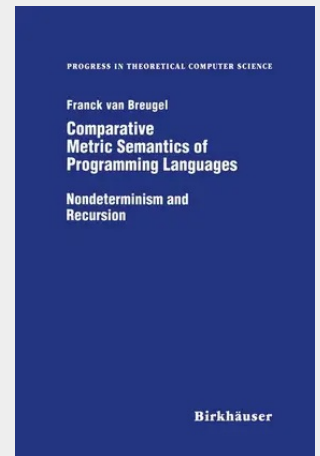


Comparative Metric Semantics of Programming Languages

Nondeterminism and Recursion

During the last three decades several different styles of semantics for programming languages have been developed. This book compares two of them: the operational and the denotational approach. On the basis of several examples we show how to define operational and denotational semantic models for programming languages. Furthermore, we introduce a general technique for comparing various semantic models for a given language. We focus on different degrees of nondeterminism in programming languages. Nondeterminism arises naturally in concurrent languages. It is also an important concept in specification languages. In the examples discussed, the degree of nondeterminism ranges from a choice between two alternatives to a choice between a collection of alternatives indexed by a closed interval of the real numbers. The former arises in a language with nondeterministic choices. A real time language with dense choices gives rise to the latter. We also consider the nondeterministic random assignment and parallel composition, both couched in a simple language. Besides nondeterminism our four example languages contain some form of recursion, a key ingredient of programming languages.

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