

# Threading and synchronization utilities

libuv provides cross-platform implementations for multiple threading and synchronization primitives. The API largely follows the pthreads API.

## Data types

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 14)**

Unknown directive type "c.type".

```
.. c:type:: uv_thread_t

Thread data type.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 18)**

Unknown directive type "c.type".

```
.. c:type:: void (*uv_thread_cb)(void* arg)

Callback that is invoked to initialize thread execution. `arg` is the same
value that was passed to :c:func:`uv_thread_create`.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 23)**

Unknown directive type "c.type".

```
.. c:type:: uv_key_t

Thread-local key data type.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 27)**

Unknown directive type "c.type".

```
.. c:type:: uv_once_t

Once-only initializer data type.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 31)**

Unknown directive type "c.type".

```
.. c:type:: uv_mutex_t

Mutex data type.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 35)**

Unknown directive type "c.type".

```
.. c:type:: uv_rwlock_t

Read-write lock data type.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 39)**

Unknown directive type "c.type".

```
.. c:type:: uv_sem_t

Semaphore data type.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 43)**

Unknown directive type "c.type".

```
.. c:type:: uv_cond_t

Condition data type.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 47)**

Unknown directive type "c:type".

```
.. c:type:: uv_barrier_t

Barrier data type.
```

## API

### Threads

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 58)**

Unknown directive type "c:type".

```
.. c:type:: uv_thread_options_t

Options for spawning a new thread (passed to :c:func:`uv_thread_create_ex`).

::

typedef struct uv_thread_options_s {
    enum {
        UV_THREAD_NO_FLAGS = 0x00,
        UV_THREAD_HAS_STACK_SIZE = 0x01
    } flags;
    size_t stack_size;
} uv_thread_options_t;

More fields may be added to this struct at any time, so its exact
layout and size should not be relied upon.

.. versionadded:: 1.26.0
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 77)**

Unknown directive type "c:function".

```
.. c:function:: int uv_thread_create(uv_thread_t* tid, uv_thread_cb entry, void* arg)

.. versionchanged:: 1.4.1 returns a UV_E* error code on failure
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 81)**

Unknown directive type "c:function".

```
.. c:function:: int uv_thread_create_ex(uv_thread_t* tid, const uv_thread_options_t* params, uv_thread_cb entry, void* arg)

Like :c:func:`uv_thread_create`, but additionally specifies options for creating a new thread.

If `UV_THREAD_HAS_STACK_SIZE` is set, `stack_size` specifies a stack size for the new thread.
`0` indicates that the default value should be used, i.e. behaves as if the flag was not set.
Other values will be rounded up to the nearest page boundary.

.. versionadded:: 1.26.0
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 91)**

Unknown directive type "c:function".

```
.. c:function:: uv_thread_t uv_thread_self(void)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 92)**

Unknown directive type "c:function".

```
.. c:function:: int uv_thread_join(uv_thread_t *tid)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 93)**

Unknown directive type "c:function".

```
.. c:function:: int uv_thread_equal(const uv_thread_t* t1, const uv_thread_t* t2)
```

### Thread-local storage

## Note

The total thread-local storage size may be limited. That is, it may not be possible to create many TLS keys.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 102)**

Unknown directive type "c:function".

```
.. c:function:: int uv_key_create(uv_key_t* key)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 103)**

Unknown directive type "c:function".

```
.. c:function:: void uv_key_delete(uv_key_t* key)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 104)**

Unknown directive type "c:function".

```
.. c:function:: void* uv_key_get(uv_key_t* key)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 105)**

Unknown directive type "c:function".

```
.. c:function:: void uv_key_set(uv_key_t* key, void* value)
```

## Once-only initialization

Runs a function once and only once. Concurrent calls to `:cfunc:uv_once`` with the same guard will block all callers except one (it's unspecified which one). The guard should be initialized statically with the `UV_ONCE_INIT` macro.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 110); [backlink](#)**

Unknown interpreted text role "c:func".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 114)**

Unknown directive type "c:function".

```
.. c:function:: void uv_once(uv_once_t* guard, void (*callback)(void))
```

## Mutex locks

Functions return 0 on success or an error code  $< 0$  (unless the return type is void, of course).

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 122)**

Unknown directive type "c:function".

```
.. c:function:: int uv_mutex_init(uv_mutex_t* handle)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 123)**

Unknown directive type "c:function".

```
.. c:function:: int uv_mutex_init_recursive(uv_mutex_t* handle)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 124)**

Unknown directive type "c:function".

```
.. c:function:: void uv_mutex_destroy(uv_mutex_t* handle)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 125)**

Unknown directive type "c:function".

```
.. c:function:: void uv_mutex_lock(uv_mutex_t* handle)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\node-master) (deps) (uv) (docs) (src) threading.rst, line 126)**

Unknown directive type "c:function".

```
.. c:function:: int uv_mutex_trylock(uv_mutex_t* handle)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\node-master) (deps) (uv) (docs) (src) threading.rst, line 127)**

Unknown directive type "c:function".

```
.. c:function:: void uv_mutex_unlock(uv_mutex_t* handle)
```

## Read-write locks

Functions return 0 on success or an error code < 0 (unless the return type is void, of course).

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\node-master) (deps) (uv) (docs) (src) threading.rst, line 135)**

Unknown directive type "c:function".

```
.. c:function:: int uv_rwlock_init(uv_rwlock_t* rwlock)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\node-master) (deps) (uv) (docs) (src) threading.rst, line 136)**

Unknown directive type "c:function".

```
.. c:function:: void uv_rwlock_destroy(uv_rwlock_t* rwlock)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\node-master) (deps) (uv) (docs) (src) threading.rst, line 137)**

Unknown directive type "c:function".

```
.. c:function:: void uv_rwlock_rdlock(uv_rwlock_t* rwlock)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\node-master) (deps) (uv) (docs) (src) threading.rst, line 138)**

Unknown directive type "c:function".

```
.. c:function:: int uv_rwlock_tryrdlock(uv_rwlock_t* rwlock)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\node-master) (deps) (uv) (docs) (src) threading.rst, line 139)**

Unknown directive type "c:function".

```
.. c:function:: void uv_rwlock_rdlunlock(uv_rwlock_t* rwlock)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\node-master) (deps) (uv) (docs) (src) threading.rst, line 140)**

Unknown directive type "c:function".

```
.. c:function:: void uv_rwlock_wrlock(uv_rwlock_t* rwlock)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\node-master) (deps) (uv) (docs) (src) threading.rst, line 141)**

Unknown directive type "c:function".

```
.. c:function:: int uv_rwlock_trywrlock(uv_rwlock_t* rwlock)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\node-master) (deps) (uv) (docs) (src) threading.rst, line 142)**

Unknown directive type "c:function".

```
.. c:function:: void uv_rwlock_wrunlock(uv_rwlock_t* rwlock)
```

## Semaphores

Functions return 0 on success or an error code < 0 (unless the return type is void, of course).

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 150)**

Unknown directive type "c:function".

```
.. c:function:: int uv_sem_init(uv_sem_t* sem, unsigned int value)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 151)**

Unknown directive type "c:function".

```
.. c:function:: void uv_sem_destroy(uv_sem_t* sem)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 152)**

Unknown directive type "c:function".

```
.. c:function:: void uv_sem_post(uv_sem_t* sem)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 153)**

Unknown directive type "c:function".

```
.. c:function:: void uv_sem_wait(uv_sem_t* sem)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 154)**

Unknown directive type "c:function".

```
.. c:function:: int uv_sem_trywait(uv_sem_t* sem)
```

## Conditions

Functions return 0 on success or an error code < 0 (unless the return type is void, of course).

### Note

1. Callers should be prepared to deal with spurious wakeups on `:c:func:`uv_cond_wait`` and `:c:func:`uv_cond_timedwait``.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 163); [backlink](#)**

Unknown interpreted text role "c:func".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 163); [backlink](#)**

Unknown interpreted text role "c:func".

2. The timeout parameter for `:c:func:`uv_cond_timedwait`` is relative to the time at which function is called.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 165); [backlink](#)**

Unknown interpreted text role "c:func".

3. On z/OS, the timeout parameter for `:c:func:`uv_cond_timedwait`` is converted to an absolute system time at which the wait expires. If the current system clock time passes the absolute time calculated before the condition is signaled, an ETIMEDOUT error results. After the wait begins, the wait time is not affected by changes to the system clock.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 167); [backlink](#)**

Unknown interpreted text role "c:func".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 173)**

Unknown directive type "c:function".

```
.. c:function:: int uv_cond_init(uv_cond_t* cond)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 174)**

Unknown directive type "c:function".

```
.. c:function:: void uv_cond_destroy(uv_cond_t* cond)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 175)**

Unknown directive type "c:function".

```
.. c:function:: void uv_cond_signal(uv_cond_t* cond)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 176)**

Unknown directive type "c:function".

```
.. c:function:: void uv_cond_broadcast(uv_cond_t* cond)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 177)**

Unknown directive type "c:function".

```
.. c:function:: void uv_cond_wait(uv_cond_t* cond, uv_mutex_t* mutex)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 178)**

Unknown directive type "c:function".

```
.. c:function:: int uv_cond_timedwait(uv_cond_t* cond, uv_mutex_t* mutex, uint64_t timeout)
```

## Barriers

Functions return 0 on success or an error code < 0 (unless the return type is void, of course).

### Note

`uv_barrier_wait` returns a value > 0 to an arbitrarily chosen "serializer" thread to facilitate cleanup, i.e.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 187); [backlink](#)**

Unknown interpreted text role "c:func".

```
if (uv_barrier_wait(&barrier) > 0)
    uv_barrier_destroy(&barrier);
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 195)**

Unknown directive type "c:function".

```
.. c:function:: int uv_barrier_init(uv_barrier_t* barrier, unsigned int count)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 196)**

Unknown directive type "c:function".

```
.. c:function:: void uv_barrier_destroy(uv_barrier_t* barrier)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\node-master\deps\uv\docs\src\ (node-master) (deps) (uv) (docs) (src) threading.rst, line 197)**

Unknown directive type "c:function".

```
.. c:function:: int uv_barrier_wait(uv_barrier_t* barrier)
```