Bounded Fairness*

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Bounded fairness is a stronger notion than the usual fairness, based on eventuality, which guarantees occurrence of an event within a fixed number of occurrences of another event. It can be used, for example, to relate the frequency of shared resource access of a particular process with regard to other processes that access the resource with mutual exclusion. We formalize bounded fairness by introducing a family of new temporal modal operators.

This logic is shown to be equivalent to the temporal logic with just the until modality. We argue that this logic, $\kappa$TL, can be used to specify bounded fairness requirements in a more natural and succinct manner than is possible with until. The advantage of $\kappa$TL over explicit-time logics is that time does not appear explicitly.

As applications of bounded fairness, we specify requirements for some standard concurrent programming problems, and show, for example, that Dijkstra's mutual exclusion algorithm is fair in the conventional sense, but not bounded fair.

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