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On regions and zones for event-clock automata. (English) Zbl 1314.68176
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Summary: Event clock automata (ECA) are a model for timed languages that has been introduced by Alur, Fix and Henzinger as an alternative to timed automata, with better theoretical properties (for instance, ECA are determinizable while timed automata are not). In this paper, we revisit and extend the theory of ECA. We first prove that no finite time abstract language equivalence exists for ECA, thereby disproving a claim in the original work on ECA. This means in particular that regions do not form a time abstract bisimulation. Nevertheless, we show that regions can still be used to build a finite automaton recognizing the untimed language of an ECA. Then, we extend the classical notions of zones and DBMs to let them handle event clocks instead of plain clocks (as in timed automata) by introducing event zones and Event DBMs (EDBMs). We discuss algorithms to handle event zones represented as EDBMs, as well as (semi-) algorithms based on EDBMs to decide language emptiness of ECA.

MSC:

68Q45 Formal languages and automata

Keywords:

event-clock automata; timed automata; real-time; verification; formal methods; zones; regions; DBMs

Software:

Kronos; Tempo

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