Set and View Disk Quota

Information

These notes were originally written in the year 2000 as part of a set of LPI Exam 101 training materials. The LPI training course at Bromley College was subsequently discontinued and some of the sections of the notes modified and incorporated into our one-day System Administration Courses. The remainder of the notes have now been made publicly available on the linuxtraining.org.uk website.

If you are a beginner please do not be put off of training courses by these notes, as they are rather technical. On the other hand if you are a more experienced Linux user we hope you find the coverage of this topic refreshingly clear.

For full details of our current Linux training please visit the site:
http://ce.bromley.ac.uk/linux

If you have reached this page from a search engine and wish to see the full contents list for the published notes please visit the site:
http://www.linuxtraining.org.uk

We hope you find these notes useful, but please remember that they apply to the 2.2 kernel. I will update them when I have the time.

Clive Gould - 21st December 2004

Set and View Disk Quota

Objective 4

Set and View Disk Quota: Setup disk quota for a filesystem, edit user quota, check user quota, generate reports for user quota. Includes quota, edquota, repquota, quotaon commands.

Disk Quotas

Quotas are useful as they allow a system administrator to limit the maximum amount of disc space a user's (or group's) home directory can take up. This prevents home directories from becoming too large, which is particularly useful in these days of Internet downloads.

Quotas are set, by root, on a per partition basis, and can be set for both for individual users and/or groups. Before a file is written to a partition, where quotas have been set, the creator's group's quota is checked first. If a quota for that group exists, the size of the file is counted towards that group's quota.   If no quota exists for the group, the owner's user quota is checked before the file is written.

You can set soft (advisory) and hard (absolute) limits for disk quotas and establish a grace period, after which the soft limit is enforced.

Configuring the System for Quotas

An example illustrating the process of configuring both user and group quotas on a /home partition (sda6) is provided on the following pages.

Assuming quotas have been enabled in your kernel and your system initialisation script, **/etc/rc.d/rc.sysinit**, has been set up to check quotas and turn them on a boot, which is often done by default, the next step is to edit your **/etc/fstab** file to enable quotas as illustrated overleaf.

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```
[clive@redhat clive]$ cat /etc/fstab
/dev/sda1            /       ext2        defaults              1 1
/dev/sda6   /home   ext2    defaults,usrquota,grpquota        1 2
/dev/sda5           swap    swap        defaults              0 0
```

In the above example both user and group quotas have been enabled on sda6, by editing the options field. If you only require user quotas you can miss out the grpquota option or vice versa.

The files which the operating system will expect to contain the settings for user and group quotas respectively are called **quota.user** and **quota.group**.
You will need to create an empty file quota.user if you want user quotas and an empty file called quota.group if you want group quotas. These files must be located in the root of the partition in which you wish to enable quotas. The process of creating these files is illustrated below:

```
[clive@redhat clive]$ su - root
Password:
[root@redhat /root]# cd /home
[root@redhat /home]# touch quota.user
[root@redhat /home]# touch quota.group
[root@redhat /home]# chmod 600 quota.user
[root@redhat /home]# chmod 600 quota.group
[root@redhat /home]# ls -la quota*
-rw-------   1 root  root     0 Aug 11 09:10 quota.group
-rw-------   1 root  root     0 Aug 11 09:10 quota.user
```

The touch command is used to create the empty files and the chmod command used to make them read/write only by the root.

It is now necessary to reboot your system for the changes to take effect. On boot, assuming rc.sysinit tries to turn quotas on, you may see something similar to the following error messages:

```
Aug 11 09:26:51 redhat rc.sysinit: Mounting local filesystems
succeeded
Aug 11 09:26:51 redhat quotaon: quotaon: using /
home/quota.group on /dev/sda6: Invalid argument
Aug 11 09:26:51 redhat quotaon: quotaon: using /
home/quota.user on /dev/sda6: Invalid argument
Aug 11 09:26:51 redhat rc.sysinit: Turning on user and group
quotas for local filesystems failed
```

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This is to be expected at this stage as you have not yet populated the files quota.user and quota.group. Once you have entered the required data into these files you will be able to check quotas and turn them on, or off, manually using the **quotaon** and **quotaoff** commands.

Scan a Filesystem for Disk Usages - quotacheck

The command **quotacheck** scans a filesystem and produces information on directory and file usage, for both users and groups. The update is output to the quota file for the corresponding filesystem i.e quota.user or quota.group.

You should run quotacheck each time the system boots, either automatically or manually and also at regular intervals, say once a week. The command should only be run by the root.

The syntax for quotacheck is shown below:

```
quotacheck option(s) filesystem
```

Common quotacheck options are:

Option	Explanation
-a	Check all filesystems listed in /etc/fstab with quotas enabled
-g	This option causes the command to count the files and directories associated with each group in turn
-R	When used with -a checks all filesystems apart from the root filesystem.
-u	This is the default option and causes the command to count the files and directories associated with each user in turn
-v	Causes the program to provide you with some useful information on what it is doing.

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An example of the use of quotacheck is illustrated below:

```
[root@redhat /root]# quotacheck -ugv /dev/sda6
Scanning /dev/sda6 [/home] done
Checked 1685 directories and 11944 files
Using quotafile /home/quota.user
Using quotafile /home/quota.group
```

In the above example quotacheck has produced information on file and directory usage for both users and groups.

Edit User Quotas - edquota

Quotas are assigned using the **edquota** command which invokes the quota editor.

The syntax for edquota is shown below:

```
edquota option(s) argument(s)
```

One or more users or groups may be specified on the command line. For each user or group a temporary file is created with an ASCII representation of the current disk quotas for that user or group and an editor is then invoked on the file. The quotas may then be modified, new quotas added, etc. Upon leaving the editor, edquota reads the temporary file and modifies the binary quota files (quota.user or quota.group) to reflect the changes made.

Common edquota options are:

Option	Explanation
-g *GROUP*	Edit the quota data for the specified *GROUP*
- p *PROTO USERS*	Duplicate the quotas of the *PROTO*-typical user specified for each of the *USERS* specified. This is the normal mechanism used to initialise quotas for multiple users.
-t	Edit the grace period
-u *USER*	Edit the quota data for the specified *USER*

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When using edquota you need to be familiar with basic **vi** usage. When you start vi you are in command mode. You can move the cursor using the arrow keys, but before you can add or change text in a file you have to type a command to tell vi what to do. Some basic editor commands are explained below:

Command	Explanation
i	Insert text to the right of the cursor (Press Esc to return to command mode)
x	Delete the character immediately under the cursor
:w	Save file, but continue editing
:wq	Save file and quit the editor
:q	Quit the editor, providing you have saved any changes
:q!	Quit the editor without saving any changes (the best way to exit vi if you've messed things up!)

Some terms you also need to understand before using edquota are explained in the table below:

Term	Explanation
blocks in use	This is the total number of 1kb blocks that the user or group has already used up.
inodes in use	This is the total number of files the user or group already has in use
limits (soft)	This specifies an advisory upper limit on the number of blocks or inodes. If this limit has been exceeded and the grace period has expired, a warning will be output.
limits (hard)	This specifies an absolute upper limit on the number of blocks or inodes. This limit cannot be exceeded.
grace period	This is the amount of time the soft limit for either blocks or inodes can be exceeded before warning messages are issued.

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Examples showing the use of edquota are illustrated below:

```
[root@redhat /root]# edquota -u clive

Quotas for user clive:
/dev/sda6: blocks in use: 16323, limits (soft = 17000, hard = 20000)
          inodes in use: 1580, limits (soft = 1600, hard = 1700)
~
~
"/tmp/EdP.aNlwuma" 3 lines, 134 characters
```

In the above example the fields, **blocks in use** and **inodes in use**, are populated as quotacheck has previously been run. If quotacheck had not been run these fields would contain 0.

```
[root@redhat /root]# edquota -t

Time units may be: days, hours, minutes, or seconds
Grace period before enforcing soft limits for users:
/dev/sda6: block grace period: 7 days, file grace period: 7 days
~
~
"/tmp/EdP.avQn16J" 3 lines, 170 characters
```

In the above example the grace period is displayed. By default the grace period is 0 days. Time units of seconds, minutes, hours and days are understood. When the grace period has expired any attempts to use more disk space will result in a warning message being sent to the terminal.

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Turn File System Quotas On and Off - quotaon, quotaoff

The command quotaon tells the system to enable disk quotas on one or more filesystems. This normally happens automatically at boot.

The quotaoff command tells the system to turn off quotas on the filesystems specified.

The syntax for quotaon and quotaoff is shown below:

```
quotaon option(s) filesystem(s)

quotaoff option(s) filesystem(s)
```

Common quotaon and quotaoff options are:

Option	Explanation
-a	Enable/disable quotas on all filesystems in /etc/fstab.
-g	Turn on or off group quotas in the specified filesystem(s)
-u	Turn on or off user quotas in the specified filesystem(s). This is the default setting.
-v	Display a message for each filesystem affected

Examples of using quotaon and quotaoff are illustrated below:

```
[root@redhat /root]# quotaon -a
quotaon: using /home/quota.group on /dev/sda6: Device or
resource busy
quotaon: using /home/quota.user on /dev/sda6: Device or
resource busy
[root@redhat /root]# quotaoff -a
[root@redhat /root]# quotaon -a
```

In the above example you can see that if quotas are already on, they have to be turned off, before they can be turned on again and any new settings take effect.

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Display Disk Usage and Limits - quota

Provided quotas are turned on, the command quota displays disk usage and limits for individual users or groups. By default only the user quotas are printed. A user can examine their own quotas, but only the root can examine the quotas of other users.

The syntax for quota is shown below:

```
quota option(s) argument
```

Common quota options are:

Option	Explanation
-g GID	Display group quotas for the group with GID (root only)
-q	Display information only where quotas have been exceeded
-u UID	Display user quotas for the user with UID (root only)

An example of using the quota command is illustrated below:

```
[clive@redhat clive]$ quota
Disk quotas for user clive (uid 500):
    Filesystem  blocks  quota  limit  grace  files  quota  limit  grace
     /dev/sda6  17016*  17000  20000      1   1592   1600   1700      1
```

In the above example the blocks soft limit has been exceeded and the grace period has 1 minute remaining. If any attempt to store further information is made, after this minute is up, a warning message will be sent to the terminal.

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Summarise Quotas for a File System -repquota

The command **repquota** prints a summary of the disc usage and quotas for all users and groups on the specified filesystem. For each user the current number of files and amount of space (in kilobytes) is printed, along with any quotas. The command can only be used by root.

The syntax for repquota is shown below:

repquota *option(s) filesystem*

Common repquota options are:

Option	Explanation
-a	Report on all filesystems listed in /etc/fstab
-g	Report on group quotas
-u	Report on user quotas.
-v	Report on all quotas even if there is no usage

An example of the use of repquota is illustrated below:

```
[root@redhat /root]# repquota -au
                     Block limits               File limits
User            used    soft    hard  grace    used  soft  hard  grace
root      --    5671       0       0            284     0     0
clive     --   16323   17000   20000           1580  1600  1700
student1  --      52       0       0             47     0     0
student2  --      48       0       0             43     0     0
student3  --    2242       0       0            205     0     0
```

In the above example only one user has quotas set.

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Bringing it all together - An Example

An example showing the effects of exceeding the soft limits is illustrated below:

```
[clive@redhat clive]$quota

Disk quotas for user clive (uid 500):
     Filesystem  blocks   quota  limit   grace  files   quota  limit  grace
      /dev/sda6  17709*   17000  20000   none   1604*   1600   1700      3

[clive@redhat clive] cp -R ./Office51/store ./Quotatest
/home: warning, user file quota exceeded
```

In the above example the blocks soft limit has been exceeded, the blocks grace period has expired and an attempt has been made to save still more information on the disk. The inode limits have not been exceeded and a maximum grace period of 3 minutes is still in force for inodes.

An example showing the effects of exceeding the hard limits is illustrated below:

```
[clive@redhat clive]$ cp  -R /home/clive/Office51 /
home/clive/Quotatest
/home: warning, user file quota exceeded too long.
cp: cannot create directory /home/clive/Quotatest/Office51'
: Disk quota exceeded
```

In the above example an attempt has been made to exceed the hard block limit and, in addition to a warning, the system has refused to allow the copy operation.