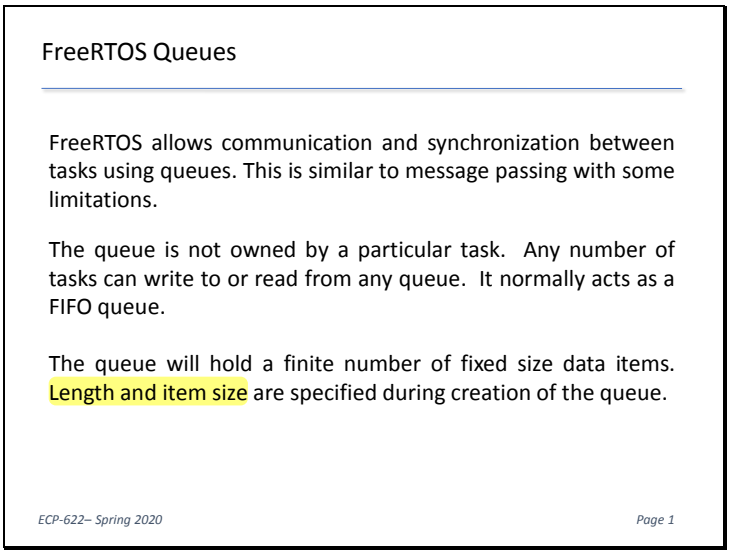
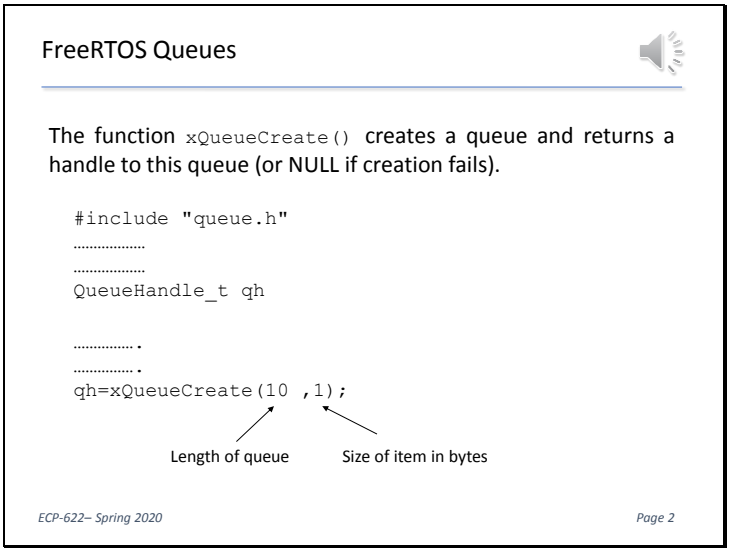


Slide 1

FreeRTOS allows information exchange and synchronization among tasks using queues. These are similar to mailboxes, but with limited options as a result of small system size.

Slide 2

Once queue is created, any task can send data to, or receive data from this queue. With few exceptions, queue operates in first-in first-out mode without message priorities.



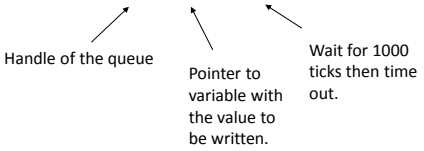
Slide 4

We need to include queue.h to use the following functions. A handle to a queue is a word used to refer to the queue later. The function xQueueCreate( ) takes two arguments: first is the number of items the queue can hold, and the second is the size of each item. The type QueueHandle_t is actually a word, but given a specific name to improve program readability.

FreeRTOS Queues

The function `xQueueSend()` is used to write an item at the back of the queue. If queue is full, the calling task will be blocked until a place in queue is empty. Calling task may time out and stop waiting for an empty place.

```
xQueueSend (qh1,&x ,1000);
```

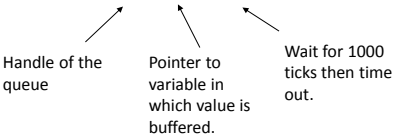


Function returns either `pdPASS` (=1) or `errQUEUE_FULL` (=0).

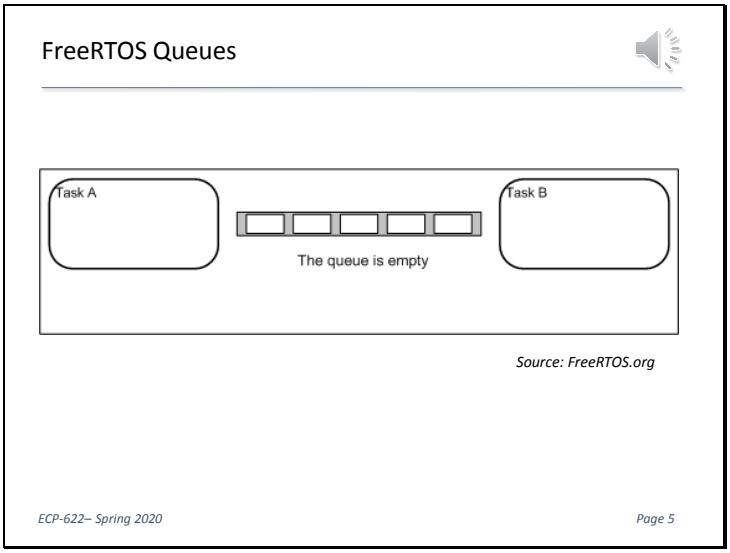
FreeRTOS Queues

The function `xQueueReceive()` is used to read an item from the front of the queue (and remove it from queue). If queue is empty, the calling task will be blocked until an item is sent to queue. Timing out is also possible.

```
xQueueReceieve (qh1,&x ,1000);
```

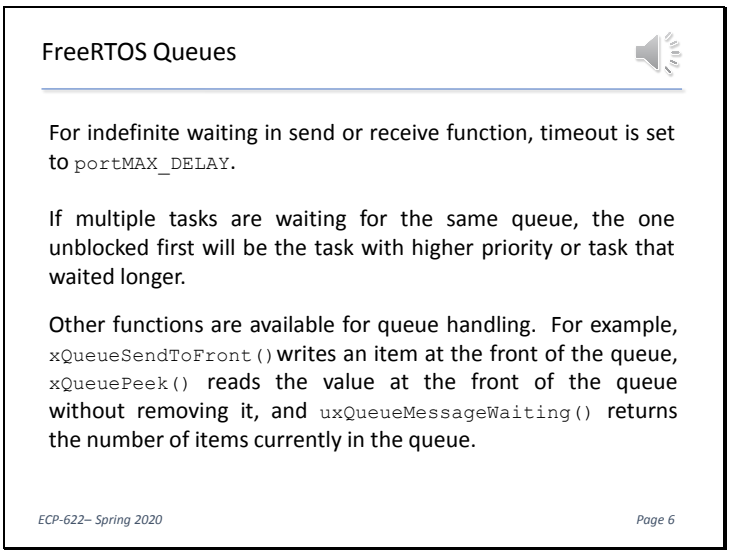


Function returns either `pdPASS` (=1) or `errQUEUE_EMPTY` (=0).



Slide 7

This animation shows Task A sending three items to the FIFO queue using xQueueSendToBack. xQueueSendToBack acts exactly as xQueueSend. Then, Task B receives the three items by executing xQueueReceive three times.



Slide 8

This option allows waiting with no timing-out, but this should be avoided in real-time tasks.

Slide 10

xQueueSendToFront is the only way to give priority to a particular message. xQueueReceive removes item from queue after reading but xQueuePeek leave it there. Number of items currently in queue can be checked at any time by the indicated function.