

Do you need clean up one-shot timers?

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The `CreateTimerQueueTimer` function allows you to create one-shot timers by passing the `WT_EXECUTEONCE` flag. The documentation says that you need to call the `DeleteTimerQueueTimer` function when you no longer need the timer.

Why do you need to clean up one-shot timers?

To answer this, I would like to introduce you to one of my favorite rhetorical questions when trying to puzzle out API design: “What would the world be like if this were true?”

Imagine what the world would be like if you didn’t need to clean up one-shot timers.

Well, for one thing, it means that the behavior of the function would be confusing. The caller of the the `CreateTimerQueueTimer` function would have to keep track of whether the timer was one-shot or not, to know whether or not the handle needed to be deleted.

But far, far worse is that if one-shot timers were self-deleting, it would be impossible to use them correctly.

Suppose you have an object that creates a one-shot timer, and you want to clean it up in your destructor if it hasn’t fired yet. If one-shot timers were self-deleting, then it would be impossible to write this object.

```
class Sample {
    HANDLE m_hTimer;
    Sample() : m_hTimer(NULL) { CreateTimerQueueTimer(&m_hTimer, ...); }
    ~Sample() { ... what to write here? ... }
};
```

You might say, “Well, I’ll have my callback null out the `m_hTimer` variable. That way, the destructor will know that the timer has fired.”

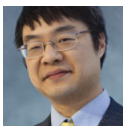
Except that’s a race condition.

```
Sample::Callback(void *context)
{
    /// RACE WINDOW HERE
    ((Sample*)context)->m_hTimer = NULL;
    ...
}
```

If the callback is pre-empted during the race window and the object is destructed, and one-shot timers were self-deleting, then the object would attempt to use an invalid handle.

This race window is unclosable since the race happens even before you get a chance to execute a single line of code.

So be glad that you have to delete handles to one-shot timers.



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