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### ***Rocky Enterprise Linux 9.2 Manual Pages on command 'futimens.3'***

#### ***\$ man futimens.3***

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

#### NAME

utimensat, futimens - change file timestamps with nanosecond precision

#### SYNOPSIS

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

int utimensat(int dirfd, const char *pathname,
              const struct timespec times[2], int flags);

int futimens(int fd, const struct timespec times[2]);
```

Feature Test Macro Requirements for glibc (see feature\_test\_macros(7)):

utimensat():

Since glibc 2.10:

```
_POSIX_C_SOURCE >= 200809L
```

Before glibc 2.10:

```
_ATFILE_SOURCE
```

futimens():

Since glibc 2.10:

```
_POSIX_C_SOURCE >= 200809L
```

Before glibc 2.10:

`_GNU_SOURCE`

## DESCRIPTION

`utimensat()` and `futimens()` update the timestamps of a file with nanosecond precision. This contrasts with the historical `utime(2)` and `utimes(2)`, which permit only second and microsecond precision, respectively, when setting file timestamps.

With `utimensat()` the file is specified via the pathname given in `pathname`. With `futimens()` the file whose timestamps are to be updated is specified via an open file descriptor, `fd`.

For both calls, the new file timestamps are specified in the array `times`: `times[0]` specifies the new "last access time" (`atime`); `times[1]` specifies the new "last modification time" (`mtime`). Each of the elements of `times` specifies a time as the number of seconds and nanoseconds since the Epoch, 1970-01-01 00:00:00 +0000 (UTC). This information is conveyed in a structure of the following form:

```
struct timespec {
    time_t tv_sec;    /* seconds */
    long tv_nsec;    /* nanoseconds */
};
```

Updated file timestamps are set to the greatest value supported by the filesystem that is not greater than the specified time.

If the `tv_nsec` field of one of the `timespec` structures has the special value `UTIME_NOW`, then the corresponding file timestamp is set to the current time. If the `tv_nsec` field of one of the `timespec` structures has the special value `UTIME_OMIT`, then the corresponding file timestamp is left unchanged. In both of these cases, the value of the corresponding `tv_sec` field is ignored.

If `times` is `NULL`, then both timestamps are set to the current time.

## Permissions requirements

To set both file timestamps to the current time (i.e., `times` is `NULL`, or both `tv_nsec` fields specify `UTIME_NOW`), either:

1. the caller must have write access to the file;

2. the caller's effective user ID must match the owner of the file; or
3. the caller must have appropriate privileges.

To make any change other than setting both timestamps to the current time (i.e., times is not NULL, and neither tv\_nsec field is UTIME\_NOW and neither tv\_nsec field is UTIME\_OMIT), either condition 2 or 3 above must apply.

If both tv\_nsec fields are specified as UTIME\_OMIT, then no file ownership or permission checks are performed, and the file timestamps are not modified, but other error conditions may still be detected.

#### utimensat() specifics

If pathname is relative, then by default it is interpreted relative to the directory referred to by the open file descriptor, dirfd (rather than relative to the current working directory of the calling process, as is done by utimes(2) for a relative pathname). See openat(2) for an explanation of why this can be useful.

If pathname is relative and dirfd is the special value AT\_FDCWD, then pathname is interpreted relative to the current working directory of the calling process (like utimes(2)).

If pathname is absolute, then dirfd is ignored.

The flags field is a bit mask that may be 0, or include the following constant, defined in <fcntl.h>:

#### AT\_SYMLINK\_NOFOLLOW

If pathname specifies a symbolic link, then update the timestamps of the link, rather than the file to which it refers.

#### RETURN VALUE

On success, utimensat() and futimens() return 0. On error, -1 is returned and errno is set to indicate the error.

#### ERRORS

EACCES times is NULL, or both tv\_nsec values are UTIME\_NOW, and the effective user ID of the caller does not match the owner of the file, the caller does not have write access to the file, and the caller is not privileged (Linux: does not have either the CAP\_FOWNER or the CAP\_DAC\_OVERRIDE capability).

EBADF (futimens()) fd is not a valid file descriptor.

EBADF (utimensat()) pathname is a relative pathname, but dirfd is nei?

ther AT\_FDCWD nor a valid file descriptor.

EFAULT times pointed to an invalid address; or, dirfd was AT\_FDCWD, and

pathname is NULL or an invalid address.

EINVAL Invalid value in flags.

EINVAL Invalid value in one of the tv\_nsec fields (value outside range

0 to 999,999,999, and not UTIME\_NOW or UTIME\_OMIT); or an in?

valid value in one of the tv\_sec fields.

EINVAL pathname is NULL, dirfd is not AT\_FDCWD, and flags contains

AT\_SYMLINK\_NOFOLLOW.

ELOOP (utimensat()) Too many symbolic links were encountered in re?

solving pathname.

ENAMETOOLONG

(utimensat()) pathname is too long.

ENOENT (utimensat()) A component of pathname does not refer to an ex?

isting directory or file, or pathname is an empty string.

ENOTDIR

(utimensat()) pathname is a relative pathname, but dirfd is nei?

ther AT\_FDCWD nor a file descriptor referring to a directory;

or, one of the prefix components of pathname is not a directory.

EPERM The caller attempted to change one or both timestamps to a value

other than the current time, or to change one of the timestamps

to the current time while leaving the other timestamp unchanged,

(i.e., times is not NULL, neither tv\_nsec field is UTIME\_NOW,

and neither tv\_nsec field is UTIME\_OMIT) and either:

\* the caller's effective user ID does not match the owner of

file, and the caller is not privileged (Linux: does not have

the CAP\_FOWNER capability); or,

\* the file is marked append-only or immutable (see chattr(1)).

EROFS The file is on a read-only filesystem.

ESRCH (utimensat()) Search permission is denied for one of the prefix

components of pathname.

## VERSIONS

utimensat() was added to Linux in kernel 2.6.22; glibc support was added with version 2.6.

Support for futimens() first appeared in glibc 2.6.

## ATTRIBUTES

For an explanation of the terms used in this section, see attributes(7).

??

?Interface ? Attribute ? Value ?

??

?utimensat(), futimens() ? Thread safety ? MT-Safe ?

??

## CONFORMING TO

utimensat() and futimens() are specified in POSIX.1-2008.

## NOTES

utimensat() obsoletes futimesat(2).

On Linux, timestamps cannot be changed for a file marked immutable, and the only change permitted for files marked append-only is to set the timestamps to the current time. (This is consistent with the historical behavior of utime(2) and utimes(2) on Linux.)

If both tv\_nsec fields are specified as UTIME\_OMIT, then the Linux implementation of utimensat() succeeds even if the file referred to by dirfd and pathname does not exist.

### C library/kernel ABI differences

On Linux, futimens() is a library function implemented on top of the utimensat() system call. To support this, the Linux utimensat() system call implements a nonstandard feature: if pathname is NULL, then the call modifies the timestamps of the file referred to by the file descriptor dirfd (which may refer to any type of file). Using this feature, the call futimens(fd, times) is implemented as:

```
utimensat(fd, NULL, times, 0);
```

Note, however, that the glibc wrapper for utimensat() disallows passing NULL as the value for pathname: the wrapper function returns the error

EINVAL in this case.

## BUGS

Several bugs afflict `utimensat()` and `futimens()` on kernels before 2.6.26. These bugs are either nonconformances with the POSIX.1 draft specification or inconsistencies with historical Linux behavior.

- \* POSIX.1 specifies that if one of the `tv_nsec` fields has the value `UTIME_NOW` or `UTIME_OMIT`, then the value of the corresponding `tv_sec` field should be ignored. Instead, the value of the `tv_sec` field is required to be 0 (or the error `EINVAL` results).
- \* Various bugs mean that for the purposes of permission checking, the case where both `tv_nsec` fields are set to `UTIME_NOW` isn't always treated the same as specifying times as `NULL`, and the case where one `tv_nsec` value is `UTIME_NOW` and the other is `UTIME_OMIT` isn't treated the same as specifying times as a pointer to an array of structures containing arbitrary time values. As a result, in some cases: a) file timestamps can be updated by a process that shouldn't have permission to perform updates; b) file timestamps can't be updated by a process that should have permission to perform updates; and c) the wrong `errno` value is returned in case of an error.
- \* POSIX.1 says that a process that has write access to the file can make a call with times as `NULL`, or with times pointing to an array of structures in which both `tv_nsec` fields are `UTIME_NOW`, in order to update both timestamps to the current time. However, `futimens()` instead checks whether the access mode of the file descriptor allows writing.

## SEE ALSO

`chattr(1)`, `touch(1)`, `futimesat(2)`, `openat(2)`, `stat(2)`, `utimes(2)`, `futimes(3)`, `inode(7)`, `path_resolution(7)`, `symlink(7)`

## COLOPHON

This page is part of release 5.10 of the Linux man-pages project. A description of the project, information about reporting bugs, and the latest version of this page, can be found at <https://www.kernel.org/doc/man-pages/>.

