

NAME

flock – apply or remove an advisory lock on an open file

SYNOPSIS

```
#include <sys/file.h>
```

```
int flock(int fd, int operation);
```

DESCRIPTION

Apply or remove an advisory lock on the open file specified by *fd*. The argument *operation* is one of the following:

LOCK_SH

Place a shared lock. More than one process may hold a shared lock for a given file at a given time.

LOCK_EX

Place an exclusive lock. Only one process may hold an exclusive lock for a given file at a given time.

LOCK_UN

Remove an existing lock held by this process.

A call to **flock()** may block if an incompatible lock is held by another process. To make a nonblocking request, include **LOCK_NB** (by ORing) with any of the above operations.

A single file may not simultaneously have both shared and exclusive locks.

Locks created by **flock()** are associated with an open file description (see **open(2)**). This means that duplicate file descriptors (created by, for example, **fork(2)** or **dup(2)**) refer to the same lock, and this lock may be modified or released using any of these file descriptors. Furthermore, the lock is released either by an explicit **LOCK_UN** operation on any of these duplicate file descriptors, or when all such file descriptors have been closed.

If a process uses **open(2)** (or similar) to obtain more than one file descriptor for the same file, these file descriptors are treated independently by **flock()**. An attempt to lock the file using one of these file descriptors may be denied by a lock that the calling process has already placed via another file descriptor.

A process may hold only one type of lock (shared or exclusive) on a file. Subsequent **flock()** calls on an already locked file will convert an existing lock to the new lock mode.

Locks created by **flock()** are preserved across an **execve(2)**.

A shared or exclusive lock can be placed on a file regardless of the mode in which the file was opened.

RETURN VALUE

On success, zero is returned. On error, -1 is returned, and *errno* is set appropriately.

ERRORS**EBADF**

fd is not an open file descriptor.

EINTR

While waiting to acquire a lock, the call was interrupted by delivery of a signal caught by a handler; see **signal(7)**.

EINVAL

operation is invalid.

ENOLCK

The kernel ran out of memory for allocating lock records.

EWOULDBLOCK

The file is locked and the **LOCK_NB** flag was selected.

CONFORMING TO

4.4BSD (the **flock()** call first appeared in 4.2BSD). A version of **flock()**, possibly implemented in terms of **fcntl(2)**, appears on most UNIX systems.

NOTES

Since kernel 2.0, **flock()** is implemented as a system call in its own right rather than being emulated in the GNU C library as a call to **fcntl(2)**. With this implementation, there is no interaction between the types of lock placed by **flock()** and **fcntl(2)**, and **flock()** does not detect deadlock. (Note, however, that on some systems, such as the modern BSDs, **flock()** and **fcntl(2)** locks *do* interact with one another.)

flock() places advisory locks only; given suitable permissions on a file, a process is free to ignore the use of **flock()** and perform I/O on the file.

flock() and **fcntl(2)** locks have different semantics with respect to forked processes and **dup(2)**. On systems that implement **flock()** using **fcntl(2)**, the semantics of **flock()** will be different from those described in this manual page.

Converting a lock (shared to exclusive, or vice versa) is not guaranteed to be atomic: the existing lock is first removed, and then a new lock is established. Between these two steps, a pending lock request by another process may be granted, with the result that the conversion either blocks, or fails if **LOCK_NB** was specified. (This is the original BSD behavior, and occurs on many other implementations.)

NFS details

In Linux kernels up to 2.6.11, **flock()** does not lock files over NFS (i.e., the scope of locks was limited to the local system). Instead, one could use **fcntl(2)** byte-range locking, which does work over NFS, given a sufficiently recent version of Linux and a server which supports locking.

Since Linux 2.6.12, NFS clients support **flock()** locks by emulating them as **fcntl(2)** byte-range locks on the entire file. This means that **fcntl(2)** and **flock()** locks *do* interact with one another over NFS. It also means that in order to place an exclusive lock, the file must be opened for writing.

Since Linux 2.6.37, the kernel supports a compatibility mode that allows **flock()** locks (and also **fcntl(2)** byte region locks) to be treated as local; see the discussion of the *local_lock* option in **nfs(5)**.

SEE ALSO

flock(1), **close(2)**, **dup(2)**, **execve(2)**, **fcntl(2)**, **fork(2)**, **open(2)**, **lockf(3)**, **lsocks(8)**

Documentation/filesystems/locks.txt in the Linux kernel source tree (*Documentation/locks.txt* in older kernels)

COLOPHON

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