Distributive laws of directed containers

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Abstract

Containers are an elegant representation of a wide class of datatypes in terms of positions and shapes. We have recently introduced directed containers as a special case to account for the common situation where every position in a shape determines another shape, informally the subshape rooted by that position. While containers interpret into set functors via a fully faithful functor, directed containers denote comonads fully faithfully. In fact, directed containers correspond to exactly those containers that carry a comonad structure. Directed containers can be seen as a generalization (a dependently typed version) of monoids.

While the category of containers (just as the category of set functors) carries a composition monoidal structure, directed containers (just as comonads) do not generally compose. In this talk, I develop a concept of a distributive law between two directed containers matching that of a distributive law between two comonads and spell out the distributive-law based composition construction of directed containers. This turns out to generalize the Zappa-Szép product of two monoids.

This is joint work with Danel Ahman.