

Using dynamic macro expansion to execute
reversible computations
Preliminary observations

Armando B. Matos

January 2021

Abstract

A simple executing algorithm for SRL computations is described. The program is modified during its own execution and each expansion block is always executed from one end to the other. The execution of a loop instruction causes the expansion of a part of the program. To execute the reverse program it is enough to change the “time arrow” and to start from the rightmost part of the text.

References

- [BN98] Franz Baader and Tobias Nipkow. *Term Rewriting and All That*. Cambridge University Press, 1998.
- [KR88] Brian W. Kernighan and Dennis M. Ritchie. *The C Programming Language*. Prentice Hall Professional Technical Reference, 2nd edition, 1988.
- [Mat03] Armando B. Matos. Analysis of a simple reversible language. *Theoretical Computer Science*, 290(3):2063–2074, 2003.
- [Mat17] Armando B. Matos. Reversible programming languages and micro-reversibility, Preliminary Notes. 2017.
- [Mey65] Albert R. Meyer. Depth of nesting and the Grzegorzcyk hierarchy. *Notices of the American Mathematical Society*, 12:342, 1965.
- [MPR19] Armando B. Matos, Luca Paolini, and Luca Roversi. The fixed point problem of a simple reversible language. *Theoretical Computer Science*, October 2019.
- [MR67a] A. R. Meyer and D. M. Ritchie. The complexity of loop programs. In *Proceedings of 22nd National Conference of the ACM*, pages 465–469. Association for Computing Machinery, 1967.
- [MR67b] A. R. Meyer and D. M. Ritchie. Computational complexity and program structure. In *IBM Research Report RC 1817*. IBM, 1967.
- [Per14] Kalyan Perumalla. *Introduction to Reversible Computing*. CRC Press, 2014.
- [RPM19] Luca Roversi, Luca Paolini, and Armando B. Matos. Forward/backward SRL machines — changing the time direction in reversible computations (slides). (slides), 2019.
- [RPM20] Luca Roversi, Luca Paolini, and Armando B. Matos. Representation of SRL configurations and computations by generalized monomials (under development). (slides), 2020.