



Linux Ubuntu 26.04 Manual Pages on command 'pthread_mutexattr_setrobust.3'

\$ man pthread_mutexattr_setrobust.3

pthread_mutexattr_setrobust(3) Library Functions Manual pthread_mutexattr_setrobust(3)

NAME

pthread_mutexattr_getrobust, pthread_mutexattr_setrobust - get and set the robustness attribute of a mutex attributes object

LIBRARY

POSIX threads library (libpthread, -lpthread)

SYNOPSIS

```
#include <pthread.h>

int pthread_mutexattr_getrobust(const pthread_mutexattr_t *attr,
                               int *robustness);

int pthread_mutexattr_setrobust(pthread_mutexattr_t *attr,
                               int robustness);
```

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

```
pthread_mutexattr_getrobust(), pthread_mutexattr_setrobust():
    _POSIX_C_SOURCE >= 200809L
```

DESCRIPTION

The pthread_mutexattr_getrobust() function places the value of the robustness attribute of the mutex attributes object referred to by attr in *robustness. The pthread_mutexattr_setrobust() function sets the value of the robustness attribute of the mutex attributes object referred to by attr to the value specified in *robustness.

The robustness attribute specifies the behavior of the mutex when the owning thread dies without unlocking the mutex. The following values are valid for robustness:

PTHREAD_MUTEX_STALLED

This is the default value for a mutex attributes object. If a mutex is initialized with the `PTHREAD_MUTEX_STALLED` attribute and its owner dies without unlocking it, the mutex remains locked afterwards and any future attempts to call `pthread_mutex_lock(3)` on the mutex will block indefinitely.

PTHREAD_MUTEX_ROBUST

If a mutex is initialized with the `PTHREAD_MUTEX_ROBUST` attribute and its owner dies without unlocking it, any future attempts to call `pthread_mutex_lock(3)` on this mutex will succeed and return `EOWNERDEAD` to indicate that the original owner no longer exists and the mutex is in an inconsistent state. Usually after `EOWNERDEAD` is returned, the next owner should call `pthread_mutex_consistent(3)` on the acquired mutex to make it consistent again before using it any further.

If the next owner unlocks the mutex using `pthread_mutex_unlock(3)` before making it consistent, the mutex will be permanently unusable and any subsequent attempts to lock it using `pthread_mutex_lock(3)` will fail with the error `ENOTRECOVERABLE`. The only permitted operation on such a mutex is `pthread_mutex_destroy(3)`.

If the next owner terminates before calling `pthread_mutex_consistent(3)`, further `pthread_mutex_lock(3)` operations on this mutex will still return `EOWNERDEAD`.

Note that the `attr` argument of `pthread_mutexattr_getrobust()` and `pthread_mutexattr_setrobust()` should refer to a mutex attributes object that was initialized by `pthread_mutexattr_init(3)`, otherwise the behavior is undefined.

RETURN VALUE

On success, these functions return 0. On error, they return a positive error number.

In the glibc implementation, `pthread_mutexattr_getrobust()` always return zero.

ERRORS

EINVAL A value other than `PTHREAD_MUTEX_STALLED` or `PTHREAD_MUTEX_ROBUST` was passed to `pthread_mutexattr_setrobust()`.

VERSIONS

In the Linux implementation, when using process-shared robust mutexes, a waiting thread also receives the `EOWNERDEAD` notification if the owner of a robust mutex performs an `execve(2)` without first unlocking the mutex. POSIX.1 does not specify this detail, but the same behavior also occurs in at least some other implementations.

STANDARDS

POSIX.1-2008.

HISTORY

glibc 2.12. POSIX.1-2008.

Before the addition of `pthread_mutexattr_getrobust()` and `pthread_mutexattr_setrobust()` to POSIX, glibc defined the following equivalent nonstandard functions if `_GNU_SOURCE` was defined:

[[deprecated]]

```
int pthread_mutexattr_getrobust_np(const pthread_mutexattr_t *attr,
                                   int *robustness);
```

[[deprecated]]

```
int pthread_mutexattr_setrobust_np(const pthread_mutexattr_t *attr,
                                   int robustness);
```

Correspondingly, the constants `PTHREAD_MUTEX_STALLED_NP` and `PTHREAD_MUTEX_ROBUST_NP` were also defined.

These GNU-specific APIs, which first appeared in glibc 2.4, are nowadays obsolete and should not be used in new programs; since glibc 2.34 these APIs are marked as deprecated.

EXAMPLES

The program below demonstrates the use of the robustness attribute of a mutex attributes object. In this program, a thread holding the mutex dies prematurely without unlocking the mutex. The main thread subsequently acquires the mutex successfully and gets the error `EOWNERDEAD`, after which it makes the mutex consistent.

The following shell session shows what we see when running this program:

```
$ ./a.out;
[original owner] Setting lock...
[original owner] Locked. Now exiting without unlocking.
[main] Attempting to lock the robust mutex.
[main] pthread_mutex_lock() returned EOWNERDEAD
[main] Now make the mutex consistent
[main] Mutex is now consistent; unlocking
```

Program source

```
#include <err.h>
#include <errno.h>
#include <pthread.h>
#include <stdio.h>
```

```

#include <stdlib.h>

#include <unistd.h>

static pthread_mutex_t mtx;

static void *
original_owner_thread(void *ptr)
{
    printf("[original owner] Setting lock...\n");
    pthread_mutex_lock(&mtx);
    printf("[original owner] Locked. Now exiting without unlocking.\n");
    pthread_exit(NULL);
}

int
main(void)
{
    pthread_t thr;
    pthread_mutexattr_t attr;
    int s;

    pthread_mutexattr_init(&attr);
    pthread_mutexattr_setrobust(&attr, PTHREAD_MUTEX_ROBUST);
    pthread_mutex_init(&mtx, &attr);
    pthread_create(&thr, NULL, original_owner_thread, NULL);
    sleep(2);
    /* "original_owner_thread" should have exited by now. */
    printf("[main] Attempting to lock the robust mutex.\n");
    s = pthread_mutex_lock(&mtx);
    if (s == EOWNERDEAD) {
        printf("[main] pthread_mutex_lock() returned EOWNERDEAD\n");
        printf("[main] Now make the mutex consistent\n");
        s = pthread_mutex_consistent(&mtx);
        if (s != 0)
            errc(EXIT_FAILURE, s, "pthread_mutex_consistent");
        printf("[main] Mutex is now consistent; unlocking\n");
        s = pthread_mutex_unlock(&mtx);
    }
}

```

```
    if (s != 0)
        errc(EXIT_FAILURE, s, "pthread_mutex_unlock");
    exit(EXIT_SUCCESS);
} else if (s == 0) {
    printf("[main] pthread_mutex_lock() unexpectedly succeeded\n");
    exit(EXIT_FAILURE);
} else {
    printf("[main] pthread_mutex_lock() unexpectedly failed\n");
    errc(EXIT_FAILURE, s, "pthread_mutex_lock");
}
}
```

SEE ALSO

[get_robust_list\(2\)](#), [set_robust_list\(2\)](#), [pthread_mutex_consistent\(3\)](#), [pthread_mutex_init\(3\)](#),
[pthread_mutex_lock\(3\)](#), [pthreads\(7\)](#)

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