Gordon

Functional Programming and Input/Output

A common attraction to functional programming is the ease with which proofs can be given of program properties. A common disappointment with functional programming is the difficulty of expressing input/output (I/O), while at the same time being able to verify programs. Here, the author shows how a theory of functional programming can be smoothly extended to admit both an operational semantics for functional I/O and verification of programs engaged in I/O. He obtains operational semantics for the three most widely implemented I/O mechanisms for lazy languages, and proves that the three are equivalent in expressive power. He develops semantics for a form of monadic I/O and verifies a simple programming example. These theories of functional I/O are based on an entirely operational theory of functional programming, developed using Abramsky's 'applicative bisimulation'.

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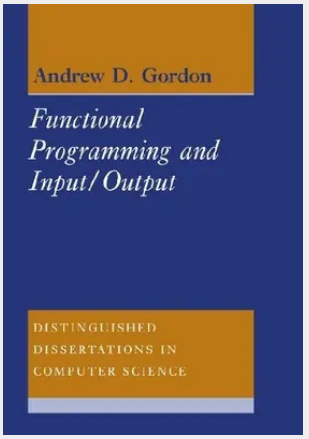

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