Assigning types to processes. (English) Zbl 1009.68085

Summary: In wide area distributed systems it is now common for higher-order code to be transferred from one domain to another; the receiving host may initialise parameters and then execute the code in its local environment. In this paper we propose a fine-grained typing system for a higher-order π-calculus which can be used to control the effect of such migrating code on local environments. Processes may be assigned different types depending on their intended use. This is in contrast to most of the previous work on typing processes where all processes are typed by a unique constant type, indicating essentially that they are well typed relative to a particular environment. Our fine-grained typing facilitates the management of access rights and provides host protection from potentially malicious behaviour. Our process type takes the form of an interface limiting the resources to which it has access and the types at which they may be used. Allowing resource names to appear both in process types and process terms, as interaction ports, complicates the typing system considerably. For the development of a coherent typing system, we use a kinding technique, similar to that used by the subtyping of the system $F$, and order-theoretic properties of our subtyping relation. Various examples of this paper illustrate the usage of our fine-grained process types in distributed systems.

MSC:
68Q85 Models and methods for concurrent and distributed computing (process algebras, bisimulation, transition nets, etc.)
68M14 Distributed systems

Software:
Facile; KLAIM; Voyager

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