Eberhart, Clovis; Hirschowitz, Tom; Seiller, Thomas
An intensionally fully-abstract sheaf model for $\pi$ (expanded version). (English)
Zbl 1459.68140

Summary: Following previous work on CCS, we propose a compositional model for the $\pi$-calculus in which processes are interpreted as sheaves on certain simple sites. Such sheaves are a concurrent form of innocent strategies, in the sense of Hyland-Ong/Nickau game semantics. We define an analogue of fair testing equivalence in the model and show that our interpretation is intensionally fully abstract for it. That is, the interpretation preserves and reflects fair testing equivalence; and furthermore, any innocent strategy is fair testing equivalent to the interpretation of some process. The central part of our work is the construction of our sites, relying on a combinatorial presentation of $\pi$-calculus traces in the spirit of string diagrams.

MSC:
68Q85 Models and methods for concurrent and distributed computing (process algebras, bisimulation, transition nets, etc.)
18F20 Presheaves and sheaves, stacks, descent conditions (category-theoretic aspects)
91A80 Applications of game theory

Keywords:
programming languages; categorical semantics; presheaf semantics; game semantics; concurrency; process algebra

Full Text: DOI arXiv