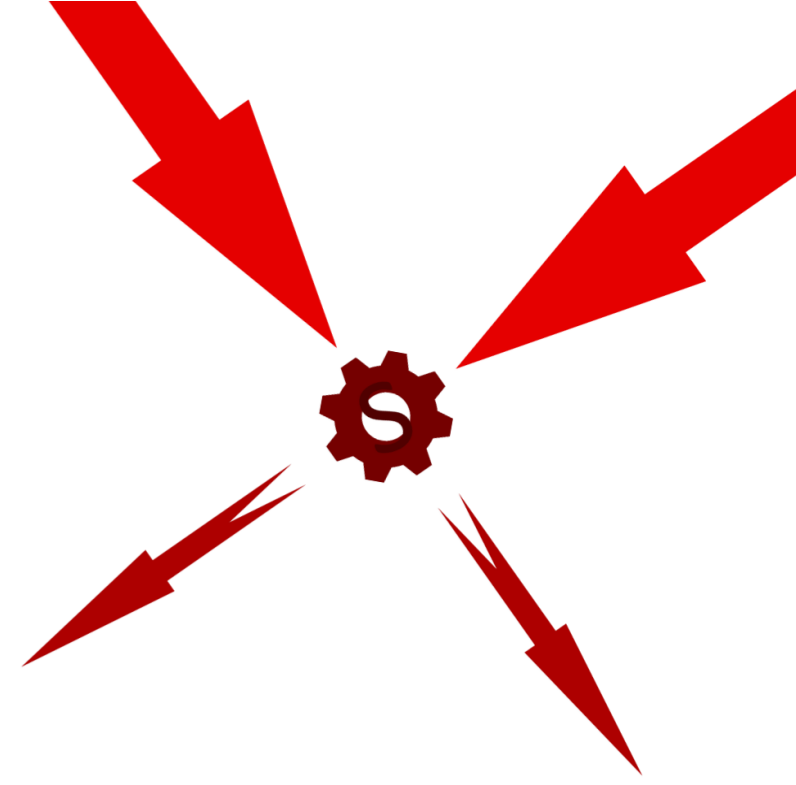


Combining-Based Concurrent Double-Ended Queues



Fatourou Panagiota, Papadogiannakis Petros, Nikolaos Arvanitakis, Nikolaos Giachoudis

Motivation

- Stacks and queues are widely used in many settings: OS kernels, memory management, synchronization, scheduling, load balancing, resource sharing.
- Dequeues have enhanced functionality. They can be used as stacks or queues, or as a combination of both.
- Additional applications. They are used when implementing a web browser's history, application's list of undo operations, in graph traversal algorithms, task management, queuing and caching systems.

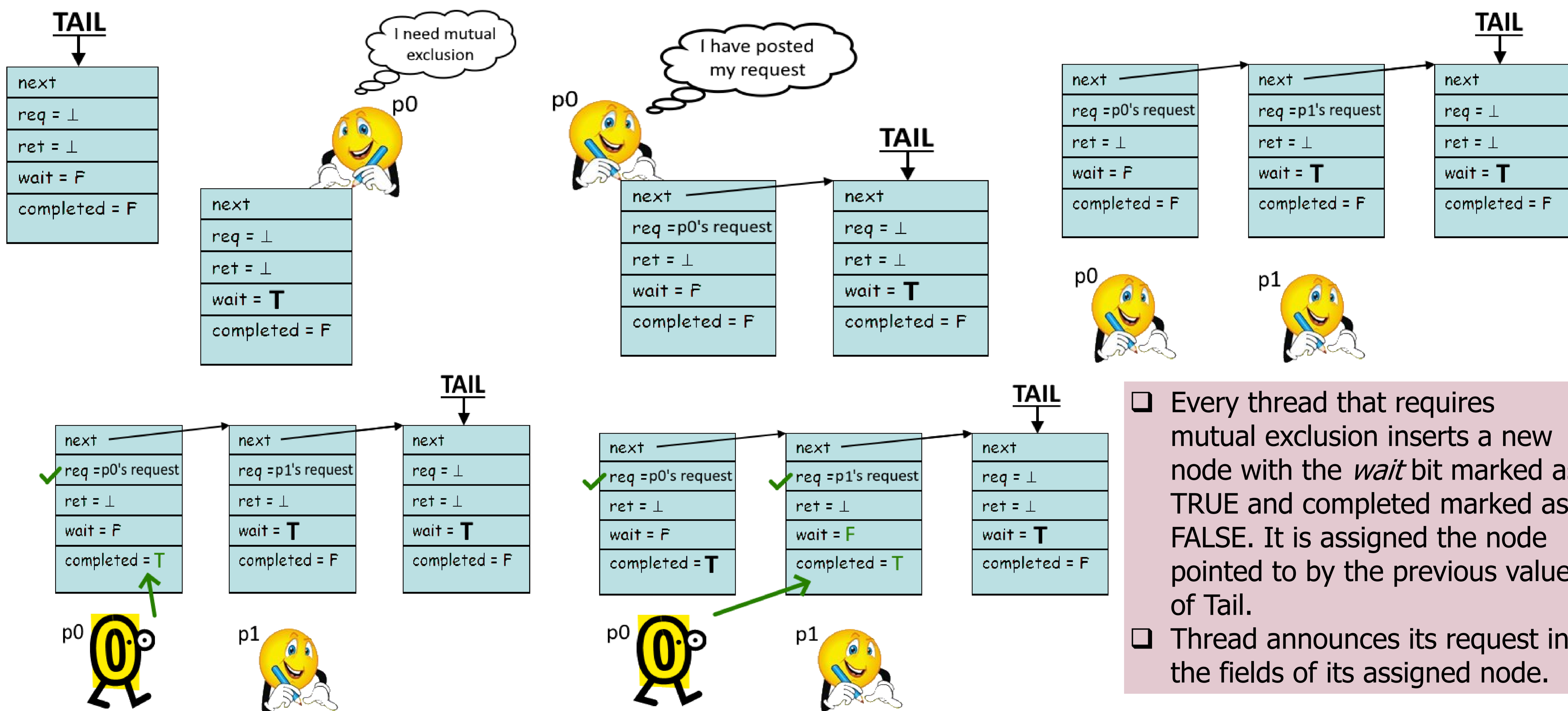
Challenge

- Synchronization is required between threads operating on the same and on different sides of the deque.
- Dequeues are more complex than queues and stacks: they support additional functionality, and thus require implementing more operations.

Implementation

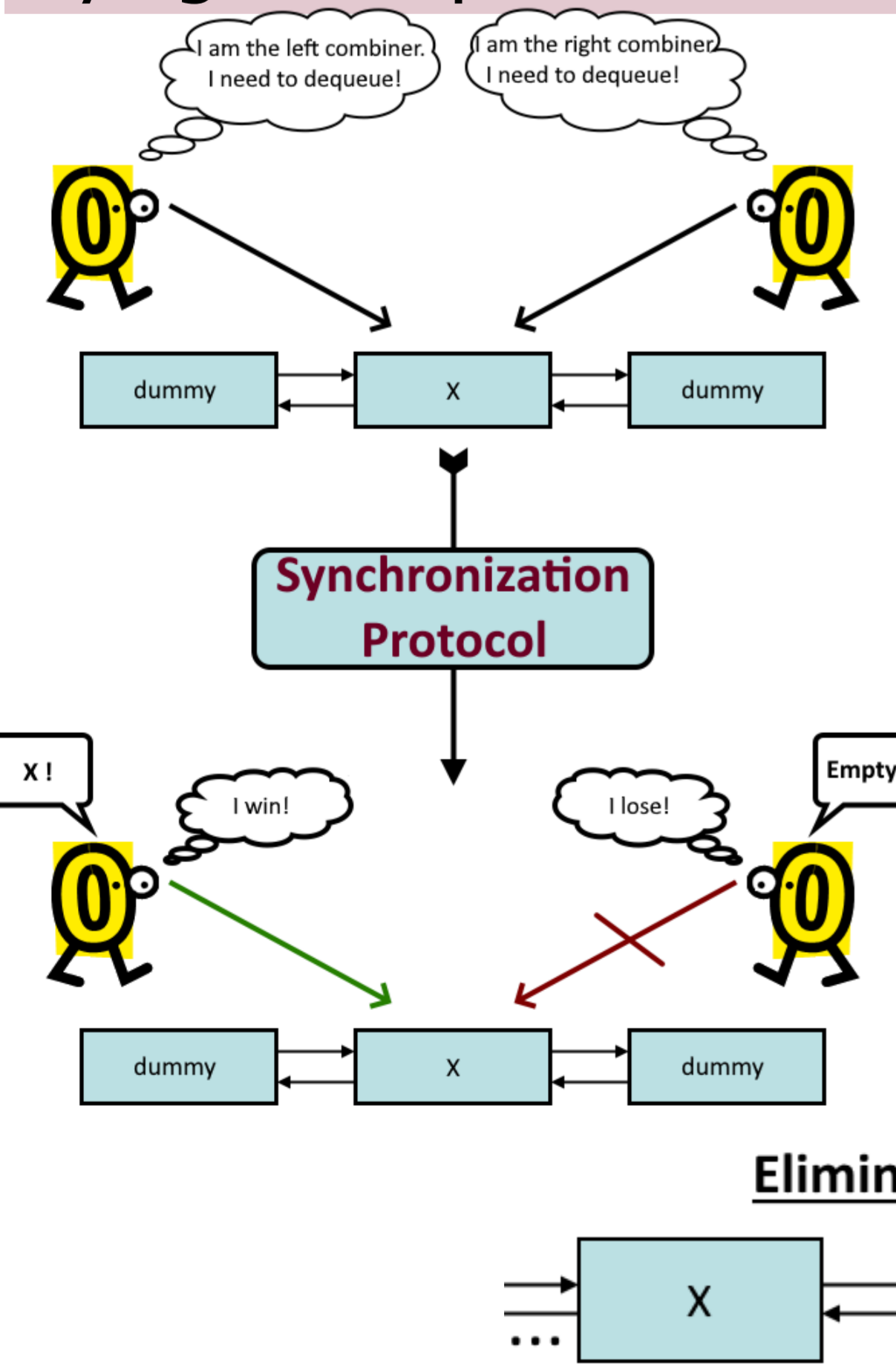
- Employs SoTA software combining algorithms: CC-Synch (Fatourou and Kallimanis PPOPP 2012).
- It uses one instance of CC-Synch for each of its two endpoint.

Software Combining



Double-Ended Queues

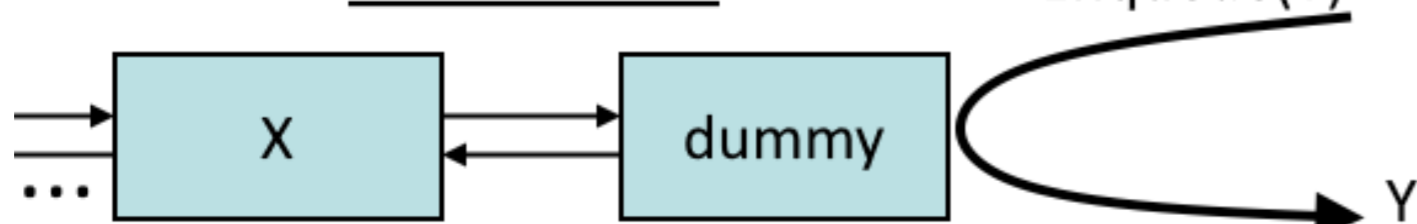
Which combiner gets the node if both are trying to dequeue?



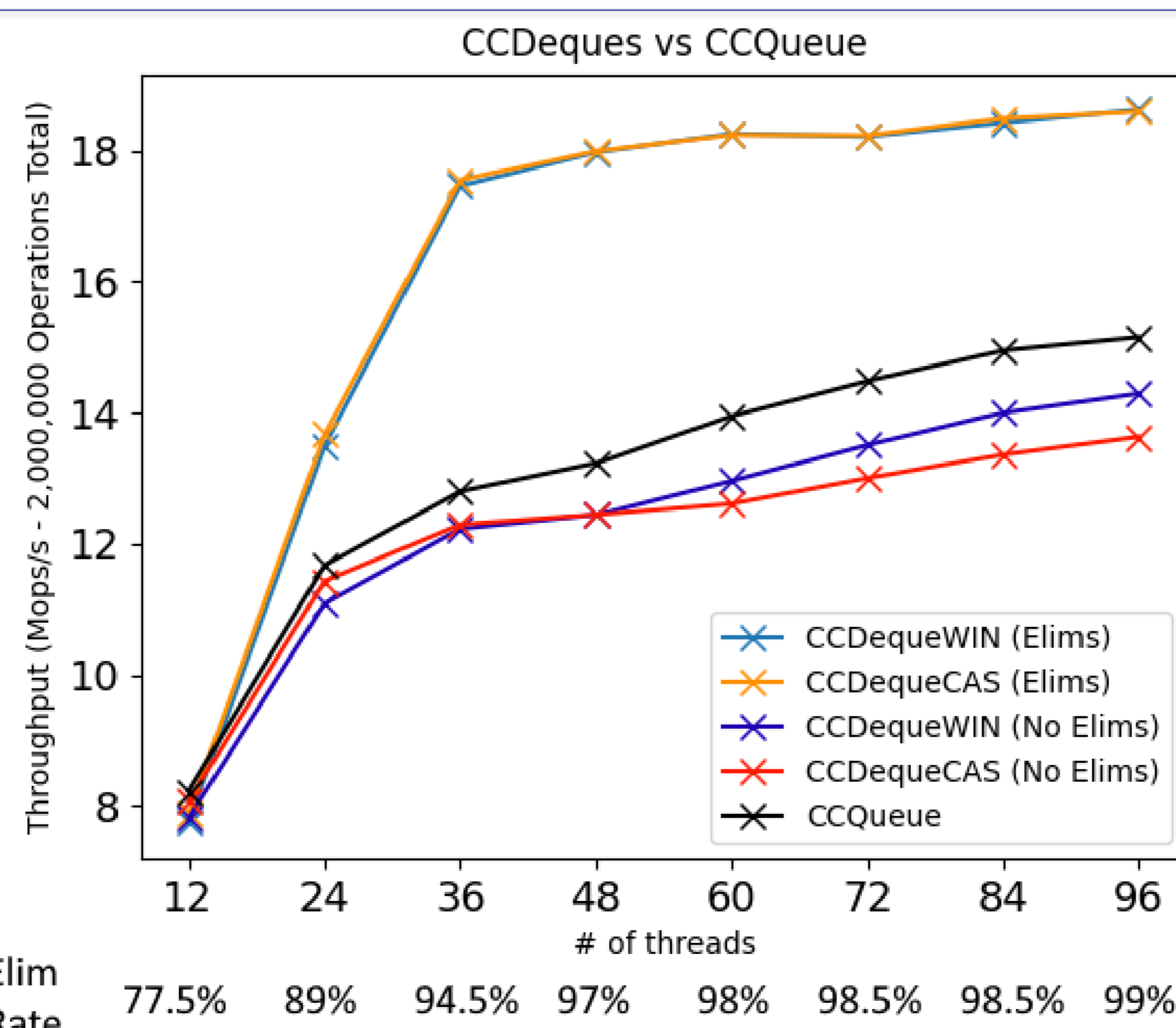
Two algorithms have been designed and tested.

The proposed dequeues use *elimination*: concurrent enqueues & dequeues on the same endpoint get eliminated.

Elimination

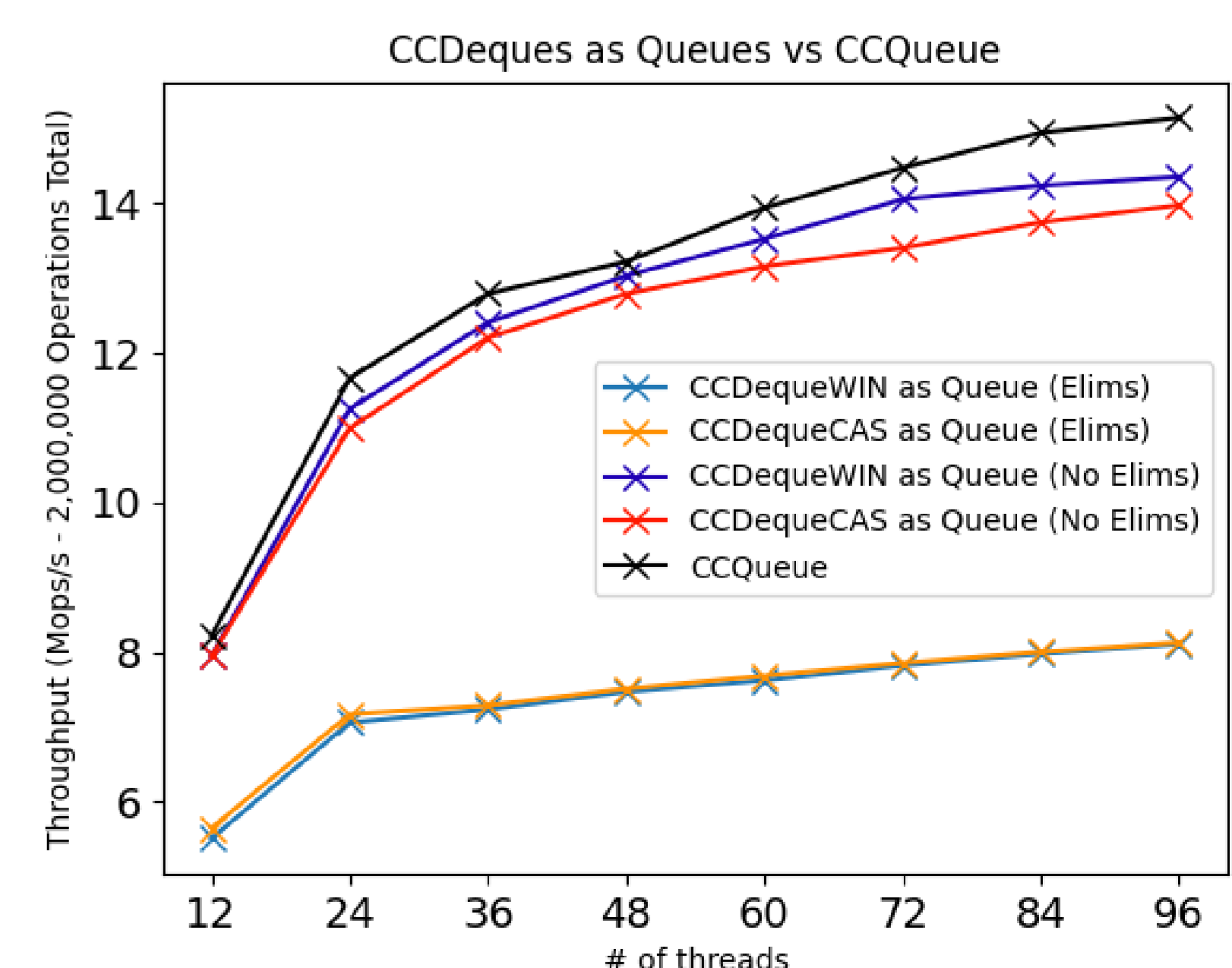


Experiments



- Dequeues with elimination outperform by far *CCQueue*, the state-of-the-art FIFO Queue.
- Dequeues without elimination exhibit almost as good performance as *CCQueue*, despite the additional functionality they support.

Dequeues perform similarly to *CCQueue* even when used as Queues.



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