

Logical by need

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12 April 2015

Call-by-need calculi are complex to design and reason with. When adding control effects, the very notion of canonicity is irremediably lost, the resulting calculi being necessarily ad hoc. This calls for a design of call-by-need guided by logical rather than operational considerations. This would allow for a direct extension to control operators, given their strong connections with classical logic. This work provides such logical by-need calculi rooted in linear head reduction.

After recalling linear head reduction, it is first reformulated thanks to closure contexts stemming from Danos and Regnier's sigma-equivalence. This reformulation allows to extend linear head reduction to the lambda-mu-calculus.

From the linear head reduction, a call-by-need calculus is then derived in three main steps. This methodology is eventually validated by the design of a classical by-need calculus, that is a lazy lambda-mu-calculus.