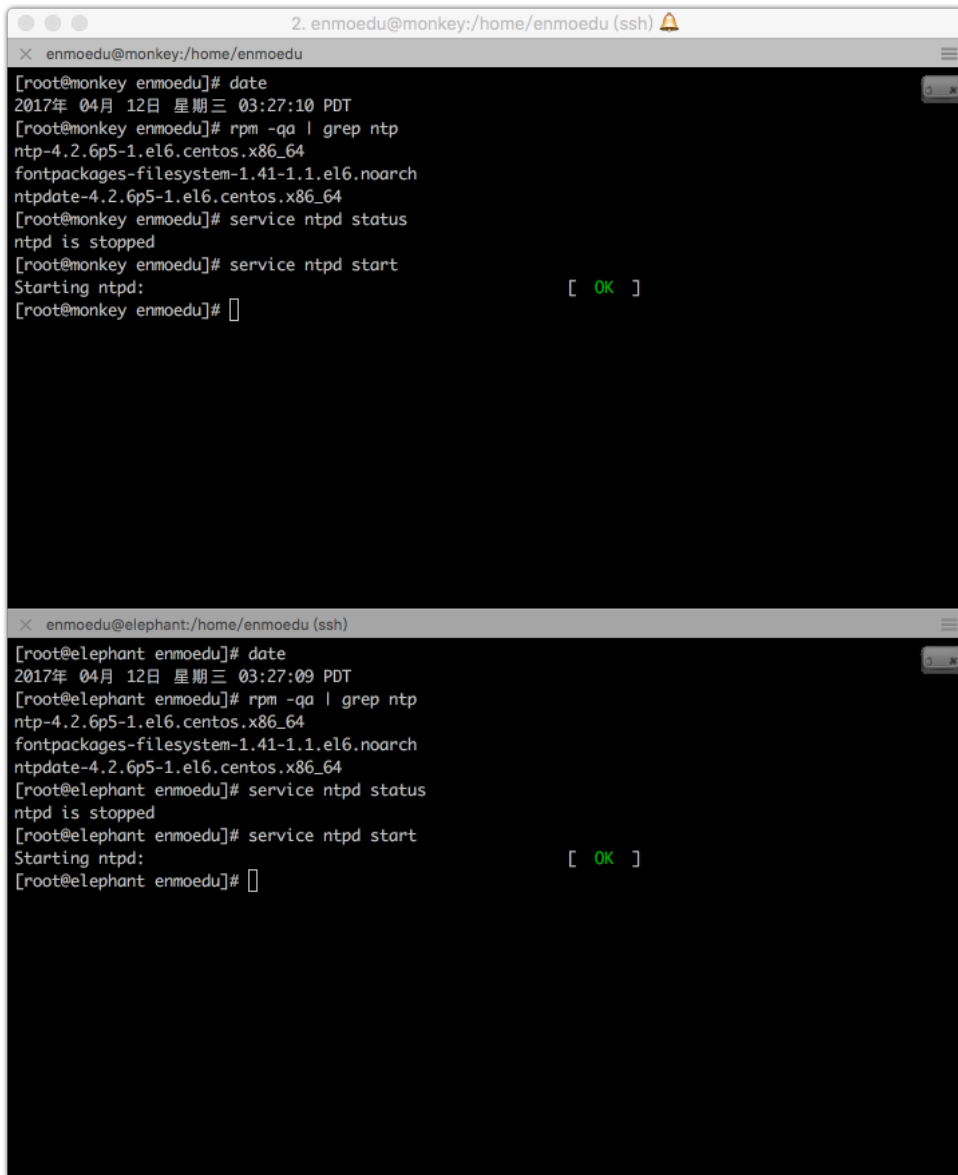
(2) 检查主从节点是否安装 `ntp` 包

```
[root@monkey enmoedu]# rpm -qa | grep ntp
ntp-4.2.6p5-1.el6.centos.x86_64
fontpackages-filesystem-1.41-1.1.el6.noarch
ntpdate-4.2.6p5-1.el6.centos.x86_64
```

```
# 如果没有发现ntp包, 可以尝试使用默认的yum源安装(推荐使用163源)
# yum install ntp
```

(3) 检查主从节点 `ntp` 服务状态, 并启动

```
[root@monkey enmoedu]# service ntpd status
ntpd is stopped
[root@monkey enmoedu]# service ntpd start
Starting ntpd: [ OK ]
```



(4) 设计 `elephant` 为主节点, 作为时间服务器, `monkey` 从主节点获取时间

将 `elephant` 作为ntp server, 配置 `/etc/ntp.conf` 文件, 将 `server` 设置为 `127.127.1.0` 本地物理时钟地址

```
[root@elephant enmoedu]# vim /etc/ntp.conf
server 127.127.1.0
```

相应的修改 `monkey` 的 `ntp.conf`, 将 `server` 设置成 `elephant` 的IP地址:

```
[root@monkey enmoedu]# vim /etc/ntp.conf
server 10.8.2.157 ## 主节点的IP地址
```

```
2. enmoedu@monkey:/home/enmoedu (ssh)
enmoedu@monkey:/home/enmoedu (ssh)
restrict -6 default kod nomodify notrap nopeer noquery

# Permit all access over the loopback interface. This could
# be tightened as well, but to do so would effect some of
# the administrative functions.
restrict 127.0.0.1
restrict -6 ::1

# Hosts on local network are less restricted.
#restrict 192.168.1.0 mask 255.255.255.0 nomodify notrap

# Use public servers from the pool.ntp.org project.
# Please consider joining the pool (http://www.pool.ntp.org/join.html).

# server 0.centos.pool.ntp.org iburst
# server 1.centos.pool.ntp.org iburst
# server 2.centos.pool.ntp.org iburst
# server 3.centos.pool.ntp.org iburst
server 10.8.2.157

#broadcast 192.168.1.255 autokey          # broadcast server
"/etc/ntp.conf" 56L, 1806C 已写入          27,0-1          23%

enmoedu@elephant:/home/enmoedu (ssh)
[root@elephant enmoedu]# !cat
cat /etc/ntp.conf | grep server
# Use public servers from the pool.ntp.org project.
# server 0.centos.pool.ntp.org iburst
# server 1.centos.pool.ntp.org iburst
# server 2.centos.pool.ntp.org iburst
# server 3.centos.pool.ntp.org iburst
server 127.127.1.0
#broadcast 192.168.1.255 autokey          # broadcast server
#broadcast 224.0.1.1 autokey              # multicast server
#manycastserver 239.255.254.254            # manycast server
[root@elephant enmoedu]# ifconfig | grep 10
    inet addr:10.8.2.157 Bcast:10.8.2.255 Mask:255.255.255.0
    collisions:0 txqueuelen:1000
    RX packets:10 errors:0 dropped:0 overruns:0 frame:0
    TX packets:10 errors:0 dropped:0 overruns:0 carrier:0
[root@elephant enmoedu]#
```

(5) 重启一下ntpd服务，从节点使用 `ntpd -p` 检查是否从主节点同步时间

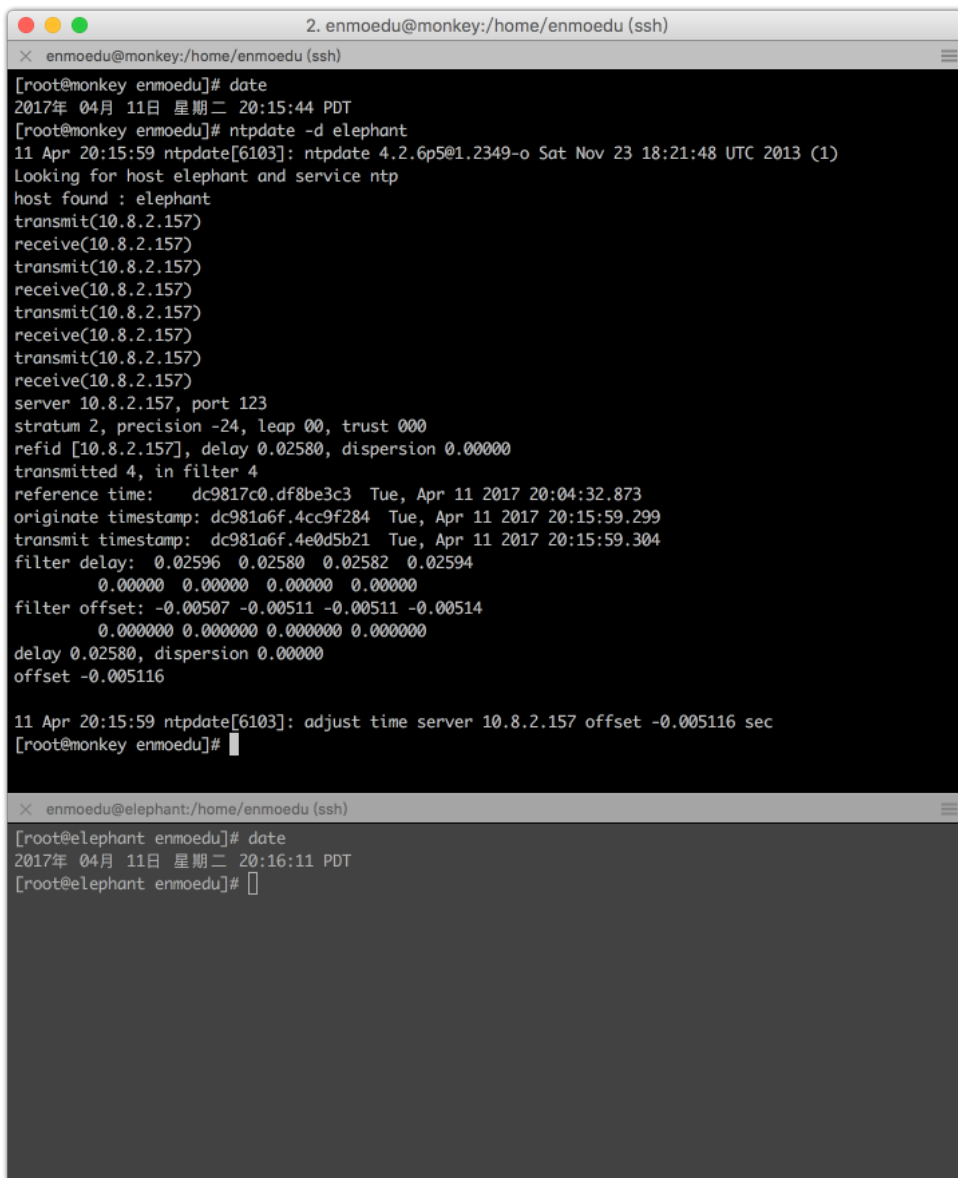
`remote` 显示成为主节点hostname，说明设置生效

```
[root@monkey enmoedu]# service ntpd restart
Shutting down ntpd:          [ OK ]
Starting ntpd:                [ OK ]
[root@monkey enmoedu]# ntpq -p
      remote           refid      st t when poll reach  delay  offset  jitter
=====
 elephant            85.199.214.101    2 u   1   64   1   0.789   29.671   0.000
```

```
[root@monkey enmoedu]# ntpq -p
      remote           refid      st t when poll reach  delay  offset  jitter
=====
 dns1.synet.edu. .STEP.        16 u   - 1024   0   0.000   0.000   0.000
 marla.ludost.ne .STEP.        16 u   - 1024   0   0.000   0.000   0.000
 biisoni.miuku.n 207.224.49.219    2 u  178   64   74 279.503  22.026  115.626
 ntp3.flashdance 194.58.202.148    2 u  113   64  216 300.585  34.255  79.107
[root@monkey enmoedu]#
[root@monkey enmoedu]# service ntpd resart
Usage: /etc/init.d/ntpd {start|stop|status|restart|try-restart|force-reload}
[root@monkey enmoedu]# service ntpd restart
Shutting down ntpd:          [ OK ]
Starting ntpd:                [ OK ]
[root@monkey enmoedu]# ntpq -p
      remote           refid      st t when poll reach  delay  offset  jitter
=====
 elephant            85.199.214.101    2 u   1   64   1   0.789   29.671   0.000
[root@monkey enmoedu]#
```

(6) 使用 `ntpdate -d elephant` 同步主从节点时间

```
[root@monkey enmoedu]# ntpdate -d elephant
```



The image shows two terminal windows. The top window is titled '2. enmoedu@monkey:/home/enmoedu (ssh)' and shows the execution of `ntpdate -d elephant`. It displays the process of finding the 'elephant' host, exchanging NTP packets, and adjusting the system time. The bottom window is titled 'enmoedu@elephant:/home/enmoedu (ssh)' and shows the result of the synchronization on the 'elephant' node, where the time is now 20:16:11 PDT.

```
2. enmoedu@monkey:/home/enmoedu (ssh)
enmoedu@monkey:/home/enmoedu (ssh)
[root@monkey enmoedu]# date
2017年 04月 11日 星期二 20:15:44 PDT
[root@monkey enmoedu]# ntpdate -d elephant
11 Apr 20:15:59 ntpdate[6103]: ntpdate 4.2.6p5@1.2349-o Sat Nov 23 18:21:48 UTC 2013 (1)
Looking for host elephant and service ntp
host found : elephant
transmit(10.8.2.157)
receive(10.8.2.157)
transmit(10.8.2.157)
receive(10.8.2.157)
transmit(10.8.2.157)
receive(10.8.2.157)
transmit(10.8.2.157)
receive(10.8.2.157)
server 10.8.2.157, port 123
stratum 2, precision -24, leap 00, trust 000
refid [10.8.2.157], delay 0.02580, dispersion 0.00000
transmitted 4, in filter 4
reference time:   dc9817c0.df8be3c3  Tue, Apr 11 2017 20:04:32.873
originate timestamp: dc981a6f.4cc9f284  Tue, Apr 11 2017 20:15:59.299
transmit timestamp:  dc981a6f.4e0d5b21  Tue, Apr 11 2017 20:15:59.304
filter delay:  0.02596  0.02580  0.02582  0.02594
               0.00000  0.00000  0.00000  0.00000
filter offset: -0.00507 -0.00511 -0.00511 -0.00514
               0.000000 0.000000 0.000000 0.000000
delay 0.02580, dispersion 0.00000
offset -0.005116

11 Apr 20:15:59 ntpdate[6103]: adjust time server 10.8.2.157 offset -0.005116 sec
[root@monkey enmoedu]#

enmoedu@elephant:/home/enmoedu (ssh)
[root@elephant enmoedu]# date
2017年 04月 11日 星期二 20:16:11 PDT
[root@elephant enmoedu]#
```

Q3. 在 Linux 操作系统上搭建安装服务器，能够利用 `yum install`命令从安装服务器上下载对应的软件包。

(0) 检查并配置主从hostname，检查网络是否连通

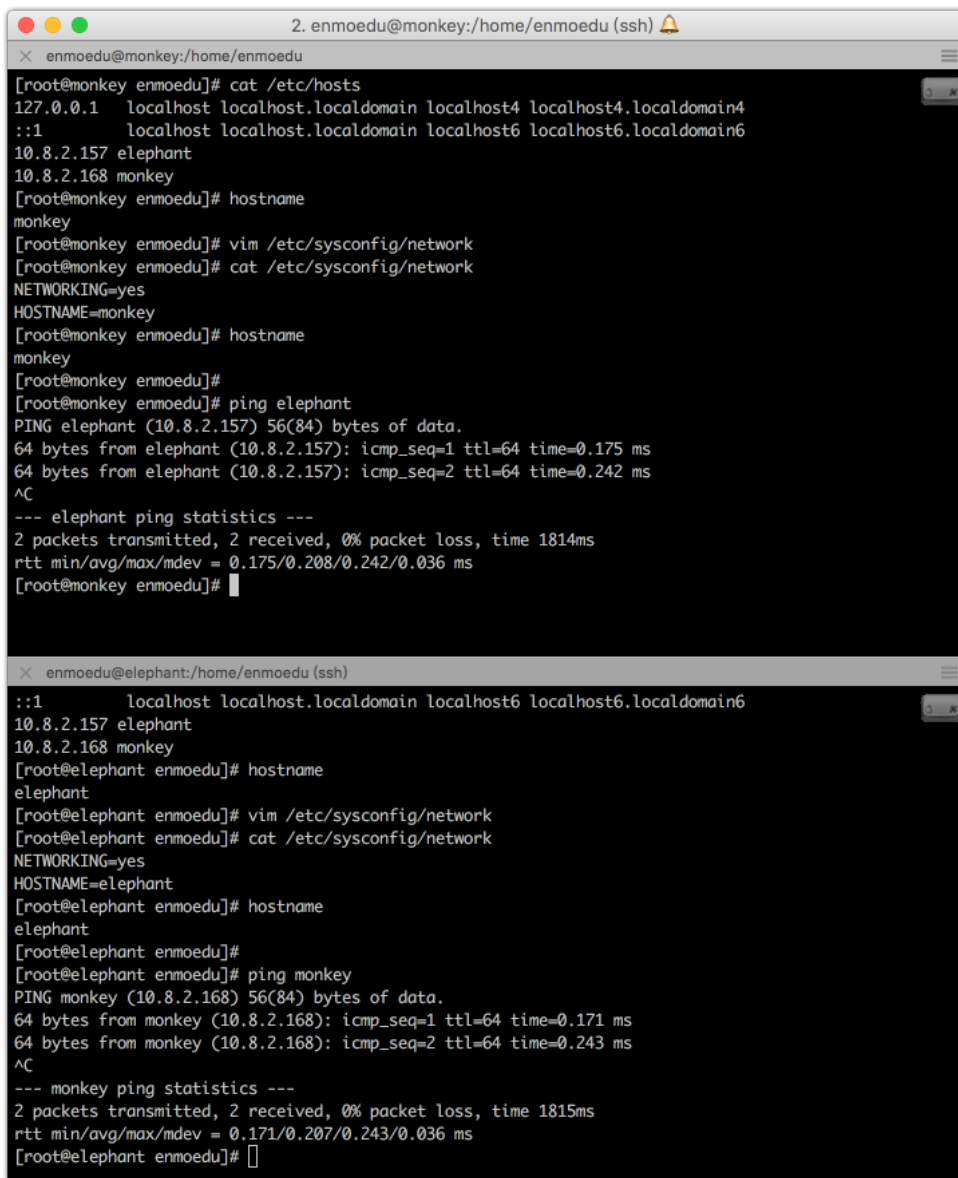
```
## 1. check hosts configure
[root@monkey enmoedu]# cat /etc/hosts
127.0.0.1    localhost localhost.localdomain localhost4 localhost4.localdomain4
::1         localhost localhost.localdomain localhost6 localhost6.localdomain6
10.8.2.157  elephant
10.8.2.168  monkey

## 2. modify /etc/sysconfig/network configure change `HOSTNAME` fields
[root@monkey enmoedu]# cat /etc/sysconfig/network
NETWORKING=yes
HOSTNAME=monkey

[root@elephant enmoedu]# cat /etc/sysconfig/network
NETWORKING=yes
HOSTNAME=elephant

## 3. re-declare hostname (I've set it before)
[root@monkey enmoedu]# hostname monkey
monkey
[root@elephant enmoedu]# hostname elephant
elephant

## if reset network that need to restart network service
# service network restart
```



The screenshot shows two terminal windows. The top window is titled '2. enmoedu@monkey:/home/enmoedu (ssh)' and shows the following commands and output:

```
[root@monkey enmoedu]# cat /etc/hosts
127.0.0.1    localhost localhost.localdomain localhost4 localhost4.localdomain4
::1         localhost localhost.localdomain localhost6 localhost6.localdomain6
10.8.2.157  elephant
10.8.2.168  monkey
[root@monkey enmoedu]# hostname
monkey
[root@monkey enmoedu]# vim /etc/sysconfig/network
[root@monkey enmoedu]# cat /etc/sysconfig/network
NETWORKING=yes
HOSTNAME=monkey
[root@monkey enmoedu]# hostname
monkey
[root@monkey enmoedu]#
[root@monkey enmoedu]# ping elephant
PING elephant (10.8.2.157) 56(84) bytes of data.
64 bytes from elephant (10.8.2.157): icmp_seq=1 ttl=64 time=0.175 ms
64 bytes from elephant (10.8.2.157): icmp_seq=2 ttl=64 time=0.242 ms
^C
--- elephant ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1814ms
rtt min/avg/max/mdev = 0.175/0.208/0.242/0.036 ms
[root@monkey enmoedu]#
```

The bottom window is titled 'enmoedu@elephant:/home/enmoedu (ssh)' and shows the following commands and output:

```
:::1         localhost localhost.localdomain localhost6 localhost6.localdomain6
10.8.2.157  elephant
10.8.2.168  monkey
[root@elephant enmoedu]# hostname
elephant
[root@elephant enmoedu]# vim /etc/sysconfig/network
[root@elephant enmoedu]# cat /etc/sysconfig/network
NETWORKING=yes
HOSTNAME=elephant
[root@elephant enmoedu]# hostname
elephant
[root@elephant enmoedu]#
[root@elephant enmoedu]# ping monkey
PING monkey (10.8.2.168) 56(84) bytes of data.
64 bytes from monkey (10.8.2.168): icmp_seq=1 ttl=64 time=0.171 ms
64 bytes from monkey (10.8.2.168): icmp_seq=2 ttl=64 time=0.243 ms
^C
--- monkey ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1815ms
rtt min/avg/max/mdev = 0.171/0.207/0.243/0.036 ms
[root@elephant enmoedu]#
```

(1) 主节点检查并启动 `httpd` 服务

检查或安装 `httpd` 服务

```
## check httpd package is install or not
[root@elephant enmoedu]# rpm -qa | grep httpd
httpd-2.2.15-29.el6.centos.x86_64
httpd-tools-2.2.15-29.el6.centos.x86_64

## if not install use `yum` default source (recommand 163 mirrors)
[root@elephant enmoedu]# yum install httpd
```

```
[root@elephant enmoedu]# service httpd status
httpd is stopped
[root@elephant enmoedu]# service httpd start
Starting httpd: httpd: Could not reliably determine the server's fully qualified domain name, using 10.8.2.157 for ServerName
[ OK ]
```

设置开启自启动

```
[root@elephant enmoedu]# chkconfig httpd on
```

```
2. enmoedu@elephant:/home/enmoedu (ssh)
X enmoedu@monkey:/home/enmoedu (ssh)

[root@monkey enmoedu]# curl http://elephant | more
% Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
           % Done      0         0                 0             0          0
100  5039  100  5039    0     0  3322k      0 --:--:-- --:--:-- --:--:-- 4920k
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.1//EN" "http://www.w3.org/TR/xhtml11/DTD/xhtml11.dtd">
<head>
  <title>Apache HTTP Server Test Page powered by CentOS</title>
  <meta http-equiv="Content-Type" content="text/html; charset=UTF-8" />
  <style type="text/css">
    body {
      background-color: #fff;
      color: #000;
      font-size: 0.9em;
      font-family: sans-serif,helvetica;
      margin: 0;
      padding: 0;
    }
    :link {
      color: #0000FF;
    }
    :visited {
      color: #0000FF;
    }
    a:hover {
      color: #3399FF;
    }
  
```

```
X enmoedu@elephant:/home/enmoedu (ssh)

[root@elephant enmoedu]# service httpd status
httpd (pid 6252) is running...
[root@elephant enmoedu]# service httpd restart
Stopping httpd:                                     [ OK ]
Starting httpd: httpd: Could not reliably determine the server's fully qualified domain name, using 1
0.8.2.157 for ServerName                             [ OK ]

[root@elephant enmoedu]# service httpd status
httpd (pid 6347) is running...
[root@elephant enmoedu]#
```

将准备好的 CDH 包组挪到 httpd 默认的 web 目录：


```
[root@elephant software]# ls
Cloudera-cdh5  cloudera-manager
[root@elephant software]# mv Cloudera-cdh5/ /var/www/html/
[root@elephant software]# mv cloudera-manager/ /var/www/html/
[root@elephant software]# cd /var/www/html/
[root@elephant html]# pwd
/var/www/html
[root@elephant html]# ls
Cloudera-cdh5  cloudera-manager
```

创建 repo :

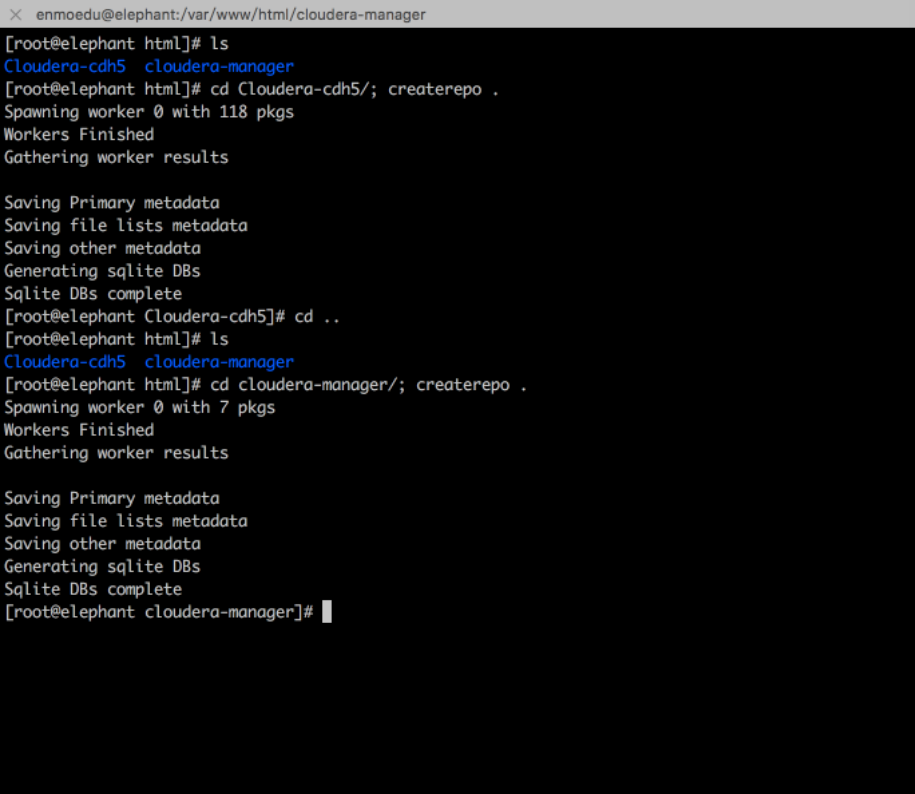
```
[root@elephant html]# pwd
/var/www/html
[root@elephant html]# cd Cloudera-cdh5/; createrepo .

Spawning worker 0 with 118 pkgs
Workers Finished
Gathering worker results

Saving Primary metadata
Saving file lists metadata
Saving other metadata
Generating sqlite DBs
Sqlite DBs complete

[root@elephant html]# pwd
/var/www/html
[root@elephant html]# cd cloudera-manager/; createrepo .
Spawning worker 0 with 7 pkgs
Workers Finished
Gathering worker results

Saving Primary metadata
Saving file lists metadata
Saving other metadata
Generating sqlite DBs
Sqlite DBs complete
```



```
x enmoedu@elephant:/var/www/html/cloudera-manager
[root@elephant html]# ls
Cloudera-cdh5  cloudera-manager
[root@elephant html]# cd Cloudera-cdh5/; createrepo .
Spawning worker 0 with 118 pkgs
Workers Finished
Gathering worker results

Saving Primary metadata
Saving file lists metadata
Saving other metadata
Generating sqlite DBs
Sqlite DBs complete
[root@elephant Cloudera-cdh5]# cd ..
[root@elephant html]# ls
Cloudera-cdh5  cloudera-manager
[root@elephant html]# cd cloudera-manager/; createrepo .
Spawning worker 0 with 7 pkgs
Workers Finished
Gathering worker results

Saving Primary metadata
Saving file lists metadata
Saving other metadata
Generating sqlite DBs
Sqlite DBs complete
[root@elephant cloudera-manager]#
```

(4) 创建yum repo config文件, 分发到所有节点

yum的repo配置文件存放于 `/etc/yum.repos.d` ,在这里创建 `repo` 文件:

```
[root@elephant yum.repos.d]# pwd
/etc/yum.repos.d
[root@elephant yum.repos.d]# ll Cloudera-*
-rw-r--r--. 1 root root 85 4月 11 21:06 Cloudera-cdh5.repo
-rw-r--r--. 1 root root 94 4月 11 21:07 Cloudera-manager.repo
[root@elephant yum.repos.d]# cat Cloudera-*
[Cloudera-cdh5]
name=Cloudera-cdh5
baseurl=http://elephant/Cloudera-cdh5/
gpgcheck=0
[Cloudera-manager]
name=Cloudera-manager
baseurl=http://elephant/cloudera-manager/
gpgcheck=0
[root@elephant yum.repos.d]#
```

将创建的两个 `Cloudera Repo` 文件scp到从节点

```
[root@elephant yum.repos.d]# scp Cloudera-* root@monkey:/etc/yum.repos.d/
The authenticity of host 'monkey (10.8.2.168)' can't be established.
RSA key fingerprint is 46:69:2d:47:1f:7d:69:2b:a4:c9:93:7d:09:25:c3:62.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'monkey,10.8.2.168' (RSA) to the list of known hosts.
root@monkey's password:
Cloudera-cdh5.repo      100% 85    0.1KB/s  00:00
Cloudera-manager.repo  100% 94    0.1KB/s  00:00
[root@elephant yum.repos.d]#
```

(5) 所有节点同时更新 `yum cache` 缓存

```
[root@elephant yum.repos.d]# pwd
/etc/yum.repos.d
[root@elephant yum.repos.d]# ll Cloudera-*
-rw-r--r--. 1 root root 85 4月 11 21:06 Cloudera-cdh5.repo
-rw-r--r--. 1 root root 94 4月 11 21:07 Cloudera-manager.repo
[root@elephant yum.repos.d]# yum clean all; yum makecache
```

```
2. enmoedu@elephant:/etc/yum.repos.d (ssh)
enmoedu@monkey:/etc/yum.repos.d (ssh)

[root@monkey yum.repos.d]# pwd
/etc/yum.repos.d
[root@monkey yum.repos.d]# ll Cloudera-*
-rw-r--r--. 1 root root 85 4月 11 21:09 Cloudera-cdh5.repo
-rw-r--r--. 1 root root 94 4月 11 21:09 Cloudera-manager.repo
[root@monkey yum.repos.d]# yum clean all; yum makecache
Loaded plugins: fastestmirror, refresh-packagekit, security
Cleaning repos: Cloudera-cdh5 Cloudera-manager base extras updates
Cleaning up Everything
Cleaning up list of fastest mirrors
Loaded plugins: fastestmirror, refresh-packagekit, security
Determining fastest mirrors
 * base: mirrors.zju.edu.cn
 * extras: mirrors.zju.edu.cn
 * updates: mirrors.zju.edu.cn
Cloudera-cdh5 | 2.9 kB 00:00
Cloudera-cdh5/filelists_db | 404 kB 00:00
Cloudera-cdh5/primary_db | 67 kB 00:00
Cloudera-cdh5/other_db | 7.6 kB 00:00
Cloudera-manager | 2.9 kB 00:00

enmoedu@elephant:/etc/yum.repos.d (ssh)

[root@elephant yum.repos.d]# pwd
/etc/yum.repos.d
[root@elephant yum.repos.d]# ll Cloudera-*
-rw-r--r--. 1 root root 85 4月 11 21:06 Cloudera-cdh5.repo
-rw-r--r--. 1 root root 94 4月 11 21:07 Cloudera-manager.repo
[root@elephant yum.repos.d]# yum clean all; yum makecache
Loaded plugins: fastestmirror, refresh-packagekit, security
Cleaning repos: Cloudera-cdh5 Cloudera-manager base extras updates
Cleaning up Everything
Cleaning up list of fastest mirrors
Loaded plugins: fastestmirror, refresh-packagekit, security
Determining fastest mirrors
 * base: mirrors.aliyun.com
 * extras: mirrors.aliyun.com
 * updates: mirrors.aliyun.com
Cloudera-cdh5 | 2.9 kB 00:00
Cloudera-cdh5/filelists_db | 404 kB 00:00
Cloudera-cdh5/primary_db | 67 kB 00:00
Cloudera-cdh5/other_db | 7.6 kB 00:00
Cloudera-manager | 2.9 kB 00:00
Cloudera-manager/filelists_db | 101 kB 00:00
Cloudera-manager/primary_db | 11 kB 00:00
Cloudera-manager/other_db | 1.0 kB 00:00
base | 3.7 kB 00:00
base/group_gz | 226 kB 00:00
base/filelists_db | 6.4 MB 00:00
```

(6) 从节点中，下载一个主节点有的软件包

```
[root@monkey yum.repos.d]# yum install cloudera-manager-agent
```

```
2. enmoedu@monkey:/etc/yum.repos.d (ssh)
enmoedu@monkey:/etc/yum.repos.d (ssh)
[root@monkey yum.repos.d]# yum install cloudera-manager-agent
Loaded plugins: fastestmirror, refresh-packagekit, security
Loading mirror speeds from cached hostfile
 * base: mirrors.zju.edu.cn
 * extras: mirrors.zju.edu.cn
 * updates: mirrors.zju.edu.cn
Setting up Install Process
Resolving Dependencies
--> Running transaction check
--> Package cloudera-manager-agent.x86_64 0:5.6.0-1.cm560.p0.54.el6 will be installed
--> Processing Dependency: cloudera-manager-daemons = 5.6.0 for package: cloudera-manager-agent-5.6.0-1.cm560.p0.54.el6.x86_64
--> Processing Dependency: python-psycopg2 for package: cloudera-manager-agent-5.6.0-1.cm560.p0.54.el6.x86_64
--> Processing Dependency: portmap for package: cloudera-manager-agent-5.6.0-1.cm560.p0.54.el6.x86_64
--> Processing Dependency: openssl-devel for package: cloudera-manager-agent-5.6.0-1.cm560.p0.54.el6.x86_64
--> Processing Dependency: mod_ssl for package: cloudera-manager-agent-5.6.0-1.cm560.p0.54.el6.x86_64
--> Processing Dependency: cyrus-sasl-gssapi for package: cloudera-manager-agent-5.6.0-1.cm560.p0.54.el6.x86_64
--> Processing Dependency: MySQL-python for package: cloudera-manager-agent-5.6.0-1.cm560.p0.54.el6.x86_64
--> Processing Dependency: /lib/lsb/init-functions for package: cloudera-manager-agent-5.6.0-1.cm560.p0.54.el6.x86_64
--> Running transaction check
--> Package MySQL-python.x86_64 0:1.2.3-0.3.c1.1.el6 will be installed
--> Package cloudera-manager-daemons.x86_64 0:5.6.0-1.cm560.p0.54.el6 will be installed
--> Package cyrus-sasl-gssapi.x86_64 0:2.1.23-15.el6_6.2 will be installed
--> Processing Dependency: cyrus-sasl-lib = 2.1.23-15.el6_6.2 for package: cyrus-sasl-gssapi-2.1.23-15.el6_6.2.x86_64
--> Package mod_ssl.x86_64 1:2.2.15-59.el6.centos will be installed
--> Processing Dependency: httpd = 2.2.15-59.el6.centos for package: 1:mod_ssl-2.2.15-59.el6.centos.x86_64
--> Package openssl-devel.x86_64 0:1.0.1e-57.el6 will be installed
--> Processing Dependency: openssl = 1.0.1e-57.el6 for package: openssl-devel-1.0.1e-57.el6.x86_64

extras/other_db | 51 kB | 00:00
updates | 3.4 kB | 00:00
updates/filelists_db | 37 kB | 00:00
updates/prestodelta | 5.6 kB | 00:00
updates/primary_db | 24 kB | 00:00
updates/other_db | 96 kB | 00:00
Metadata Cache Created
[root@elephant yum.repos.d]# ls
CentOS-Base.repo      CentOS-Media.repo    Cloudera-cdh5.repo
CentOS-Debuginfo.repo CentOS-Vault.repo     Cloudera-manager.repo
[root@elephant yum.repos.d]#
```

Q4. 学习搭建时间服务器 NTP 的目的是什么？

单个节点默认是从本地物理时钟时间读取时间信息（BIOS 时间），与标准时间有一定时间差距，是不准的。当希望校对时间获取最标准时间，应该从网络同步获取标准时间，但即使从网络同步也需要预想到网络传输消耗的时间。

承上所述，多个节点在集群内工作时，是不一定能保证每台都是标准时间，即使都从网络获取标准时间，我们也不一定能保证各个节点的网络环境稳定。如果希望多个节点之间能保证时间同步，那么这个时候的解决办法就是，让集群中多个节点从某个特定的节点获取时间，保证整个集群的时间同步。

作为NTP服务器的节点，负责统一所有节点时间，保障集群节点之间的协作不会受到时间不统一问题的影响。

Q5. 学习搭建安装服务器的目的是什么？

1. 整个CDH安装所需的包太多，并不适合直接网络传输。搭建安装服务器，有利于加快构建集群的效率，排除网络的干扰因素。
2. 解决包依赖问题。每个软件包依赖繁多，使用 yum 解决依赖的问题。

Q6. Linux 文件系统管理数据的思路是什么？我们学习这个知识点的目的是什么？

1. Linux文件系统，以ext系列为例，以inode为准存储，文件系统分为多块，由superblock为首，然后跟着inode节点位信息，存储inodetable信息，然后跟着各级间接指针，指向文件块。
2. 大数据存储技术构建于Linux文件系统之上，设计思路也与此一脉相承。了解 Linux 文件系统的设计思路，有利于了解大数据存储文件系统的设计思路。

Q7. 利用dd 创建1M文件testdisk，并利用操作系统格式化的命令将testdisk 格式化成ext2文件系统，利用文件系统相关命令，找到inode count 信息（整型数字）

(1) 使用dd创建1M的 testdisk

```
shell [root@monkey tmp]# dd if=/dev/zero of=./testdisk count=256 bs=4 记录了256+0 的读入 记录了256+0 的写出 1024字节(1.0 kB)已复制, 0.000502306
```

(2) 使用 mke2fs 将 testdisk 格式化为 ext2 文件系统

```
[root@monkey tmp]# mke2fs ./testdisk
mke2fs 1.41.12 (17-May-2010)
./testdisk is not a block special device.
无论如何也要继续? (y,n) y
mke2fs: inode_size (128) * inodes_count (0) too big for a
filesystem with 0 blocks, specify higher inode_ratio (-i)
or lower inode count (-N).
```

```
enmoedu@monkey:/tmp
[root@monkey tmp]# dd if=/dev/zero of=./testdisk count=256 bs=4
记录了256+0 的读入
记录了256+0 的写出
1024字节(1.0 kB)已复制, 0.000502306 秒, 2.0 MB/秒
[root@monkey tmp]# ll ./testdisk
-rw-r--r--. 1 root root 1024 4月 11 21:29 ./testdisk
[root@monkey tmp]# mke2fs ./testdisk
mke2fs 1.41.12 (17-May-2010)
./testdisk is not a block special device.
无论如何也要继续? (y,n) y
mke2fs: inode_size (128) * inodes_count (0) too big for a
filesystem with 0 blocks, specify higher inode_ratio (-i)
or lower inode count (-N).
```

(3) 读取 inode count 信息

```
[root@elephant tmp]# tune2fs -l ./testfile | grep count
Inode count:          128
Block count:          1024
Reserved block count: 51
Mount count:          0
Maximum mount count:  35
```

```
or file gam          vgaextsvetog:Ext20 虚拟机 C:\moedu
[root@elephant tmp]# dd if=/dev/zero of=./testfile count=256 bs=4k
记录了256+0 的读入
记录了256+0 的写出
1048576字节(1.0 MB)已复制, 0.00141733 秒, 740 MB/秒
[root@elephant tmp]# mke2fs ./testfile
mke2fs 1.41.12 (17-May-2010)
./testfile is not a block special device.
无论如何也要继续? (y,n) y
文件系统标签=
操作系统:Linux
块大小=1024 (log=0)
分块大小=1024 (log=0)
Stride=0 blocks, Stripe width=0 blocks
128 inodes, 1024 blocks
51 blocks (4.98%) reserved for the super user
第一个数据块=1
Maximum filesystem blocks=1048576
1 block group
8192 blocks per group, 8192 fragments per group
128 inodes per group

正在写入inode表: 完成
Writing superblocks and filesystem accounting information: 完成

This filesystem will be automatically checked every 35 mounts or
180 days, whichever comes first. Use tune2fs -c or -i to override.
[root@elephant tmp]# tune2fs -l ./testfile | grep Count
[root@elephant tmp]# tune2fs -l ./testfile | grep count
Inode count:          128
Block count:          1024
Reserved block count: 51
Mount count:          0
Maximum mount count:  35
[root@elephant tmp]#
```