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Circular Queue

Design of Circular Queue Class

We introduce a new approach of building circular queues that are lock-free, and support multiple producers and consumers using indirection and two queues. The design is ABA safe and live-lock free because we compare cycles and update indices accordingly.

Queue Data Structure :

Indirection :

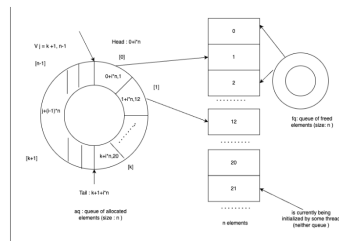
The queue doesn't store the data entries directly; instead, a queue entry records an index within the array of data. To simplify, we assume the data consists of integers.

Unallocated Entries Queue (fq) :

This queue is denoted by fq it keeps the indices to unallocated entries of the data array.

Allocated Entries Queue (aq) :

This queue keeps allocated indices which are to be consumed.



The entire data structure has the following properties :

- Both the queues have Head and Tail pointers and tail is incremented when new entries are enqueued, Head is incremented when new entry is dequeued.
- An entries array which will store the index and cycle of each entry in the queue.