The Sound of Coinduction

Baltasar Trancón y Widemann[1,2] and Markus Lepper[2]

[1] Technische Universität Ilmenau
[2] `<semantics/>` GmbH

Abstract. The field of declarative stream programming (discrete time, clocked synchronous, modular, data-centric) is divided between the data-flow graph paradigm favored by domain experts, and the functional reactive paradigm favored by academics. In a recent paper [1], we describe the foundations of a framework for unifying functional and data-flow styles that differs from FRP proper in significant ways: It is based on set theory to match the expectations of domain experts, and the two paradigms are reduced symmetrically to a low-level middle ground, with strongly compositional semantics. The design of the framework is derived from mathematical first principles, in particular coalgebraic coinduction and a standard relational model of stateful computation. The abstract syntax and semantics introduced in [1] constitute the full core of a novel stream programming language. Here we demonstrate its expressive potential and the prototype of an actual implementation with an application in electronic music.

References

1. Baltasar Trancón y Widemann and Markus Lepper. Foundations of total functional data-flow programming. In Neelanatan Krishnaswami and Paul Blain Levy, editors, *Mathematically Structured Functional Programming (MSFP 2014)*, EPTCS, 2014. In press.