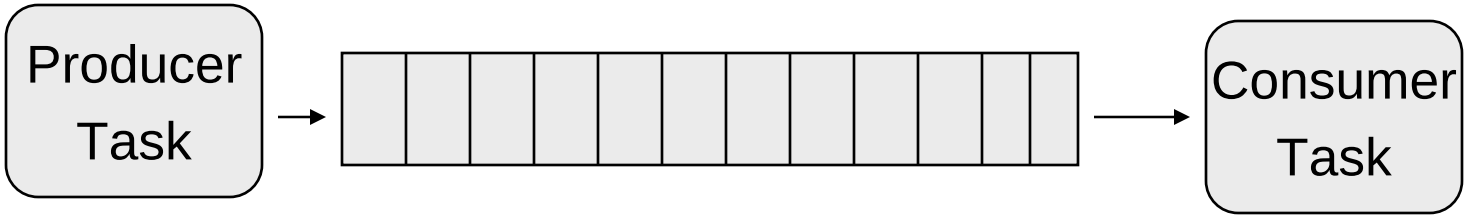
Task communication

- Tasks need to communicate:



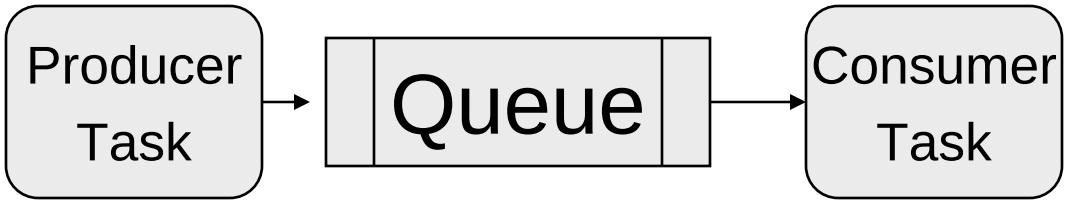
- Shared data structure: Queue
- Operations: (RTOS services)
  - » Queue Initialize(int size): create and set up for size
  - » Void Enqueue(Queue q,void* item): block if full, else put
  - » Void* Dequeue(Queue q): block if empty, else get
- Multiple tasks use it: *mutual exclusion* is enforced

Task communication

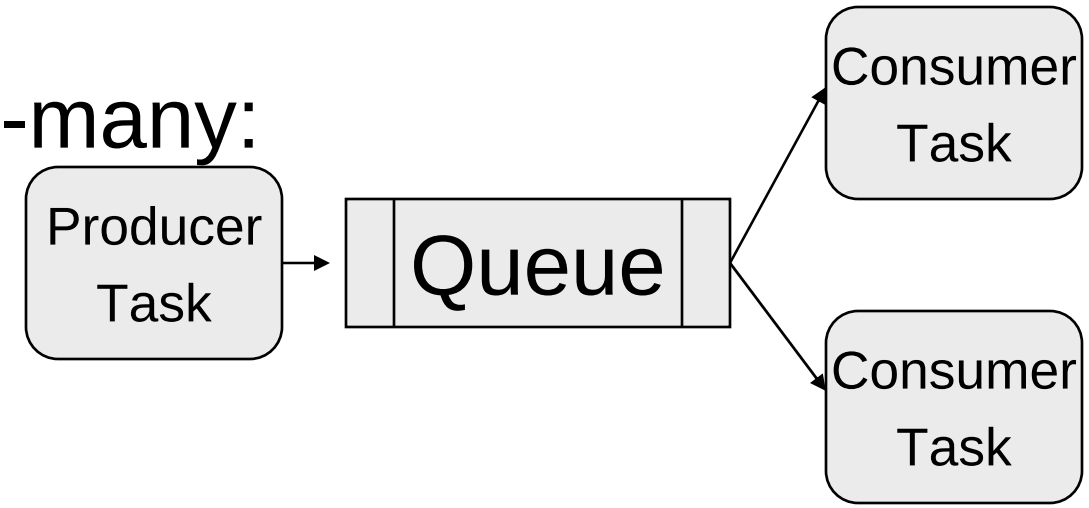
- Mailboxes:
  - » Similar to queues, (usually) has a single element and two states: empty/full
  - » If multiple tasks are waiting for a mailbox, the highest priority one gets the message
- Pipes:
  - » Streams of data
  - » Typically use fwrite()/fread() operations
  - » Arbitrary length and data format

Using queues

1-to-1:



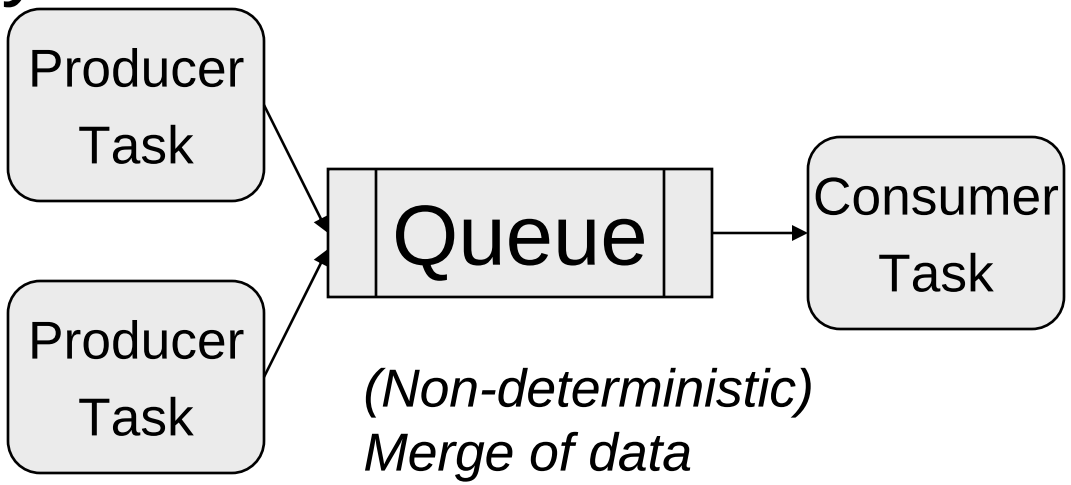
1-to-many:



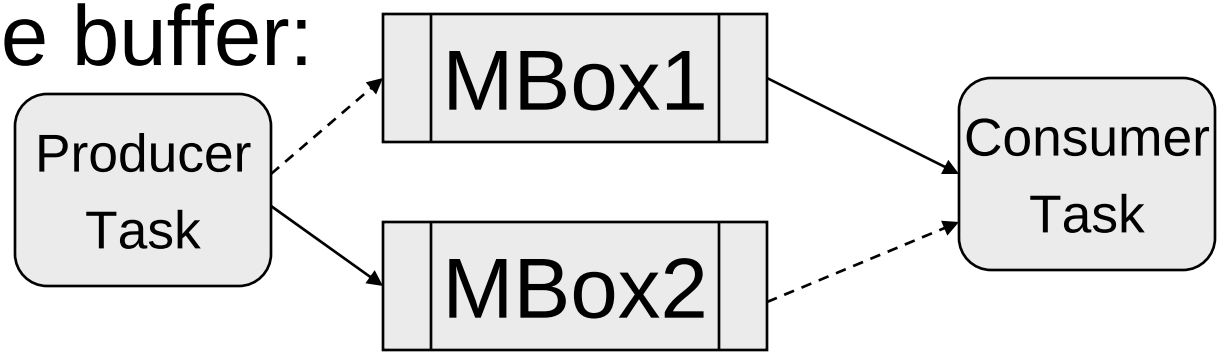
Highest priority task gets the data

Using queues, mailboxes

Many-to-1:



Double buffer:



Problems with queues, etc.

- If of finite size, task may block/receive error if full/empty
- Passing pointers as queue elements: data becomes shared (“ownership” changes)
- The sender and the receive must agree on the format/meaning of the data passed
  - » void* is not a very good idea
- Memory management: running out of memory space leads to disasters (or reboots)