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# 磁盘分区，格式化与检验

**磁盘分区：fdisk**

**磁盘格式化：mkfs,mke2fs**

**磁盘检测：fsck**

**大容量磁盘分区：parted**

## 磁盘分区

**语法：** fdisk[-l] 设备名称

-l:输出系统内所有分区

**举例：**

```
[root@localhost ~]# fdisk -l

Disk /dev/sda: 21.4 GB, 21474836480 bytes
255 heads, 63 sectors/track, 2610 cylinders
Units = cylinders of 16065 * 512 = 8225280bytes

  Device Boot      Start        End      Blocks   Id  System
/dev/sda1   *          1         13      104391   83  Linux
/dev/sda2             14       1288    10241437+  83  Linux
/dev/sda3           1289       1925     5116702+  83  Linux
/dev/sda4           1926       2610     5502262+   5  Extended
/dev/sda5           1926       2052     1020096   82  Linux swap / Solaris
/dev/sda6           2053       2302     2008093+  83  Linux
```

**1. 查看磁盘文件名**

[root@localhost ~]# df /

文件系统 1K-块 已用 可用 已用% 挂载点

/dev/sda2 9920624 4329108 5079448 47% /

**2. 查看磁盘分区功能**

```
[root@localhost ~]# fdisk /dev/sda   //这里不带数字

The number of cylinders for this disk isset to 2610.
There is nothing wrong with that, but thisis larger than 1024,
and could in certain setups cause problemswith:
1) software that runs at boot time (e.g.,old versions of LILO)
2) booting and partitioning software fromother OSs
   (e.g., DOS FDISK, OS/2 FDISK)

Command (m for help): m
Command action
   a   toggle a bootable flag
   b   edit bsd disklabel
   c   toggle the dos compatibilityflag
   d   delete a partition //删除磁盘分区
   l   list known partition types
   m   print this menu  //查看磁盘分区功能
   n   add a new partition //增加一个磁盘分区
   o   create a new empty DOSpartition table
   p   print the partition table //查看磁盘分区
   q   quit without saving changes
   s   create a new empty Sundisklabel
   t   change a partition's system id
   u   change display/entry units
   v   verify the partition table
   w   write table to disk and exit
   x   extra functionality (expertsonly)
```

## 删除磁盘分区

```
[root@localhost ~]# fdisk /dev/sda

The number of cylinders for this disk isset to 2610.
There is nothing wrong with that, but thisis larger than 1024,
and could in certain setups cause problemswith:
1) software that runs at boot time (e.g.,old versions of LILO)
2) booting and partitioning software fromother OSs
   (e.g., DOS FDISK, OS/2 FDISK)

Command (m for help): p

Disk /dev/sda: 21.4 GB, 21474836480 bytes
255 heads, 63 sectors/track, 2610 cylinders
Units = cylinders of 16065 * 512 = 8225280bytes

   Device Boot      Start         End      Blocks   Id  System
/dev/sda1   *           1          13      104391   83  Linux
/dev/sda2              14        1288    10241437+  83  Linux
/dev/sda3            1289        1925     5116702+  83  Linux
/dev/sda4            1926        2610     5502262+   5  Extended
/dev/sda5            1926        2052     1020096   82  Linux swap / Solaris
/dev/sda6            2053        2302     2008093+  83  Linux
```

由上可知我的磁盘主要分为6个分区，1,2,3为主分区，4为扩展分区，5为 swap 分区，6是逻辑分区

```
Command (m for help): d
Partition number (1-6): 3

Command (m for help): p

Disk /dev/sda: 21.4 GB, 21474836480 bytes
255 heads, 63 sectors/track, 2610 cylinders
Units = cylinders of 16065 * 512 = 8225280bytes

  Device Boot      Start         End      Blocks   Id  System
/dev/sda1   *         1          13      104391   83  Linux
/dev/sda2            14        1288    10241437+  83  Linux
/dev/sda4          1926        2610     5502262+   5  Extended
/dev/sda5          1926        2052     1020096   82  Linux swap / Solaris
/dev/sda6          2053        2302     2008093+  83  Linux

删除主分区 sad3 后可以看到磁盘信息不在包含 sad3
Command (m for help): d
Partition number (1-6): 4

Command (m for help): p

Disk /dev/sda: 21.4 GB, 21474836480 bytes
255 heads, 63 sectors/track, 2610 cylinders
Units = cylinders of 16065 * 512 = 8225280bytes

  Device Boot      Start         End      Blocks   Id  System
/dev/sda1   *         1          13      104391   83  Linux
/dev/sda2            14        1288    10241437+  83  Linux
```

删除扩展分区 sad4 后可以看到扩展分区，逻辑分区都被删除（因为逻辑分区是由扩展分区衍生而来的）。

## 增加磁盘分区

磁盘分区最多只能有4个主分区+扩展分区组成，其中扩展分区最多只能有一个，剩下在创建的分区都是由扩展分区衍生出来的逻辑分区

**举例1. 由于磁盘现分区分为3个主分区，1个扩展分区。因此在创建时将直接创建逻辑分区，而不在询问是否创建主分区或者扩展分区**

```
[root@localhost ~]# fdisk /dev/sda

The number of cylinders for this disk isset to 2610.
There is nothing wrong with that, but thisis larger than 1024,
and could in certain setups cause problemswith:
1) software that runs at boot time (e.g.,old versions of LILO)
2) booting and partitioning software fromother OSs
   (e.g., DOS FDISK, OS/2 FDISK)

Command (m for help): p

Disk /dev/sda: 21.4 GB, 21474836480 bytes
255 heads, 63 sectors/track, 2610 cylinders
Units = cylinders of 16065 * 512 = 8225280bytes

   Device Boot      Start        End      Blocks   Id  System
/dev/sda1   *           1         13      104391   83  Linux
/dev/sda2              14       1288    10241437+  83  Linux
/dev/sda3            1289       1925     5116702+  83  Linux
/dev/sda4            1926       2610     5502262+   5  Extended
/dev/sda5            1926       2052     1020096   82  Linux swap / Solaris
/dev/sda6            2053       2302     2008093+  83  Linux

Command (m for help): n
First cylinder (2303-2610, default 2303):
```

**举例2：创建主/扩展分区**

```
[root@localhost ~]# fdisk /dev/sda

The number of cylinders for this disk isset to 2610.
There is nothing wrong with that, but thisis larger than 1024,
and could in certain setups cause problemswith:
1) software that runs at boot time (e.g.,old versions of LILO)
2) booting and partitioning software fromother OSs
   (e.g., DOS FDISK, OS/2 FDISK)

Command (m for help): d //先将主分区和逻辑分区删除（如果为4个则默认创建逻辑分区）
Partition number (1-6): 2

Command (m for help): d
Partition number (1-6): 4

Command (m for help): p

Disk /dev/sda: 21.4 GB, 21474836480 bytes
255 heads, 63 sectors/track, 2610 cylinders
Units = cylinders of 16065 * 512 = 8225280bytes

   Device Boot      Start        End      Blocks   Id  System
/dev/sda1   *           1         13      104391   83  Linux
/dev/sda3            1289       1925     5116702+  83  Linux

Command (m for help): n
Command action
   e   extended
   p   primary partition (1-4)
```

提示用户选择是是创建主分区还是扩展分区

**举例3.创建逻辑分区与扩展分区**

```
root@localhost ~]# fdisk /dev/sda

The number of cylinders for this disk isset to 2610.
There is nothing wrong with that, but thisis larger than 1024,
and could in certain setups cause problemswith:
1) software that runs at boot time (e.g.,old versions of LILO)
2) booting and partitioning software fromother OSs
   (e.g., DOS FDISK, OS/2 FDISK)

Command (m for help): p

Disk /dev/sda: 21.4 GB, 21474836480 bytes
255 heads, 63 sectors/track, 2610 cylinders
Units = cylinders of 16065 * 512 = 8225280bytes

  Device Boot       Start        End      Blocks  Id  System
/dev/sda1  *            1         13      104391  83  Linux
/dev/sda2               14       1288   10241437+  83  Linux
/dev/sda3             1289       1925    5116702+  83  Linux
/dev/sda4             1926       2610    5502262+   5  Extended
/dev/sda5             1926       2052    1020096   82  Linux swap / Solaris
/dev/sda6             2053       2302    2008093+  83  Linux

Command (m for help): d
Partition number (1-6): 4

Command (m for help): n
Command action
  e    extended
  p    primary partition (1-4)
e
Selected partition 4
First cylinder (1926-2610, default 1926):
Using default value 1926
Last cylinder or +size or +sizeM or +sizeK(1926-2610, default 2610):
Using default value 2610

Command (m for help): p

Disk /dev/sda: 21.4 GB, 21474836480 bytes
255 heads, 63 sectors/track, 2610 cylinders
Units = cylinders of 16065 * 512 = 8225280bytes

  Device Boot       Start        End      Blocks  Id  System
/dev/sda1  *            1         13      104391  83  Linux
/dev/sda2               14       1288   10241437+  83  Linux
/dev/sda3             1289       1925    5116702+  83  Linux
/dev/sda4             1926       2610    5502262+   5  Extended
```

**sd4为新创建的扩展分区，大小为从柱面1926到2610**

```
Command (m for help): n
Firstcylinder (1926-2610, default 1926):
Usingdefault value 1926
Lastcylinder or +size or +sizeM or +sizeK (1926-2610, default 2610): +500M
```

对于此处可以指定柱面号码，以可以通过+XXM 指定大小，让其自动分配柱面

Command (m for help): p

```
Disk /dev/sda: 21.4 GB, 21474836480 bytes
255 heads, 63 sectors/track, 2610 cylinders
Units = cylinders of 16065 * 512 = 8225280bytes

  Device Boot       Start         End      Blocks   Id  System
/dev/sda1   *           1          13      104391   83  Linux
/dev/sda2              14        1288    10241437+  83  Linux
/dev/sda3            1289        1925     5116702+  83  Linux
/dev/sda4            1926        2610     5502262+   5  Extended
/dev/sda5            1926        1987      497983+  83  Linux
```

**sd5为新创建的逻辑分区，大小为500M**

## 内核查找分区

**当我们增加分区后，系统让我们 reboot 以加载分区。也可以不用重启，只需要通知内容重新查找分区即可**

```
The partition table has been altered!

Calling ioctl() to re-read partition table.

WARNING: Re-reading the partition tablefailed with error 16: 设备或资源忙.
The kernel still uses the old table.
The new table will be used at the nextreboot.
Syncing disks.
[root@localhost~]# partprobe
```

## 磁盘格式化

分区完毕后要进行文件系统的格式化

**mkfs**

**语法:** mkfs[-t 文件系统格式] 设备文件名

**选项与参数:**

-t:文件系统格式，例如 ext3,ext2,vfat 等

**举例**

```
[root@localhost ~]# mkfs -t ext3 /dev/sda7
mke2fs 1.39 (29-May-2006)
Filesystemlabel=
OS type: Linux
Blocksize=1024 (log=0)
Fragment size=1024 (log=0)
50200 inodes, 200780 blocks
10039 blocks (5.00%) reserved for the superuser
First data block=1
Maximum filesystem blocks=67371008
25 block groups
8192 blocks per group, 8192 fragments pergroup
2008 inodes per group
Superblock backups stored on blocks:
        8193, 24577, 40961, 57345, 73729

Writing inode tables: done
Creating journal (4096 blocks): done
Writing superblocks and filesystemaccounting information: done

This filesystem will be automaticallychecked every 37 mounts or
180 days, whichever comes first.  Use tune2fs -c or -i to override.
```

其中文件系统 Label 以及 iBLOCK 大小均采用默认大小。如果对于 EXT2/EXT3 我们对这些信息由特殊的需求,可以使用 mke2fs

**mke2fs**

**语法：** mke2fs[-b block大小] [-i inode 大小] [-L 卷标] [-cj] 设备

**选项与参数：**

-b:设置 block 大小，目前支持1024,2048,4096

-i:多少容量给予一个 inode

-c:检查磁盘错误

-L:卷标名称（Label）

-j:自动加入日志系统成为 EXT3文件系统，不加在默认为 EXT2

**举例**

```
[root@localhost ~]# mke2fs -b 2048 -i 4096-L "TKFDISK" -j /dev/sda7
mke2fs 1.39 (29-May-2006)
Filesystemlabel=TKFDISK
OS type: Linux
Blocksize=2048 (log=1)
Fragment size=2048 (log=1)
50288 inodes, 100390 blocks
5019 blocks (5.00%) reserved for the superuser
First data block=0
Maximum filesystem blocks=103809024
7 block groups
16384 blocks per group, 16384 fragments pergroup
7184 inodes per group
Superblock backups stored on blocks:
        16384, 49152, 81920

Writing inode tables: done
Creatingjournal (4096 blocks): done
Writing superblocks and filesystemaccounting information: done

This filesystem will be automaticallychecked every 31 mounts or
180 days, whichever comes first.  Use tune2fs -c or -i to override.
```

## 磁盘检测(fsck)

**语法：** fsck [-t 文件系统格式] [-ACay]

**选项与参数**

-t ： 文件系统格式。

-A ： 依据/etc/fstab 的内容，将需要的装置扫瞄一次。

-a ： 自动修复检查到的有问题的扇区.

-y ： 与 -a 类似，但是某些 filesystem 仅支持 -y 这个参数

-C ： 可以在检验的过程当中，使用一个直方图来显示目前的进度!

EXT2/EXT3 的额外选项功能：(e2fsck 这支命令所提供)

-f ： 强制检查! 一般来说，如果 fsck 没有发现任何 unclean 的旗标，不会主动进入细部检查的，如果您想要强制 fsck 进入细部检查，就得加上 -f

-D ： 针对文件系统下的目录进行优化配置。

**举例**

```
[root@localhost ~]# fsck -Cf /dev/sda7
fsck 1.39 (29-May-2006)
e2fsck 1.39 (29-May-2006)
Pass 1: Checking inodes, blocks, and sizes
Pass 2: Checking directory structure
Pass 3: Checking directory connectivity
Pass 4: Checking reference counts
Pass 5: Checking group summary information
TKFDISK: 11/50288 files (9.1%non-contiguous), 7673/100390 blocks
```

**说明：** 需要磁盘检查的分区不能挂载在系统上，需要先被卸载才能磁盘检测

## 大容量磁盘分区(parted)

由于 fdisk 无法支持到高于2 TB 以上的分区，此时就需要 parted 来处理了

**语法：** parted [设备] [命令 [参数]]

**选项与参数：**

新增分区：mkpart [primary|logical|extended] [ext3|vfat]开始结束

分区表：print

删除分区：rm [partition]

**举例1：查看分区表**

```
[root@bogon ~]# parted /dev/sda print

Model: VMware, VMware Virtual S (scsi)
Disk /dev/sda: 21.5GB
Sector size (logical/physical): 512B/512B
Partition Table: msdos

Number  Start    End     Size     Type      File system   标志
1       32.3kB  107MB   107MB    主分区      ext3          启动
2       107MB   10.6GB  10.5GB   主分区      ext3
3       10.6GB  15.8GB  5240MB   主分区      ext3
4       15.8GB  21.5GB  5634MB   扩展分区
5       15.8GB  16.9GB  1045MB   逻辑分区     linux-swap

信息：如果必要，不要忘记更新 /etc/fstab。
```

通过以上信息可以看出，扩展分区到21.5 G，逻辑分区使用到16.9 G，那么16.9 G~21.5 G只部分空间还为被使用（未被分区）

**举例2：新增分区**

```
[root@bogon ~]# parted /dev/sda mkpart logical ext3 16.9G 18.9G
信息：如果必要，不要忘记更新 /etc/fstab。

[root@bogon ~]# parted /dev/sda print

Model: VMware, VMware Virtual S (scsi)
Disk /dev/sda: 21.5GB
Sector size (logical/physical): 512B/512B
Partition Table: msdos

Number  Start    End     Size     Type      File system   标志
1       32.3kB  107MB   107MB    主分区      ext3          启动
2       107MB   10.6GB  10.5GB   主分区      ext3
3       10.6GB  15.8GB  5240MB   主分区      ext3
4       15.8GB  21.5GB  5634MB   扩展分区
5       15.8GB  16.9GB  1045MB   逻辑分区     linux-swap
6       16.9GB  18.9GB  2023MB   逻辑分区
```

**举例3：删除分区**

```
[root@bogon ~]# parted /dev/sda rm 6
信息：如果必要，不要忘记更新 /etc/fstab。


[root@bogon ~]# parted /dev/sda print

Model: VMware, VMware Virtual S (scsi)
Disk /dev/sda: 21.5GB
Sector size (logical/physical): 512B/512B
Partition Table: msdos

Number  Start   End     Size    Type       File system  标志
1       32.3kB  107MB   107MB   主分区      ext3         启动
2       107MB   10.6GB  10.5GB  主分区      ext3
3       10.6GB  15.8GB  5240MB  主分区      ext3
4       15.8GB  21.5GB  5634MB  扩展分区
5       15.8GB  16.9GB  1045MB  逻辑分区    linux-swap

信息：如果必要，不要忘记更新 /etc/fstab。
```

**说明：parted 分区提交即执行，因此使用起来需小心**

上一篇: 磁盘挂载与卸载 (/project/learn-linux-step-by-step/disk-mount-and-unmount.html)
　　　　　　下一篇: 文件系统简单操作 (/project/learn-linux-step-by-step/file-system-simple-operation.html)

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