

The pros of using a priority queue within a semaphore is speed and it is easy to wake processes up based on priority. A priority queue allows $O(\log(N))$ insert and removals with a heap-based structure, and this is very efficient. Waking up the highest priority process first makes the most sense. The con of the priority queue is fairness. A low priority process will never be reached if high priority processes continue to be added. The simple solution would be to age the process and adjust the position in the queue (a “swim” operation on a heap) based on the new priority.