



Rocky Enterprise Linux 9.2 Manual Pages on command 'link.2'

C:\>man link.2

LINK(2) Linux Programmer's Manual LINK(2)

NAME

link, linkat - make a new name for a file

SYNOPSIS

```
#include <unistd.h>
```

```
int link(const char *oldpath, const char *newpath);
```

```
#include <fcntl.h>           /* Definition of AT_* constants */
```

```
#include <unistd.h>
```

```
int linkat(int olddirfd, const char *oldpath,  
          int newdirfd, const char *newpath, int flags);
```

Feature Test Macro Requirements for glibc (see `feature_test_macros(7)`):

linkat():

Since glibc 2.10:

```
  _POSIX_C_SOURCE >= 200809L
```

Before glibc 2.10:

```
  _ATFILE_SOURCE
```

DESCRIPTION

link() creates a new link (also known as a hard link) to an existing file.

If newpath exists, it will not be overwritten.

This new name may be used exactly as the old one for any operation; both names refer

to the same file (and so have the same permissions and ownership) and it is impossible

to tell which name was the "original".

linkat()

The linkat() system call operates in exactly the same way as link(), except for the differences described here.

If the pathname given in oldpath is relative, then it is interpreted relative to the directory referred to by the file descriptor olddirfd (rather than relative to the current working directory of the calling process, as is done by link() for a relative pathname).

If oldpath is relative and olddirfd is the special value AT_FDCWD, then oldpath is interpreted relative to the current working directory of the calling process (like link()).

If oldpath is absolute, then olddirfd is ignored.

The interpretation of newpath is as for oldpath, except that a relative pathname is interpreted relative to the directory referred to by the file descriptor newdirfd.

The following values can be bitwise ORed in flags:

AT_EMPTY_PATH (since Linux 2.6.39)

If oldpath is an empty string, create a link to the file referenced by olddirfd (which may have been obtained using the open(2) O_PATH flag). In this case, olddirfd can refer to any type of file except a directory. This will generally not work if the file has a link count of zero (files created with O_TMPFILE and without O_EXCL are an exception). The caller must have the CAP_DAC_READ_SEARCH capability in order to use this flag. This flag is Linux-specific; define _GNU_SOURCE to obtain its definition.

AT_SYMLINK_FOLLOW (since Linux 2.6.18)

By default, linkat(), does not dereference oldpath if it is a symbolic link (like link()). The flag AT_SYMLINK_FOLLOW can be specified in flags to cause oldpath to be dereferenced if it is a symbolic link. If procfs is mounted, this can be used as an alternative to AT_EMPTY_PATH, like this:

```
linkat(AT_FDCWD, "/proc/self/fd/<fd>", newdirfd,  
      newname, AT_SYMLINK_FOLLOW);
```

Before kernel 2.6.18, the flags argument was unused, and had to be specified as 0.

See openat(2) for an explanation of the need for linkat().

RETURN VALUE

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

ately.

ERRORS

EACCES Write access to the directory containing `newpath` is denied, or `search` permission is denied for one of the directories in the path prefix of `oldpath` or `newpath`. (See also `path_resolution(7)`.)

EDQUOT The user's quota of disk blocks on the filesystem has been exhausted.

EEXIST `newpath` already exists.

EFAULT `oldpath` or `newpath` points outside your accessible address space.

EIO An I/O error occurred.

ELOOP Too many symbolic links were encountered in resolving `oldpath` or `newpath`.

EMLINK The file referred to by `oldpath` already has the maximum number of links to it. For example, on an `ext4(5)` filesystem that does not employ the `dir_in?dex` feature, the limit on the number of hard links to a file is 65,000; on `btrfs(5)`, the limit is 65,535 links.

ENAMETOOLONG

`oldpath` or `newpath` was too long.

ENOENT A directory component in `oldpath` or `newpath` does not exist or is a dangling symbolic link.

ENOMEM Insufficient kernel memory was available.

ENOSPC The device containing the file has no room for the new directory entry.

ENOTDIR

A component used as a directory in `oldpath` or `newpath` is not, in fact, a directory.

EPERM `oldpath` is a directory.

EPERM The filesystem containing `oldpath` and `newpath` does not support the creation of hard links.

EPERM (since Linux 3.6)

The caller does not have permission to create a hard link to this file (see the description of `/proc/sys/fs/protected_hardlinks` in `proc(5)`).

EPERM `oldpath` is marked immutable or append-only. (See `ioctl_iflags(2)`.)

EROFS The file is on a read-only filesystem.

EXDEV `oldpath` and `newpath` are not on the same mounted filesystem. (Linux permits a filesystem to be mounted at multiple points, but `link()` does not work

across different mount points, even if the same filesystem is mounted on both.)

The following additional errors can occur for `linkat()`:

EBADF `olddirfd` or `newdirfd` is not a valid file descriptor.

EINVAL An invalid flag value was specified in flags.

ENOENT `AT_EMPTY_PATH` was specified in flags, but the caller did not have the `CAP_DAC_READ_SEARCH` capability.

ENOENT An attempt was made to link to the `/proc/self/fd/NN` file corresponding to a file descriptor created with

```
open(path, O_TMPFILE | O_EXCL, mode);
```

See `open(2)`.

ENOENT `oldpath` is a relative pathname and `olddirfd` refers to a directory that has been deleted, or `newpath` is a relative pathname and `newdirfd` refers to a directory that has been deleted.

ENOTDIR

`oldpath` is relative and `olddirfd` is a file descriptor referring to a file other than a directory; or similar for `newpath` and `newdirfd`

EPERM `AT_EMPTY_PATH` was specified in flags, `oldpath` is an empty string, and `olddirfd` refers to a directory.

VERSIONS

`linkat()` was added to Linux in kernel 2.6.16; library support was added to glibc in version 2.4.

CONFORMING TO

`link()`: SVr4, 4.3BSD, POSIX.1-2001 (but see NOTES), POSIX.1-2008.

`linkat()`: POSIX.1-2008.

NOTES

Hard links, as created by `link()`, cannot span filesystems. Use `symlink(2)` if this is required.

POSIX.1-2001 says that `link()` should dereference `oldpath` if it is a symbolic link.

However, since kernel 2.0, Linux does not do so: if `oldpath` is a symbolic link, then `newpath` is created as a (hard) link to the same symbolic link file (i.e., `newpath` becomes a symbolic link to the same file that `oldpath` refers to). Some other

implementations behave in the same manner as Linux. POSIX.1-2008 changes the spec?

ification of `link()`, making it implementation-dependent whether or not `oldpath` is dereferenced if it is a symbolic link. For precise control over the treatment of symbolic links when creating a link, use `linkat()`.

Glibc notes

On older kernels where `linkat()` is unavailable, the glibc wrapper function falls back to the use of `link()`, unless the `AT_SYMLINK_FOLLOW` is specified. When `oldpath` and `newpath` are relative pathnames, glibc constructs pathnames based on the symbolic links in `/proc/self/fd` that correspond to the `olddirfd` and `newdirfd` arguments.

BUGS

On NFS filesystems, the return code may be wrong in case the NFS server performs the link creation and dies before it can say so. Use `stat(2)` to find out if the link got created.

SEE ALSO

`ln(1)`, `open(2)`, `rename(2)`, `stat(2)`, `symlink(2)`, `unlink(2)`, `path_resolution(7)`, `symbolic link(7)`

COLOPHON

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