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Relational structures model of concurrency. (English) Zbl 1147.68054

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Summary: The paper deals with the foundations of concurrency theory. We show how structurally complex concurrent behaviours can be modelled by relational structures $(X, \diamondsuit, \sqsubset)$, where X is a set (of event occurrences), and $\diamondsuit$ (interpreted as commutativity) and $\sqsubset$ (interpreted as weak causality) are binary relations on X. The paper is a continuation of the approach initiated by *H. Gaifman* and *V. Pratt* ["Partial order models of concurrency and the computation of functions", in: Proceedings of LICS'87, 72–85 (1987)], *L. Lamport* [J. Assoc. Comput. Mach. 33, 313–326 (1986; Zbl 0627.68017)], *U. Abraham, S. Ben-David* and *M. Magodor* ["On global-time and inter-process communication", in: Semantics for concurrency, Workshops in Computing. Springer, Heidelberg, 311–323 (1990)] and *R. Janicki* and *M. Koutny* ["Invariants and paradigms of concurrency theory", Lect. Notes Comput. Sci. 506, 59–74 (1991)], substantially developed in [*R. Janicki* and *M. Koutny*, Theor. Comput. Sci. 112, 5–52 (1993; Zbl 0814.68061)] and [*R. Janicki* and *M. Koutny*, Acta Inf. 34, 367–388 (1997; Zbl 0934.68047)], and recently generalized by *G. Guo* and *R. Janicki* ["Modelling concurrent behaviours by commutativity and weak causality relations", Lect. Notes Comput. Sci. 2422, 178–191 (2002)] and *R. Janicki* [Lect. Notes Comput. Sci. 3407, 84–98 (2005; Zbl 1109.68073)]. For the first time the full model for the most general case is given.

MSC:

68Q85 Models and methods for concurrent and distributed computing (process algebras, bisimulation, transition nets, etc.)

Full Text: DOI

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