

Bounded Fairness^{*}

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*Dedicated with gratitude to Zohar Manna
in honor of his 26th birthday.*

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, *kTL*, can be used to specify bounded fairness requirements in a more natural and succinct manner than is possible with *until*. The advantage of *kTL* 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 Dekker's mutual exclusion algorithm is *fair* in the conventional sense, but *not* bounded fair.

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