

*****Draft*****

Part 5 pico
freeRTOS
Semaphore
03/10/22

*****Draft*****

<https://learnembeddedsystems.co.uk/freertos-on-the-rp2040-part-5-semaphores>

<https://www.youtube.com/watch?v=0mqlPds5rkU>

Intro

What are we going to cover?

- What a semaphore is
- Why should you use a semaphore?
- Differences between binary and counting semaphores
- How to implement a semaphore

What is a Binary Semaphore?

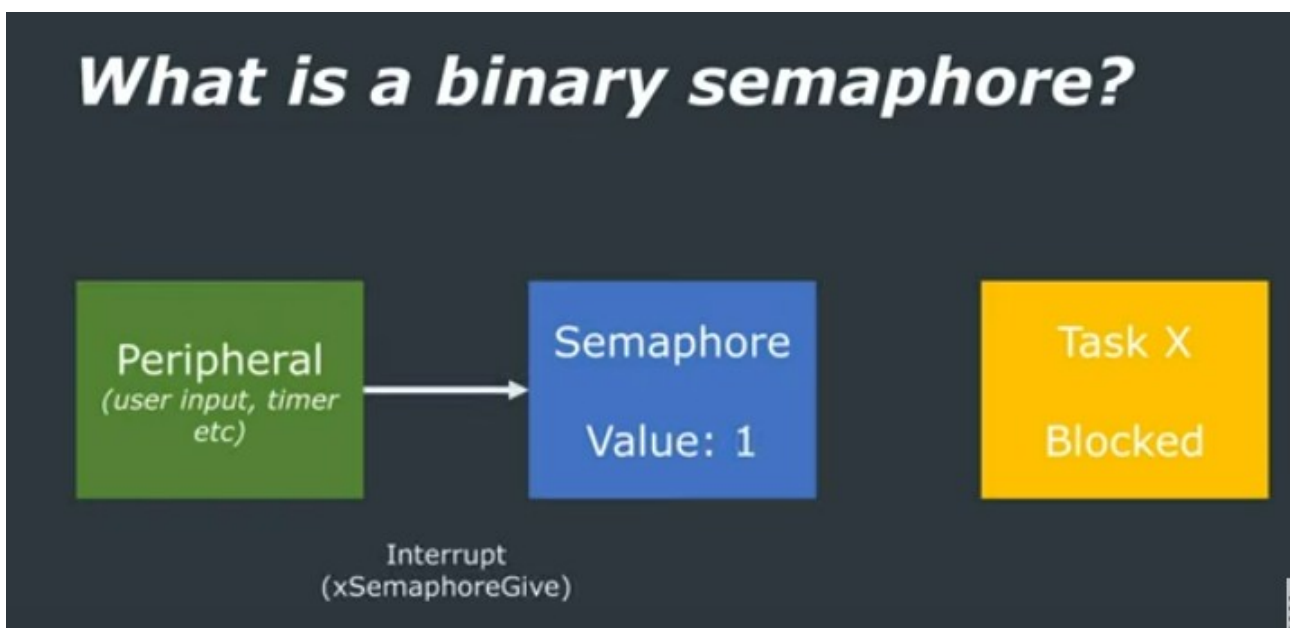
What is a binary semaphore?

- Very similar to a mutex but without the priority inheritance.
- 'Queue' that can only hold one item which has a value of 0 or 1.
- Binary semaphores are the better choice for implementing task synchronisation.
- Mutexes the better choice for implementing mutual exclusion or resource protection.

What is a Binary Semaphore?



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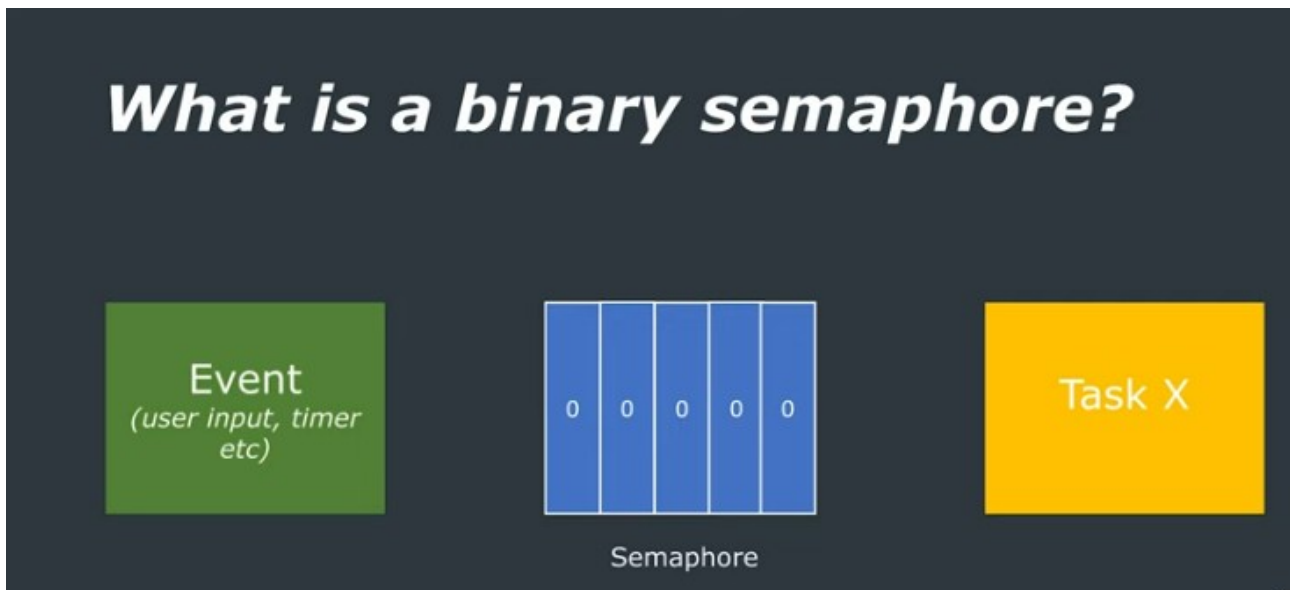


What is a Counting Semaphore?

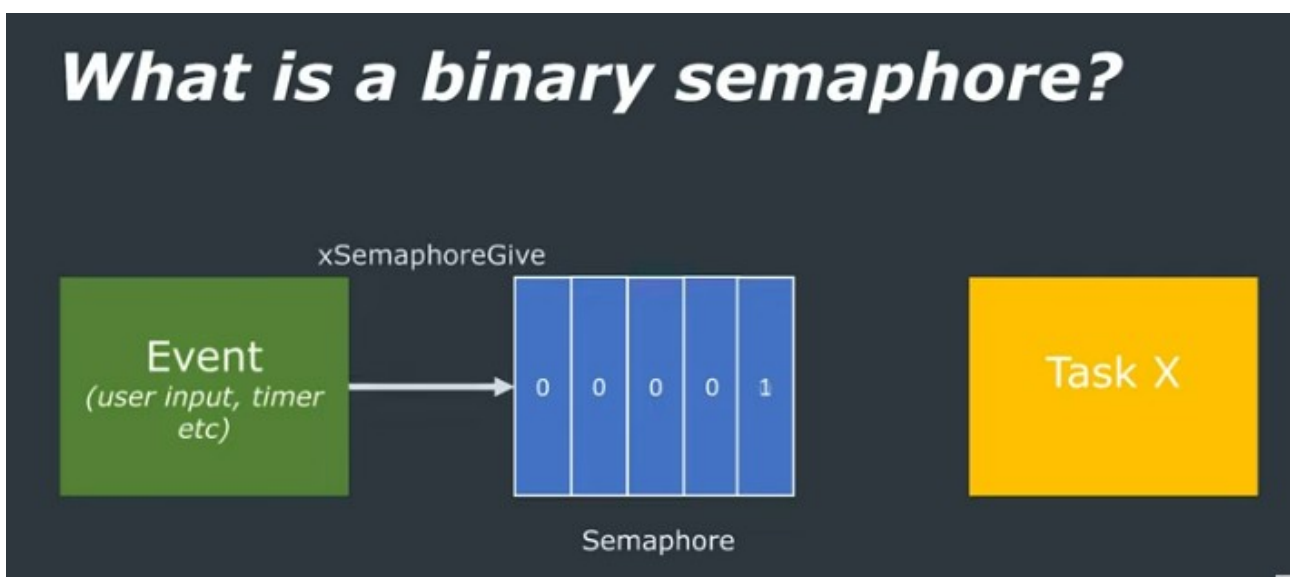
What is a counting semaphore?

- 'Queue' that can multiple items.
- The data in the queue is not important, only whether the queue is full or empty.
- Counting semaphores are used for:
 - counting events
 - resource management

What is a Counting Semaphore?



What is a Counting Semaphore?



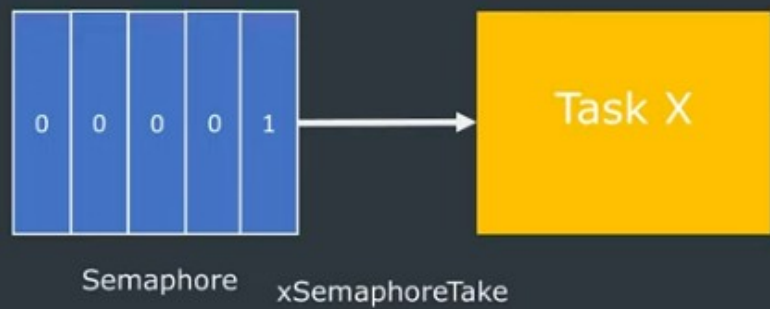
What is a Counting Semaphore?

What is a binary semaphore?



What is a Counting Semaphore?

What is a binary semaphore?



What is a Counting Semaphore?

Semaphore Functions

- xSemaphoreCreateBinary()
- xSemaphoreCreateCounting(max counter, initial value)
- xSemaphoreGive(semaphore)
- xSemaphoreTake(semaphore, blocking time in ticks)

FreeRTOS API Calls

Example

Conclusion