

Linux 文件管理实验

实验报告

一、 实验目的

熟练掌握 Linux 操作系统的使用，掌握 Linux 的系统的进程管理和文件管理功能。

二、 实验内容

1. 将若干已有用户加入到同一个组 xjtuse 中。在/home 下创建一个共享的公用目录 public,允许 xjtuse 组中的用户对该目录具有读写和执行操作。（给出相关命令及运行结果）
2. 对于 public 目录下的文件，只有文件的拥有者才具有删除文件的权限。（给出相关命令及运行结果）
3. 对于 public 目录下的文件，也可以通过路径/mnt/public 来访问。（给出相关命令及运行结果）
4. 看 Linux 系统磁盘空间的使用情况（给出显示结果），并为/分区创建磁盘配额，使得用户可用空间的软限制为 100M，硬限制为 150M,且每个用户可用的 inodes 的软限制为 100,硬限制为 120。并对磁盘配额情况进行验证测试。（给出相关命令及运行结果）

三、 题目分析及基本设计过程分析

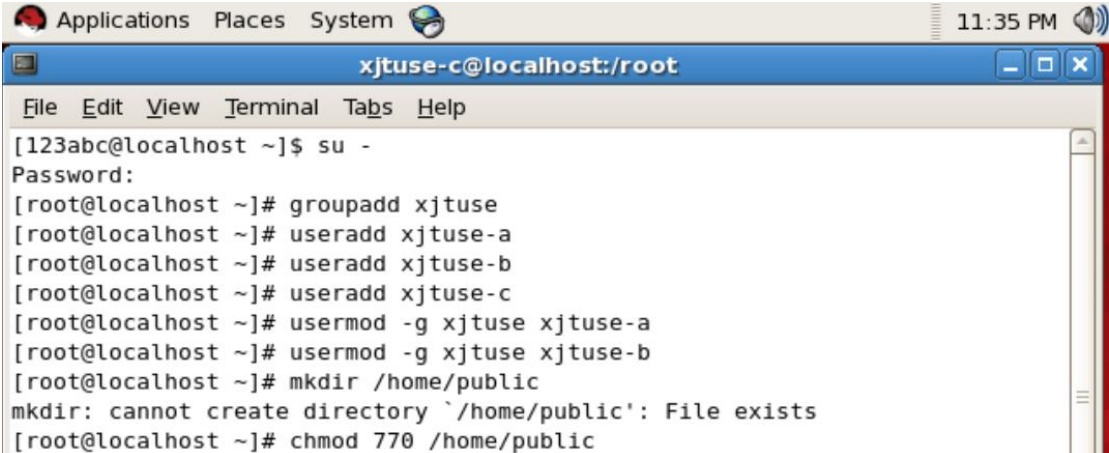
1. 可以通过 useradd 命令创建用户，使用 groupadd 命令创建用户组，再通过 usermod 命令将用户添加到指定的用户组。此

外，可以使用 `mkdir` 命令创建目录，用 `chmod` 命令修改目录的权限，用 `chown` 命令设置目录的所有者。

2. 可以使用 `chmod` 命令修改文件的权限。
3. 使用 `mount -bind` 命令可以将某个目录挂载到 `/mnt/public` 路径下，使其在该路径下可用。
4. 可以使用 `df` 命令查看磁盘的使用情况。通过配置 `/etc/fstab` 文件中的条目来激活文件系统的限额功能，并使用 `edquota` 命令为用户设置磁盘使用限额。

四、 运行截图和相关说明

1. 将用户 `xjtuse-1` 和 `xjtuse-2` 加入到同一个用户组中，然后通过 `chmod` 和 `chown` 命令为该用户组分配读写权限。之后切换到用户 `xjtuse-1`，能够正常访问并创建目录 `xjtuse-test`。
用户 `xjtuse-2` 也可以访问该目录，但未加入该组的用户 `xjtuse-3` 则无法访问。

A terminal window titled 'xjtuse-c@localhost:/root' with a menu bar (File, Edit, View, Terminal, Tabs, Help). The terminal shows a sequence of commands: a user switches to root via 'su -', then runs 'groupadd xjtuse', 'useradd xjtuse-a', 'useradd xjtuse-b', and 'useradd xjtuse-c'. Next, they run 'usermod -g xjtuse xjtuse-a' and 'usermod -g xjtuse xjtuse-b'. Then, they attempt 'mkdir /home/public', which fails with the message 'mkdir: cannot create directory '/home/public': File exists'. Finally, they run 'chmod 770 /home/public'.

```
[123abc@localhost ~]$ su -  
Password:  
[root@localhost ~]# groupadd xjtuse  
[root@localhost ~]# useradd xjtuse-a  
[root@localhost ~]# useradd xjtuse-b  
[root@localhost ~]# useradd xjtuse-c  
[root@localhost ~]# usermod -g xjtuse xjtuse-a  
[root@localhost ~]# usermod -g xjtuse xjtuse-b  
[root@localhost ~]# mkdir /home/public  
mkdir: cannot create directory '/home/public': File exists  
[root@localhost ~]# chmod 770 /home/public
```

```
[root@localhost ~]# chmod 770 /home/public
[root@localhost ~]# chown :xjtuse /home/public
[root@localhost ~]# su xjtuse-a
[xjtuse-a@localhost root]$ cd /home/public
[xjtuse-a@localhost public]$ mkdir xjtuse-test
[xjtuse-a@localhost public]$ su -
Password:
[root@localhost ~]# su xjtuse-b
[xjtuse-b@localhost root]$ cd /home/public
[xjtuse-b@localhost public]$ ls
public-test share-test xjtuse-test
[xjtuse-b@localhost public]$ su -
Password:
[root@localhost ~]# su xjtuse-c
[xjtuse-c@localhost root]$ cd /home/public
bash: cd: /home/public: Permission denied
[xjtuse-c@localhost root]$
```

2. 使用 `chmod` 命令将文件或目录的权限设置为 700，这意味着只有文件或目录的所有者拥有完全的读、写和执行权限，而其他用户（包括同组用户和其他用户）均无法访问。接着，将文件或目录的所有者设置为 `xjtuse-1`。当切换到用户 `xjtuse-2` 时，会发现无法访问该文件或目录。

```
[xjtuse-b@localhost public]$ su -
Password:
[root@localhost ~]# su xjtuse-c
[xjtuse-c@localhost root]$ cd /home/public
bash: cd: /home/public: Permission denied
[xjtuse-c@localhost root]$ su -
Password:
[root@localhost ~]# chmod 700 /home/public
[root@localhost ~]# chown xjtuse-a /home/public
[root@localhost ~]# su xjtuse-b
[xjtuse-b@localhost root]$ cd /home/public
bash: cd: /home/public: Permission denied
[xjtuse-b@localhost root]$
```

3. 执行 `mount --bind` 指令，执行后可以在 `/mnt/public` 访问到 `xjtuse-test`。

```
[xjtuse-b@localhost root]$ su -
Password:
[root@localhost ~]# mkdir /mnt/public
[root@localhost ~]# mount --bind /home/public /mnt/public
[root@localhost ~]# cd /mnt/public
[root@localhost public]# ls
public-test  share-test  xjtuse-test
[root@localhost public]#
```

4. 磁盘使用情况如下:

```
[root@localhost public]# df
Filesystem      1K-blocks    Used Available Use% Mounted on
/dev/sda2      17981340  2207256  14845932  13% /
/dev/sda1       295561    16053   264248    6% /boot
tmpfs           517536      0    517536    0% /dev/shm
/dev/scd1       2935370  2935370      0  100% /media/RHEL_5.4 i386
DVD
```

配置/etc/fstab 文件:

The screenshot shows a terminal window titled "root@localhost:~". The terminal displays the contents of the /etc/fstab file, which defines the filesystems to be mounted at boot time. The output is as follows:

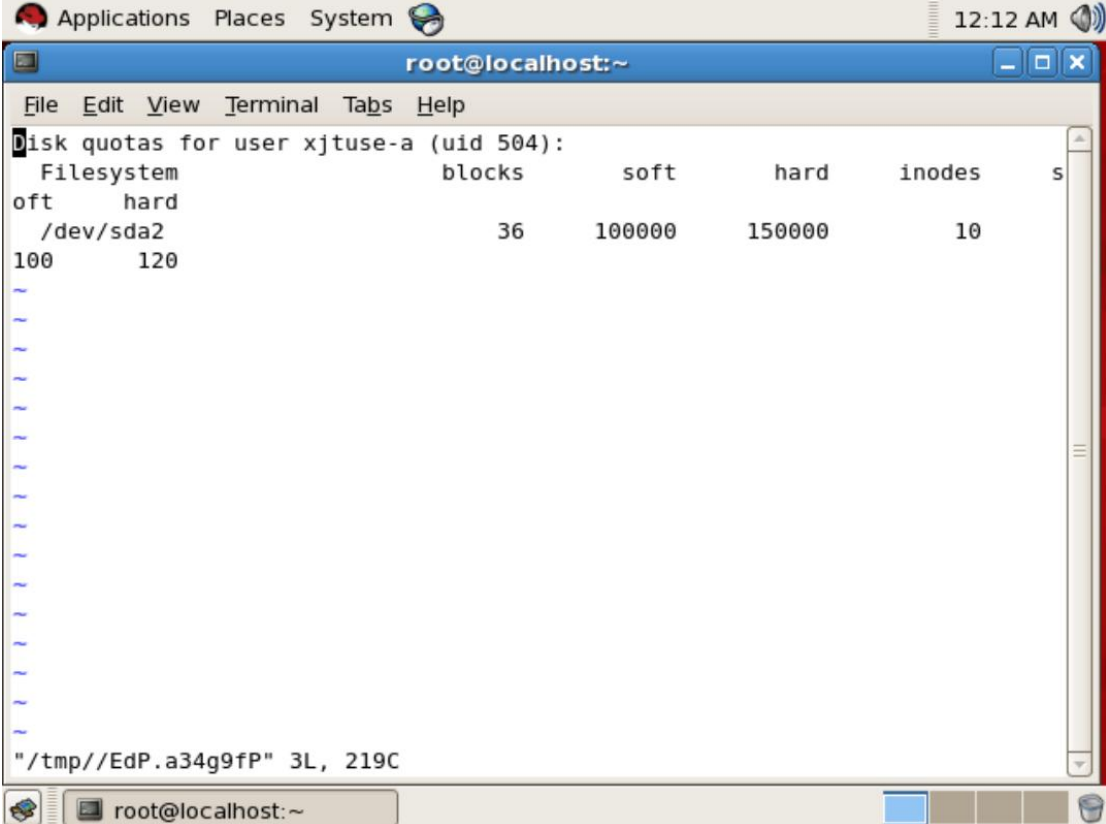
Label	Mount Point	Filesystem Type	Options	Dump Pass	Check Order
LABEL=/	/	ext4	defaults,usrquota,grpquota	0	0
LABEL=/boot	/boot	ext3	defaults	1	2
tmpfs	/dev/shm	tmpfs	defaults	0	0
devpts	/dev/pts	devpts	gid=5,mode=620	0	0
sysfs	/sys	sysfs	defaults	0	0
proc	/proc	proc	defaults	0	0
LABEL=SWAP-sda3	swap	swap	defaults	0	0

Below the fstab entries, there are several tilde (~) characters, likely representing the prompt or a continuation of the command output.

利用 `mount` 将文件系统重新装入根分区中，并使用 `quotacheck` 命令初始化限额系统。

```
[root@localhost ~]# mount -o remount /
[root@localhost ~]# quotacheck -avug -m
quotacheck: Scanning /dev/sda2 [/] quotacheck: Cannot stat old user quota file: No such file or directory
quotacheck: Cannot stat old group quota file: No such file or directory
quotacheck: Cannot stat old user quota file: No such file or directory
quotacheck: Cannot stat old group quota file: No such file or directory
done
quotacheck: Checked 9102 directories and 84262 files
quotacheck: Old file not found.
quotacheck: Old file not found.
[root@localhost ~]# edquota -u xjtuse-a
[root@localhost ~]#
```

利用 edquota 配置：



The screenshot shows a terminal window titled "root@localhost:~" with a menu bar (File, Edit, View, Terminal, Tabs, Help). The output of the command `edquota -u xjtuse-a` is displayed, showing disk quotas for user xjtuse-a (uid 504). The output is as follows:

Disk quotas for user xjtuse-a (uid 504):					
Filesystem		blocks	soft	hard	inodes
oft	hard				
/dev/sda2		36	100000	150000	10
100	120				

The terminal also shows several tilde (~) characters and a status bar at the bottom indicating the cursor position: `"/tmp//EdP.a34g9fP" 3L, 219C`.

配置后利用 repquota 查看报告。

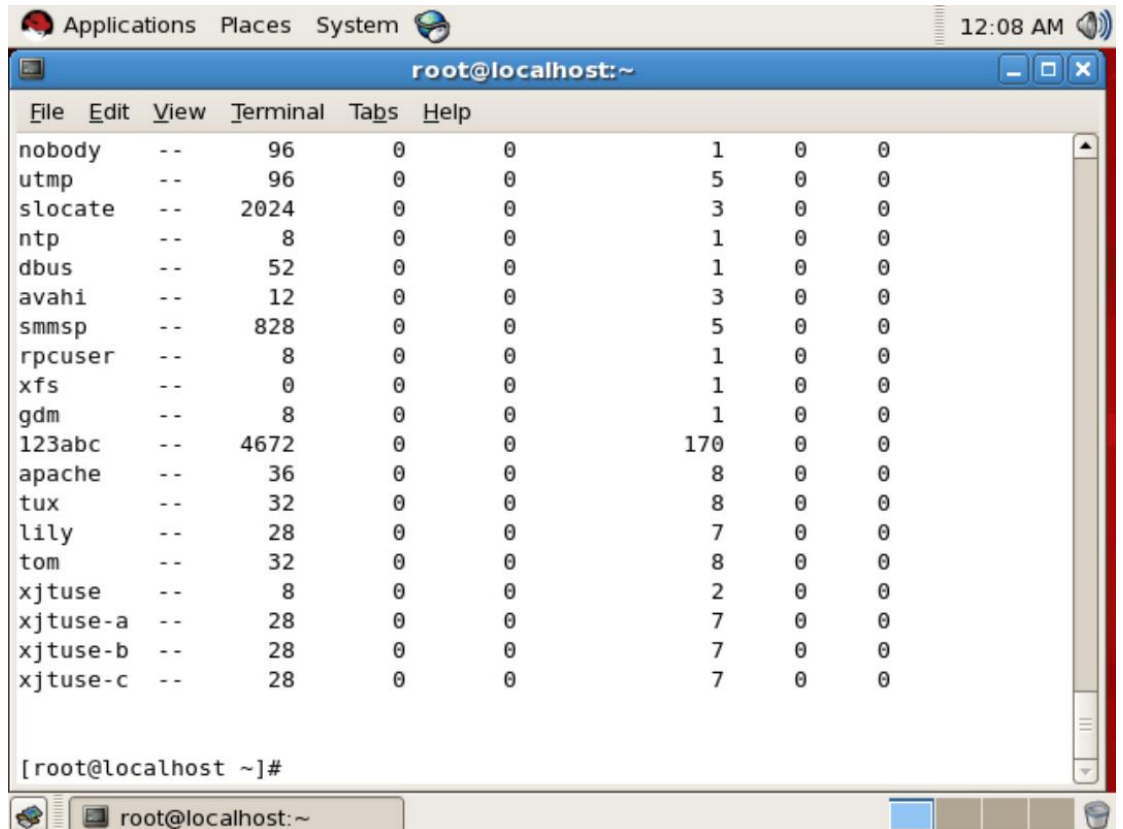
```
Applications Places System 12:13 AM
root@localhost:~
File Edit View Terminal Tabs Help
[root@localhost ~]# repquota -aug
*** Report for user quotas on device /dev/sda2
Block grace time: 7days; Inode grace time: 7days

      Block limits
User      used  soft  hard  grace  used  soft  hard  grace
-----
root      -- 2568812    0    0      93121    0    0
daemon    --    20    0    0         3    0    0
lp        --    16    0    0         2    0    0
ntp       --     8    0    0         1    0    0
rpc       --     4    0    0         1    0    0
avahi     --    12    0    0         3    0    0
smmsp     --    12    0    0         2    0    0
rpcuser   --     8    0    0         1    0    0
xfs       --     0    0    0         1    0    0
123abc    --   4668    0    0        169    0    0
apache    --    24    0    0         7    0    0
tux       --    32    0    0         9    0    0
lily      --    28    0    0         8    0    0
tom       --    32    0    0         9    0    0
xjtuse-a  --    36 100000 150000    10 100 120
xjtuse-b  --    28    0    0         8    0    0
```

```
root@localhost:~
Applications Places System 12:08 AM
root@localhost:~
File Edit View Terminal Tabs Help
xjtuse-c  --    28    0    0         8    0    0

*** Report for group quotas on device /dev/sda2
Block grace time: 7days; Inode grace time: 7days

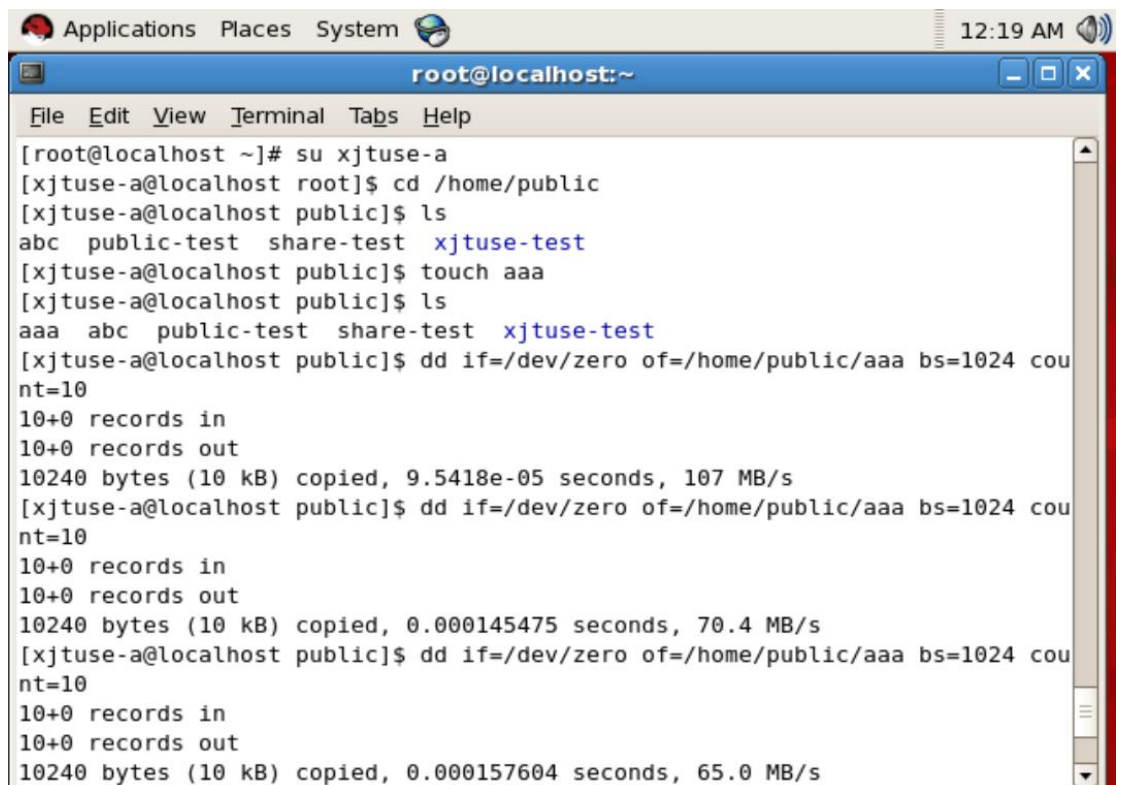
      Block limits
Group     used  soft  hard  grace  used  soft  hard  grace
-----
root      -- 2564992    0    0      93040    0    0
daemon    --    28    0    0         4    0    0
sys       --    24    0    0         3    0    0
tty       --    32    0    0         2    0    0
disk      --     4    0    0         1    0    0
lp        --   140    0    0        20    0    0
mail      --   236    0    0        13    0    0
man       --   256    0    0        32    0    0
lock      --    32    0    0         2    0    0
nobody    --    96    0    0         1    0    0
utmp      --    96    0    0         5    0    0
slocate   --   2024    0    0         3    0    0
ntp       --     8    0    0         1    0    0
dbus      --    52    0    0         1    0    0
```


A terminal window titled 'root@localhost:~' with a menu bar (File, Edit, View, Terminal, Tabs, Help) and a system bar (Applications, Places, System, 12:08 AM). The terminal displays a list of system users and their properties in a table format.

Username	UID	GID	Home	Shell	Files	Groups	Other
nobody	--	96	0	0	1	0	0
utmp	--	96	0	0	5	0	0
slocate	--	2024	0	0	3	0	0
ntp	--	8	0	0	1	0	0
dbus	--	52	0	0	1	0	0
avahi	--	12	0	0	3	0	0
smmsp	--	828	0	0	5	0	0
rpcuser	--	8	0	0	1	0	0
xfs	--	0	0	0	1	0	0
gdm	--	8	0	0	1	0	0
123abc	--	4672	0	0	170	0	0
apache	--	36	0	0	8	0	0
tux	--	32	0	0	8	0	0
lily	--	28	0	0	7	0	0
tom	--	32	0	0	8	0	0
xjtuse	--	8	0	0	2	0	0
xjtuse-a	--	28	0	0	7	0	0
xjtuse-b	--	28	0	0	7	0	0
xjtuse-c	--	28	0	0	7	0	0

The prompt is [root@localhost ~]#.

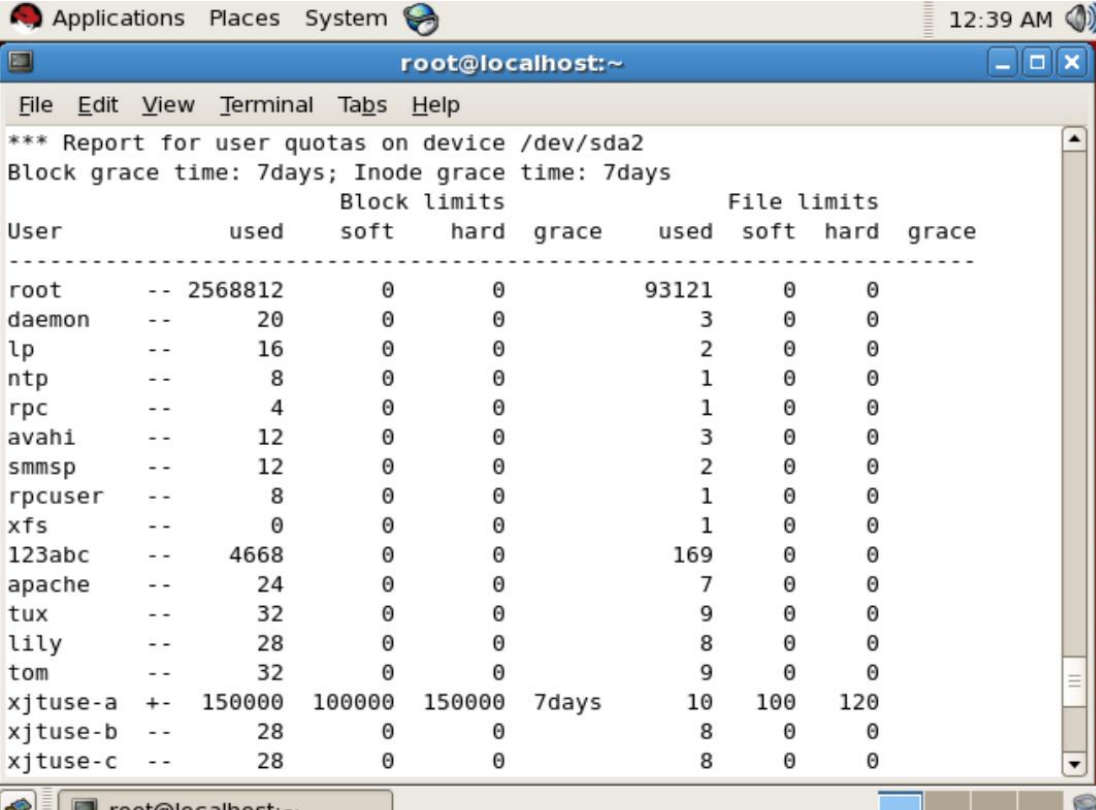
切换到用户 xjtuse-1 并写入文件。

A terminal window titled 'root@localhost:~' with a menu bar (File, Edit, View, Terminal, Tabs, Help) and a system bar (Applications, Places, System, 12:19 AM). The terminal shows the execution of several commands to switch users and create files.

```
[root@localhost ~]# su xjtuse-a
[xjtuse-a@localhost root]$ cd /home/public
[xjtuse-a@localhost public]$ ls
abc public-test share-test xjtuse-test
[xjtuse-a@localhost public]$ touch aaa
[xjtuse-a@localhost public]$ ls
aaa abc public-test share-test xjtuse-test
[xjtuse-a@localhost public]$ dd if=/dev/zero of=/home/public/aaa bs=1024 count=10
10+0 records in
10+0 records out
10240 bytes (10 kB) copied, 9.5418e-05 seconds, 107 MB/s
[xjtuse-a@localhost public]$ dd if=/dev/zero of=/home/public/aaa bs=1024 count=10
10+0 records in
10+0 records out
10240 bytes (10 kB) copied, 0.000145475 seconds, 70.4 MB/s
[xjtuse-a@localhost public]$ dd if=/dev/zero of=/home/public/aaa bs=1024 count=10
10+0 records in
10+0 records out
10240 bytes (10 kB) copied, 0.000157604 seconds, 65.0 MB/s
```

```
[xjtuse-a@localhost root]$ dd if=/dev/zero of=/home/public/aaa bs=1024 count=10000
10000+0 records in
10000+0 records out
10240000 bytes (10 MB) copied, 0.0292663 seconds, 350 MB/s
[xjtuse-a@localhost root]$ dd if=/dev/zero of=/home/public/aaa bs=1024 count=1000000
sda2: warning, user block quota exceeded.
sda2: write failed, user block limit reached.
dd: writing `/home/public/aaa': Disk quota exceeded
149849+0 records in
149848+0 records out
153444352 bytes (153 MB) copied, 0.8645 seconds, 177 MB/s
[xjtuse-a@localhost root]$ dd if=/dev/zero of=/home/public/aaa bs=1024 count=10000000
sda2: warning, user block quota exceeded.
sda2: write failed, user block limit reached.
dd: writing `/home/public/aaa': Disk quota exceeded
149849+0 records in
149848+0 records out
153444352 bytes (153 MB) copied, 0.835735 seconds, 184 MB/s
```

重新查看磁盘配额报告,发现 xjtuse-1 使用的配额发生变化



```
*** Report for user quotas on device /dev/sda2
Block grace time: 7days; Inode grace time: 7days
```

User		Block limits				File limits			
		used	soft	hard	grace	used	soft	hard	grace
root	--	2568812	0	0		93121	0	0	
daemon	--	20	0	0		3	0	0	
lp	--	16	0	0		2	0	0	
ntp	--	8	0	0		1	0	0	
rpc	--	4	0	0		1	0	0	
avahi	--	12	0	0		3	0	0	
smmsp	--	12	0	0		2	0	0	
rpcuser	--	8	0	0		1	0	0	
xfs	--	0	0	0		1	0	0	
123abc	--	4668	0	0		169	0	0	
apache	--	24	0	0		7	0	0	
tux	--	32	0	0		9	0	0	
lily	--	28	0	0		8	0	0	
tom	--	32	0	0		9	0	0	
xjtuse-a	+-	150000	100000	150000	7days	10	100	120	
xjtuse-b	--	28	0	0		8	0	0	
xjtuse-c	--	28	0	0		8	0	0	

五、 实验中出现的问题和解决

向 xjtuse-a 中写入文件后发现配额没有发生变化, 原因为写入

文件的大小过小。

六、 实验体会

实验使我学习到了 Linux 系统中文件管理的方法，学会应用 `chmod`、`ls`、`chown`、`chown` 等命令管理文件和权限，并学习使用 `quota` 管理磁盘配额。通过该实验，我对 Linux 系统形成进一步认识并逐渐熟练掌握其应用。