

Quota subsystem

Quota subsystem allows system administrator to set limits on used space and number of used inodes (inode is a filesystem structure which is associated with each file or directory) for users and/or groups. For both used space and number of used inodes there are actually two limits. The first one is called `softlimit` and the second one `hardlimit`. A user can never exceed a `hardlimit` for any resource (unless he has `CAP_SYS_RESOURCE` capability). User is allowed to exceed `softlimit` but only for limited period of time. This period is called "grace period" or "grace time". When grace time is over, user is not able to allocate more space/inodes until he frees enough of them to get below `softlimit`.

Quota limits (and amount of grace time) are set independently for each filesystem

For more details about quota design, see the documentation in quota-tools package (<https://sourceforge.net/projects/linuxquota>).

Quota netlink interface

When user exceeds a `softlimit`, runs out of grace time or reaches `hardlimit`, quota subsystem traditionally printed a message to the controlling terminal of the process which caused the excess. This method has the disadvantage that when user is using a graphical desktop he usually cannot see the message. Thus quota netlink interface has been designed to pass information about the above events to userspace. There they can be captured by an application and processed accordingly.

The interface uses generic netlink framework (see <https://lwn.net/Articles/208755/> and <http://www.infradead.org/~tgr/libnl/> for more details about this layer). The name of the quota generic netlink interface is "VFS_DQUOT". Definitions of constants below are in `<linux/quota.h>`. Since the quota netlink protocol is not namespace aware, quota netlink messages are sent only in initial network namespace.

Currently, the interface supports only one message type `QUOTA_NL_C_WARNING`. This command is used to send a notification about any of the above mentioned events. Each message has six attributes. These are (type of the argument is in parentheses):

`QUOTA_NL_A_QTYPE` (u32)

- type of quota being exceeded (one of `USRQUOTA`, `GRPQUOTA`)

`QUOTA_NL_A_EXCESS_ID` (u64)

- UID/GID (depends on quota type) of user / group whose limit is being exceeded.

`QUOTA_NL_A_CAUSED_ID` (u64)

- UID of a user who caused the event

`QUOTA_NL_A_WARNING` (u32)

- what kind of limit is exceeded:

`QUOTA_NL_IHARDWARN`
inode hardlimit

`QUOTA_NL_ISOFTLONGWARN`
inode softlimit is exceeded longer than given grace period

`QUOTA_NL_ISOFTWARN`
inode softlimit

`QUOTA_NL_BHARDWARN`
space (block) hardlimit

`QUOTA_NL_BSOFTLONGWARN`
space (block) softlimit is exceeded longer than given grace period.

`QUOTA_NL_BSOFTWARN`
space (block) softlimit

- four warnings are also defined for the event when user stops exceeding some limit:

`QUOTA_NL_IHARDBELOW`
inode hardlimit

`QUOTA_NL_ISOFTBELOW`
inode softlimit

`QUOTA_NL_BHARDBELOW`
space (block) hardlimit

`QUOTA_NL_BSOFTBELOW`
space (block) softlimit

`QUOTA_NL_A_DEV_MAJOR` (u32)

- major number of a device with the affected filesystem

QUOTA_NL_A_DEV_MINOR (u32)

- minor number of a device with the affected filesystem