管理本地用户和组
集中管理：NIS LDAP:RH423+5 天
IPA：LDAP+KERBEROS（实现单点认证）+DNS+NTP
AD：LDAP+KERBEROS（实现单点认证）+DNS+NTP

Linux 三类用户
管理员 UID=0 /bin/bash
系统用户 UID=1~999 /sbin/nologin
普通用户 UID=1000+ /bin/bash

```
[kiosk@foundation0 ~]$ ssh root@servera

[root@servera ~]# whatis  useradd
useradd (8)          - create a new user or update default new user
information

/etc/passwd        /etc/shadow      /etc/group     /etc/gshadow
[root@servera ~]# grep usera /etc/passwd
usera:x:1002:1002::/home/usera:/bin/bash

[root@servera ~]# grep usera /etc/shadow
usera:!!:18506:0:99999:7:::

[root@servera ~]# grep usera /etc/group
usera:x:1002:

[root@servera ~]# grep usera /etc/gshadow
usera:!::

[root@servera ~]# cat /etc/default/useradd
# useradd defaults file
GROUP=100
HOME=/home
INACTIVE=-1
EXPIRE=
SHELL=/bin/bash      SHELL=/sbin/nologin
SKEL=/etc/skel
CREATE_MAIL_SPOOL=yes

[root@servera ~]# vim /etc/login.defs

[root@servera ~]# whatis  usermod
usermod (8)          - modify a user account
```

```
[root@servera ~]# whatis groupadd
groupadd (8)         - create a new group
[root@servera ~]# whatis  userdel
userdel (8)          - delete a user account and related files
[root@servera ~]# whatis gpasswd
gpasswd (1)          - administer /etc/group and /etc/gshadow

[root@servera ~]# usermod  -G root usera
[root@servera ~]# gpasswd  --help
Usage: gpasswd [option] GROUP

Options:
  -a, --add USER                add USER to GROUP
  -d, --delete USER             remove USER from GROUP
  -h, --help                    display this help message and exit
  -Q, --root CHROOT_DIR         directory to chroot into
  -r, --delete-password         remove the GROUP's password
  -R, --restrict                restrict access to GROUP to its members
  -M, --members USER,...        set the list of members of GROUP
  -A, --administrators ADMIN,...
                                set the list of administrators for GROUP
Except for the -A and -M options, the options cannot be combined.

[root@servera ~]# gpasswd  root
Changing the password for group root
New Password:
Re-enter new password:

[root@servera ~]# su - usera
[usera@servera ~]$ cd /root
-bash: cd: /root: Permission denied
[usera@servera ~]$ usermod  -G root usera
usermod: Permission denied.
usermod: cannot lock /etc/passwd; try again later.
[usera@servera ~]$ newgrp  root
Password:
[usera@servera ~]$ cd /root
[usera@servera root]$ ls
anaconda-ks.cfg  original-ks.cfg

[root@servera ~]# userdel  -r userb
```

```
[root@servera ~]# whatis su
su (1)               - run a command with substitute user and group ID

[root@servera ~]# su  usera  非登录用户
[usera@servera root]$ pwd
/root
[usera@servera root]$ exit
exit
[root@servera ~]# su - usera   登录用户
Last login: Tue Sep  1 20:07:17 CST 2020 on pts/0
[usera@servera ~]$ pwd
/home/usera
```

su - usera

/etc/profile----/etc/profile.d---/home/usera/.bash_profile---/home/usera/.bashrc----/etc/basrc

su usera

/home/usera/.bashrc----/etc/basrc

```
[root@servera ~]# su - usera
Last login: Tue Sep  1 20:07:23 CST 2020 on pts/0
/etc/profile   全局配置文件，环境变量，只有用户登录时候才会加载，只加载一次
/etc/bashrc    全局配置文件，定义 BASH 功能  /bin/bash  alias
.bash_profile  用户私有配置文件，环境变量
.bashrc
/etc/bashrc
[usera@servera ~]$ exit
logout
[root@servera ~]# su usera
.bashrc
/etc/bashrc
```

sudo

```
[usera@servera ~]$ yum install vsftpd
Error: This command has to be run under the root user.
[root@servera ~]# visudo
100 root    ALL=(ALL)       ALL
101 usera   ALL=(ALL)       ALL
```

第一列：提权用户　　第二列：主机名　第三列：默认 root　第四列：命令

usera ALL=(ALL) NOPASSWD: ALL

```
[usera@servera ~]$ sudo passwd root
Changing password for user root.
New password:
BAD PASSWORD: The password is shorter than 8 characters
Retype new password:
passwd: all authentication tokens updated successfully.
```

审计：

```
Defaults  logfile=/var/log/sudo.log
[root@servera ~]# systemctl restart rsyslog

[root@servera ~]# tail /var/log/sudo.log
Sep  1 20:21:54 : usera : TTY=pts/0 ; PWD=/home/usera ; USER=root ;
    COMMAND=/bin/passwd student
```

```
User_Alias ADMINS = usera,userb
Cmnd_Alias NETWORKING = /sbin/route, /sbin/ifconfig, /bin/ping,
/sbin/dhclient, /usr/bin/net, /sbin/iptables, /usr/bin/rfcomm,
/usr/bin/wvdial, /sbin/iwconfig
```

ADMINS ALL=(ALL) NOPASSWD: NETWORKING

%sysmgrs ALL=(ALL) NOPASSWD: ALL

```
## Allows people in group wheel to run all commands
%wheel  ALL=(ALL)       ALL

[root@servera ~]# id student
uid=1000(student) gid=1000(student) groups=1000(student),10(wheel)

[usera@servera ~]$ sudo -l
Matching Defaults entries for usera on servera:
    !visiblepw, always_set_home, match_group_by_gid,
always_query_group_plugin,
    env_reset, env_keep="COLORS DISPLAY HOSTNAME HISTSIZE KDEDIR
LS_COLORS",
    env_keep+="MAIL PS1 PS2 QTDIR USERNAME LANG LC_ADDRESS LC_CTYPE",
    env_keep+="LC_COLLATE LC_IDENTIFICATION LC_MEASUREMENT
LC_MESSAGES",
```

```
    env_keep+="LC_MONETARY LC_NAME LC_NUMERIC LC_PAPER LC_TELEPHONE",
env_keep+="LC_TIME
    LC_ALL LANGUAGE LINGUAS _XKB_CHARSET XAUTHORITY",

secure_path=/sbin\:/bin\:/usr/sbin\:/usr/bin\:/usr/local/sbin\:/usr/l
ocal/bin,
    logfile=/var/log/sudo.log, lecture=never

User usera may run the following commands on servera:
    (ALL) NOPASSWD: /usr/bin/yum, /usr/bin/chmod


[usera@servera ~]$ sudo fdisk -l /dev/vda
sudo: /etc/sudoers is world writable
sudo: no valid sudoers sources found, quitting
sudo: unable to initialize policy plugin
[usera@servera ~]$ sudo chmod  755 /etc/sudoers
sudo: /etc/sudoers is world writable
sudo: no valid sudoers sources found, quitting
sudo: unable to initialize policy plugin

[root@servera ~]# chage  -l usera
Last password change                                    : Sep 01, 2020
Password expires                                        : never
Password inactive                                       : never
Account expires                                         : Oct 01, 2020
Minimum number of days between password change          : 0
Maximum number of days between password change          : 99999
Number of days of warning before password expires       : 7
```

第二章 控制对文件的访问

1 基本权限

2 特殊权限　　DAC　　MAC SELinux

3 高级权限

```
[root@servera ~]# ls -ld /public
drwxr-xr-x. 2 root root 6 Sep  1 20:46 /public
```

第一个字符文件类型: d　- b　l

USER root	GROUP root	OTHER
rwx	r-x	r-x

Read　Write　Execute　目录必须要有执行权限

```
[root@servera ~]# whatis cd
cd (1)               - bash built-in commands, see bash(1)
cd (1p)              - change the working directory
```

```
[root@servera ~]# whatis chmod
chmod (1)            - change file mode bits
chmod (1p)           - change the file modes
chmod (2)            - change permissions of a file
chmod (3p)           - change mode of a file relative to directory file
```

+ 增加权限　　-删除权限　　=重新分配权限

两种方式修改权限：

字母方式　user=u　group=g　other=o

数字方式　Read 4　Write 2　Execute 1

```
[root@servera ~]# chmod  u-w,go+w /public/
[root@servera ~]# ll -d /public/
dr-xrwxrwx. 2 root root 6 Sep  1 20:46 /public/
[root@servera ~]# chmod  777 /public/
```

descriptor

```
[root@servera ~]# whatis chown
chown (1)            - change file owner and group
chown (1p)           - change the file ownership
chown (2)            - change ownership of a file
chown (3p)           - change owner and group of a file relative to
directory file desc

[root@servera ~]# chown  usera /public/
[root@servera ~]# ll -d /public/
drwxrwxrwx. 2 usera root 6 Sep  1 20:46 /public/
[root@servera ~]# chgrp  student /public/
[root@servera ~]# ll -d /public/
drwxrwxrwx. 2 usera student 6 Sep  1 20:46 /public/

[root@servera ~]# ll -d /share/
drwxr-xrwx. 2 root sysmgrs 6 Sep  1 20:55 /share/
[root@servera ~]# id usera
uid=1002(usera) gid=1002(usera) groups=1002(usera),1005(sysmgrs)  rw
[root@servera ~]# id userb
uid=1003(userb) gid=1003(userb) groups=1003(userb)    rwx
[root@servera ~]# id userc
uid=1004(userc) gid=1004(userc) groups=1004(userc)    rwx
[root@servera ~]#
```

权限优先顺序：
如果UID匹配，就应用用户(USER)权限，否则，如果GID匹配，就应用组群(Group)权限，如果都不匹配，就应用其它（Other）权限

```
[root@servera ~]# ll -d /public/
drwxrwxrwx. 2 usera student 6 Sep  1 20:46 /public/

usera   rwx
userb   rx      ----->不能给每一个用户设置独立权限
userc   wx
userd   0
```

高级权限：

```
[root@servera ~]# whatis  setfacl
setfacl (1)          - set file access control lists
[root@servera ~]# whatis  getfacl
getfacl (1)          - get file access control lists
```

特殊权限：

```
[root@servera ~]# ll /etc/shadow
----------. 1 root root 1295 Sep  1 20:55 /etc/shadow
[usera@servera ~]$ passwd
[root@servera ~]# ll /usr/bin/passwd
-rwsr-xr-x. 1 root root 34512 Aug 13  2018 /usr/bin/passwd
```

setuid: 针对文件，必须是应用程序，且有 x 权限，以拥有者决定

```
[root@servera ~]# whatis  vim
vim (1)              - Vi IMproved, a programmer's text editor

[root@servera ~]# ll /usr/bin/vim
-rwxr-xr-x. 1 root root 3096552 Dec  6  2018 /usr/bin/vim
```

setgid: 针对目录，必须对目录 wx 权限，内部新创建的文件将和父目录有相同的组

Sticky bit:针对目录，只有 root，拥有者才能删除文件

```
[root@servera ~]# setfacl  -m u:usera:rwx /public/
[root@servera ~]# setfacl  -m u:userb:rx /public/
[root@servera ~]# setfacl  -m u:userc:wx /public/
[root@servera ~]# setfacl  -m u:userd:0 /public/

[root@servera ~]# getfacl /public/
getfacl: Removing leading '/' from absolute path names
# file: public/
# owner: root
# group: student
# flags: -st
user::rwx
user:usera:rwx
user:userb:r-x
user:userc:-wx
user:userd:---
group::rwx
mask::rwx
other::rwx
```

第三章　配置和保护 OPENSSH 服务

SSH 全称 Secure SHELL 用于两个计算机之间安全连接的协议

Window：

Putty　　Secure-CRT　　X-shell　等价于 ssh －X

从客户端来看：SSH 提供了两种级别安全验证　telnet

1 基于用户名和密码　　ssh　username@hostname　or ipaddress

```
[root@servera ~]# ssh root@serverb
The authenticity of host 'serverb (172.25.250.11)' can't be established.
ECDSA key fingerprint is
SHA256:BCd8VCfEpGbUo3zb1De0hd1Q5nOMEzYNpMFu5o7j4Fg.
Are you sure you want to continue connecting (yes/no)?
```

公钥、私钥=一对密钥

一、首先客户端向服务器发送一个连接请求，客户端输入 YES 接收服务端发送过来的公钥，保存在.ssh/known_hosts

二、客户端会用服务器发送过来的公钥对用户输入的密码进行加密，并发送到服务器

三、服务器接收到通过公钥加密的密码后，利用自己的私钥进行解密（服务器：一对密钥，一个公钥，一个私钥），核对密码表/etc/shadow

2 基于密钥身份验证

一、首先在客户端本地生成一对密钥，然后把公钥拷贝到目标服务器

二、客户端使用服务器的公钥加密一段数据，再利用自己私钥加密传送给服务器

三、服务器先用客户端的公钥解密再使用自己私钥进行解密

```
[root@servera ~]# ssh-keygen  生成一对密钥
[root@servera ~]# ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/root/.ssh/id_rsa):   私钥存储位置
Enter passphrase (empty for no passphrase):            使用密码保护私钥安全
Enter same passphrase again:
Your identification has been saved in /root/.ssh/id_rsa.
Your public key has been saved in /root/.ssh/id_rsa.pub.
The key fingerprint is:
SHA256:Sb18eK6XTmYGklNWpuLTJIUMfpopuibHObqySuB8Wj8
root@servera.lab.example.com
The key's randomart image is:
+---[RSA 2048]----+
|      .o .. o    |
|     .  oo +     |
|      . = *      |
|       B @ o     |
|.  .. + S * o    |
|+ ....   + =     |
| =.=        *.   |
|+ O..E     *o    |
|+Bo. ..   .o.    |
+----[SHA256]-----+

[root@servera ~]# ssh-copy-id   root@serverb   把当前用户的公钥拷贝到serverb 主机

[root@servera ~]# ssh-agent bash    启用 SSH 代理
[root@servera ~]# ssh-add          把私钥的密码添加给代理
Enter passphrase for /root/.ssh/id_rsa:
Identity added: /root/.ssh/id_rsa (root@servera.lab.example.com)
[root@servera ~]# ssh root@serverb
Activate the web console with: systemctl enable --now cockpit.socket
```

Last login: Wed Jul 8 02:50:01 2020 from 172.25.250.10

openssh-server-7.8p1-4.el8.x86_64 服务端软件包
openssh-clients-7.8p1-4.el8.x86_64 客户端软件包

[root@serverb ~]# vim /etc/ssh/sshd_config
Port 22 监听端口
ListenAddress 0.0.0.0 监听地址
PermitRootLogin yes 是否允许 root 远程连接
UseDNS no 建议把该参数设置为 NO，解决了连接慢的问题
X11Forwarding yes X-Window ssh -X root@serverb 把服务器图形化程序在客户上显示
UsePAM yes 模块 基于 IP 访问控制 基于时间访问控制 基于 MAC 访问控制

第四章 管理红帽企业 LINUX 网络
[root@servera ~]# cat /etc/redhat-release
Red Hat Enterprise Linux release 8.0 (Ootpa)

RHEL5/6/7 network NetworkManager（RHEL6 Disable）
RHEL8 NetworkManager

```
[root@servera ~]# systemctl status NetworkManager
â—  NetworkManager.service - Network Manager
   Loaded: loaded (/usr/lib/systemd/system/NetworkManager.service;
enabled; vendor preset>
   Active: active (running) since Thu 2020-09-03 19:21:29 CST; 18min ago
     Docs: man:NetworkManager(8)
 Main PID: 717 (NetworkManager)
    Tasks: 3 (limit: 4956)
```

[root@servera ~]# vim /etc/sysconfig/network-scripts/ifcfg-Wired_connection_1
[root@servera ~]# whatis nmcli NetworkManager 的命令行工具
nmcli (1) - command-line tool for controlling NetworkManager
[root@servera ~]# whatis nmtui NetworkManager 文本图形化工具
nmtui (1) - Text User Interface for controlling NetworkManager
[root@servera ~]# cd /etc/sysconfig/network-scripts/
[root@servera network-scripts]# ll ifcfg-Wired_connection_1
-rw-r--r--. 1 root root 471 Sep 3 19:17 ifcfg-Wired_connection_1

注意：
ifcfg-*　备份网络接口配置文件，备份到系统其它目录

```
[root@servera ~]# ping serverb
PING serverb.lab.example.com (172.25.250.11) 56(84) bytes of data.
64 bytes from serverb.lab.example.com (172.25.250.11): icmp_seq=1 ttl=64
time=1.70 ms
^C
--- serverb.lab.example.com ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 1.702/1.702/1.702/0.000 ms
[root@servera ~]# route -n
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref
Use Iface
0.0.0.0         172.25.250.254  0.0.0.0         UG    100    0
0 enp1s0
0.0.0.0         192.168.1.1     0.0.0.0         UG    102    0
0 enp7s0
172.25.250.0    0.0.0.0         255.255.255.0   U     100    0
0 enp1s0
192.168.1.0     0.0.0.0         255.255.255.0   U     102    0
0 enp7s0
[root@servera ~]# cat /etc/resolv.conf
# Generated by NetworkManager
search lab.example.com example.com
nameserver 172.25.250.254
nameserver 114.114.114.114
nameserver 223.5.5.5

[root@servera ~]# ethtool  enp1s0   物理环境
Settings for enp1s0:
        Supported ports: [ ]
        Supported link modes:   Not reported
        Supported pause frame use: No
        Supports auto-negotiation: No
        Supported FEC modes: Not reported
        Advertised link modes:  Not reported
        Advertised pause frame use: No
        Advertised auto-negotiation: No
        Advertised FEC modes: Not reported
        Speed: Unknown!
        Duplex: Unknown! (255)
        Port: Other
```

```
        PHYAD: 0
        Transceiver: internal
        Auto-negotiation: off
        Link detected: yes
[root@servera ~]# ethtool -p  enp1s0

[root@servera ~]# dmidecode
# dmidecode 3.2
Getting SMBIOS data from sysfs.
SMBIOS 2.8 present.
9 structures occupying 462 bytes.
Table at 0x000F5B00.


[root@servera ~]# nmcli device show enp1s0
GENERAL.DEVICE:                         enp1s0
GENERAL.TYPE:                           ethernet
GENERAL.HWADDR:                         52:54:00:00:FA:0A
GENERAL.MTU:                            1500
GENERAL.STATE:                          100 (connected)
GENERAL.CONNECTION:                     Wired connection 1
GENERAL.CON-PATH:
/org/freedesktop/NetworkManager/ActiveConnection/1
WIRED-PROPERTIES.CARRIER:               on
IP4.ADDRESS[1]:                         172.25.250.10/24
IP4.GATEWAY:                            172.25.250.254
```

添加一个网络接口配置文件：

```
[root@servera ~]# nmcli connection add con-name lab-prod type ethernet
ifname  enp2s0
Connection 'lab-prod' (8b8405a1-019a-43ad-83e1-b98c8d7ba508)
successfully added.
[root@servera ~]# ll /etc/sysconfig/network-scripts/ifcfg-lab-prod
-rw-r--r--. 1 root root 284 Sep  3 19:53
/etc/sysconfig/network-scripts/ifcfg-lab-prod
[root@servera ~]# vi /etc/sysconfig/network-scripts/ifcfg-lab-prod
```

修改网络接口配置：

```
[root@servera ~]# nmcli connection reload
```

```
[root@servera ~]# nmcli connection modify lab-prod ipv4.addresses
172.25.250.110/24 ipv4.gateway  172.25.250.254 ipv4.dns 172.25.250.254
ipv4.method manual
[root@servera ~]# nmcli connection up lab-prod
Connection successfully activated

[root@servera ~]# man nmcli-examples
Example 7. Adding a team master and two slave connection profiles

$ nmcli con add type team con-name Team1 ifname Team1 config '{"runner":
{"name": "activebackup"}}'
```

添加一个逻辑口

```
$ nmcli con add type ethernet con-name Team1-slave1 ifname enp11s0 master
Team1
$ nmcli con add type ethernet con-name Team1-slave2 ifname enp12s0 master
Team1

[root@servera ~]# man teamd.conf
/runner
"runner": {"name": "activebackup"}
"runner": {"name": "roundrobin"}
```

链路聚合，链路冗余　增加带宽　LACP

```
eth0
          Team0 ipaddress
eth1

[root@servera ~]# ll /etc/sysconfig/network-scripts/ifcfg-Team1*
-rw-r--r--. 1 root root 339 Sep  3 20:11
/etc/sysconfig/network-scripts/ifcfg-Team1
-rw-r--r--. 1 root root 124 Sep  3 20:11
/etc/sysconfig/network-scripts/ifcfg-Team1-slave1
-rw-r--r--. 1 root root 124 Sep  3 20:11
/etc/sysconfig/network-scripts/ifcfg-Team1-slave2
[root@servera ~]# nmcli connection modify Team1 ipv4.addresses
172.25.250.200/24 ipv4.method manual
[root@servera ~]# nmcli connection up Team1

Example 8. Adding a bridge and two slave profiles

$ nmcli con add type bridge con-name TowerBridge ifname TowerBridge
$ nmcli con add type ethernet con-name br-slave-1 ifname ens3 master
TowerBridge
```

```
$ nmcli con add type ethernet con-name br-slave-2 ifname ens4 master
TowerBridge
$ nmcli con modify TowerBridge bridge.stp no

[root@servera ~]# find / -name bonding
/usr/lib/modules/4.18.0-80.el8.x86_64/kernel/drivers/net/bonding
[root@servera ~]# modprobe  bonding
[root@servera ~]# lsmod  |grep bonding
bonding                184320  0

[root@servera ~]# yum install kernel-doc  -y
[root@servera kernel-doc-4.18.0]# cd Documentation/
[root@servera Documentation]# pwd
/usr/share/doc/kernel-doc-4.18.0/Documentation
[root@servera Documentation]# less networking/bonding.txt

[root@servera ~]# ping 172.25.250.200
PING 172.25.250.200 (172.25.250.200) 56(84) bytes of data.
64 bytes from 172.25.250.200: icmp_seq=1 ttl=64 time=0.065 ms
64 bytes from 172.25.250.200: icmp_seq=2 ttl=64 time=0.045 ms
64 bytes from 172.25.250.200: icmp_seq=3 ttl=64 time=0.053 ms

RHEL7 systemd 和 udev
/dev/sdb    /dev/sdc    /etc/fstab ------reboot
rhel6   模板部署虚拟机  /etc/udev/rules.d/70*net.rules
mac       eth0      绑定
```

根据固件、拓扑、位置信息命名网络接口

修改网卡命名规则 ethX

```
[root@servera ~]# vim /etc/sysconfig/grub
[root@servera ~]# vim /etc/sysconfig/grub
GRUB_TIMEOUT=1
GRUB_DISTRIBUTOR="$(sed 's, release .*$,,g' /etc/system-release)"
GRUB_DEFAULT=saved
GRUB_DISABLE_SUBMENU=true
GRUB_TERMINAL_OUTPUT="console"
GRUB_CMDLINE_LINUX="console=tty0 net.ifnames=0 biosdevname=0
console=ttyS0,115200n8 no_timer_check crashkernel=auto"
GRUB_DISABLE_RECOVERY="true"
GRUB_ENABLE_BLSCFG=true

[root@servera ~]# cat /etc/sysconfig/grub   加载
GRUB_TIMEOUT=1
```

```
GRUB_DISTRIBUTOR="$(sed 's, release .*$,,g' /etc/system-release)"
GRUB_DEFAULT=saved
GRUB_DISABLE_SUBMENU=true
GRUB_TERMINAL_OUTPUT="console"
GRUB_CMDLINE_LINUX="console=tty0 net.ifnames=0 biosdevname=0
console=ttyS0,115200n8 no_timer_check crashkernel=auto"
GRUB_DISABLE_RECOVERY="true"
GRUB_ENABLE_BLSCFG=true
[root@servera ~]# ll /boot/grub2/grub.cfg
-rw-r--r--. 1 root root 4880 Apr  4  2019 /boot/grub2/grub.cfg
[root@servera ~]# ll /etc/grub.d/     加载
00_header          01_users           20_ppc_terminfo    40_custom
00_tuned           10_linux           30_os-prober       41_custom
01_menu_auto_hide  20_linux_xen       30_uefi-firmware   README
[root@servera ~]# grub2-mkconfig -o /boot/grub2/grub.cfg  更新引导程序
配置文件
Generating grub configuration file ...
done

[root@servera ~]# rm -rf /boot/grub2/grub.cfg
[root@servera ~]# grub2-mkconfig -o /boot/grub2/grub.cfg
Generating grub configuration file ...
done

[root@servera ~]# ll /etc/sysconfig/network
-rw-r--r--. 1 root root 86 May 22  2019 /etc/sysconfig/network
[root@servera ~]# cat /etc/hostname
servera.lab.example.com
[root@servera ~]# hostnamectl set-hostname  servera.lab.example.com
```

第五章 计划将来的任务

```
[root@servera ~]# systemctl status  crond.service
â—   crond.service - Command Scheduler
   Loaded: loaded (/usr/lib/systemd/system/crond.service; enabled;
vendor preset: enabled)
   Active: active (running) since Thu 2020-09-03 20:10:27 CST; 26min ago
 Main PID: 1214 (crond)
    Tasks: 1 (limit: 4956)
```

服务器： 7*24 开机提供服务

重要数据：备份

linux 定时任务分类：

1 at 适合执行一次就结束调度任务 atd

2 crond 周期性的定时任务

```
[root@servera ~]# crontab  --help
Options:
 -u <user>  define user
 -e         edit user's crontab
 -l         list user's crontab
 -r         delete user's crontab

# Example of job definition:
# .---------------- minute (0 - 59)
# |  .------------- hour (0 - 23)
# |  |  .---------- day of month (1 - 31)
# |  |  |  .------- month (1 - 12) OR jan,feb,mar,apr ...
# |  |  |  |  .---- day of week (0 - 6) (Sunday=0 or 7) OR
sun,mon,tue,wed,thu,fri,sat
# |  |  |  |  |
# *  *  *  *  * user-name  command to be executed
```

分为 7 段，空格来分隔，前五段代表时间设定段

特殊符号：
1 * 号，表示任意时间都 30 21 * * * user-name command
2 - 减号 表示一个时间范围 18-20 00 18-20 * * * user-name command
3 ， 逗号 表示分隔时间段 30 17,18,20 * * * user-name command
4 /n n 代表数字 每隔 n 单位时间 每 10 分钟执行一次任务 */10 * * * * command

```
20 21 * * * systemctl reload  httpd
45 4 1,10,22 * * systemctl reload  httpd
20 1 * * 6,0 systemctl reload  httpd
0,30 19-22 * * systemctl reload  httpd
* 23,00-07/1 * * * systemctl reload  httpd
```

* 分钟，表示每分钟都执行任务 23 点和早上 0-7 点之间每隔一小时的每分钟都加载 httpd 服务

注意：
1 周和日尽量不要同时使用，有可能达不到想要的效果

2 定时任务命令或程序最好写到脚本里执行

```
[root@servera ~]# tar czf /tmp/$(date +%F).etc.tar.gz  /etc
tar: Removing leading `/' from member names
[root@servera ~]# ll /tmp/2020-09-03.etc.tar.gz
-rw-r--r--. 1 root root 5477309 Sep  3 20:51 /tmp/2020-09-03.etc.tar.gz
```

```
[root@servera ~]# du -sh /tmp/2020-09-03.etc.tar.gz
5.3M    /tmp/2020-09-03.etc.tar.gz
[root@servera ~]# rm -rf /tmp/2020-09-03.etc.tar.gz
[root@servera ~]# crontab  -e  -l root
* * * * * tar czf /tmp/$(date +%F).etc.tar.gz  /etc
```

3 在定时任务中执行脚本，脚本前添加/bin/sh　避免脚本没有执行权限也可以执行

```
[root@servera ~]# crontab  -l -u root
* * * * * /bin/sh /scripts/backup.sh
```

4　block+inode　定时任务命令或脚本的结尾添加 &> /dev/null

[root@servera ~]# ll /var/spool/clientmqueue　消耗大量 inode
如果硬盘 block 很多但是 inode 使用完，系统变成 readonly

```
[root@servera ~]# df -i
Filesystem      Inodes IUsed   IFree IUse% Mounted on
devtmpfs         99133   322   98811    1% /dev
tmpfs           105120     1  105119    1% /dev/shm
tmpfs           105120   506  104614    1% /run
tmpfs           105120    17  105103    1% /sys/fs/cgroup
/dev/vda1      5242304 53912 5188392    2% /
tmpfs           105120     5  105115    1% /run/user/0
```

No Space left on device　什么原因导致：
1　磁盘空间 block 满了　2 inode 被占满了

```
[root@servera ~]# at  22:00
warning: commands will be executed using /bin/sh
at> yum update -y
at> <EOT>
job 1 at Thu Sep  3 22:00:00 2020
[root@servera ~]# at -l
1        Thu Sep  3 22:00:00 2020 a root
[root@servera ~]# at -c 1
```

-d　删除定时任务

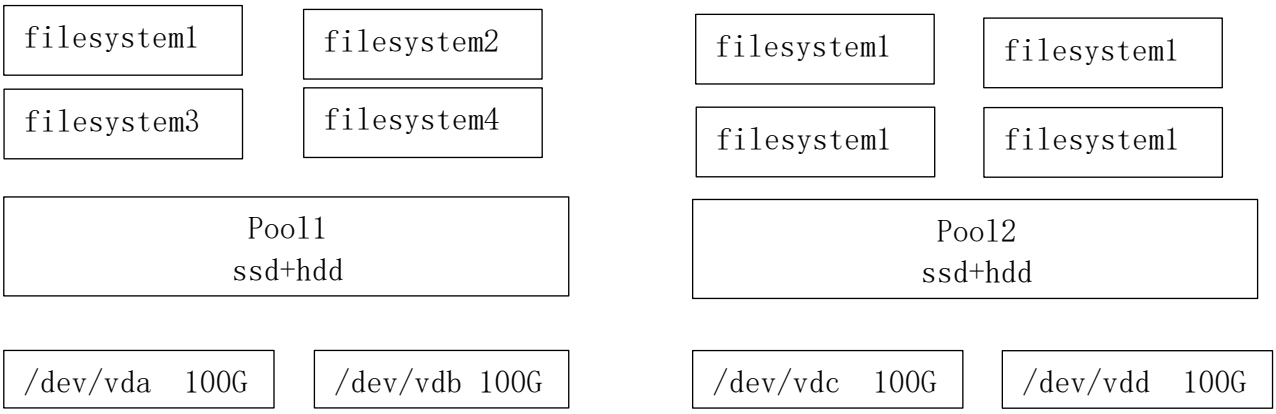
第六章　实施高级存储功能

[root@servera ~]# whatis　fdisk　针对 MBR 分区表　GPT 分区

```
fdisk (8)              - manipulate disk partition table
[root@servera ~]# whatis  partprobe  内核分区表和 MBR 分区表进行同步
partprobe (8)          - inform the OS of partition table changes
[root@servera ~]# whatis  mkfs  格式化
mkfs (8)               - build a Linux filesystem
[root@servera ~]# whatis  pvcreate   创建物理卷
pvcreate (8)           - Initialize physical volume(s) for use by LVM
[root@servera ~]# whatis  vgcreate    创建卷组
vgcreate (8)           - Create a volume group
[root@servera ~]# whatis  lvcreate   创建逻辑卷
lvcreate (8)           - Create a logical volume
```

fdisk　基本磁盘管理　　磁盘分区容量扩容非常麻烦
lvm　　高级磁盘管理　　分区容量扩容非常方便

Stratis 本地存储管理系统管理存储，并使用 VDO 卷优化使用中的存储空间




```
1 在每个池中，创建一个或多个文件系统　最多创建文件系统 2^24
2 术语 blockdev　底层块设备
3 pool 包含一个或多个块设备，把服务器本地硬盘聚合，变成一个大的存储池

1 [root@servera ~]# yum install stratis-cli stratisd -y
[root@serverb ~]# systemctl enable stratisd
[root@serverb ~]# systemctl start stratisd
[root@serverb ~]# stratis  pool list
Name    Total Physical Size  Total Physical Used
[root@serverb ~]# stratis  pool create pool1 /dev/vdb
```

```
[root@serverb ~]# stratis  pool list
Name    Total Physical Size  Total Physical Used
```

```
[root@serverb ~]# stratis  pool create pool1 /dev/vdb
[root@serverb ~]# stratis  pool list
Name     Total Physical Size  Total Physical Used
pool1                  5 GiB               52 MiB
```

[root@serverb ~]# ll -d /stratis/pool1 每个池在/stratis 目录下创建一个子目录，子目录名称是池的名字

```
drwxr-xr-x. 2 root root 6 Sep  3 21:22 /stratis/pool1
[root@serverb ~]# stratis  blockdev list pool1
Pool Name  Device Node    Physical Size   State  Tier
pool1      /dev/vdb               5 GiB  In-use  Data
[root@serverb ~]# stratis  pool add-data pool1 /dev/vdc
```

扩容

```
Execution failure caused by:
ERROR: path /dev/vdc does not refer to a block device
[root@serverb ~]# stratis  filesystem create pool1 filesystem1

[root@serverb ~]# stratis  filesystem create pool1 filesystem1
```

在 pool1 创建文件系统，默认文件系统类型是 xfs,文件系统容量是动态

```
[root@serverb ~]# ll /stratis/pool1/filesystem1
lrwxrwxrwx. 1 root root 9 Sep  3 21:24 /stratis/pool1/filesystem1 ->
/dev/dm-5
[root@serverb ~]# lsblk  --output=UUID /stratis/pool1/filesystem1
UUID
a115bc17-bc86-4e0f-a875-a1d6fc4ac099
[root@serverb ~]# mkdir /ftpserver
[root@serverb ~]# vim /etc/fstab
UUID=a115bc17-bc86-4e0f-a875-a1d6fc4ac099  /ftpserver
xfs     defaults, x-systemd.requires=stratisd.service  0 0
```