Extensional Intensions

Ed Ashcroft
Arizona State University

Abstract GLU is a hybrid language that combines C and Lucid. A GLU program is a Lucid program in which certain of the functions it uses are indicated to be C functions. (The C codes for these functions are specified separately.) In Lucid terms, the C-functions work pointwise, and also the parameter-passing is call-by-value. To evaluate a GLU term, consisting of one of these C functions applied to actual parameters A and B (GLU terms), in context C, one first evaluates A and B in context C and then passes these values to as the arguments of the C function. The C function is evaluated and the result is the value of the GLU term in context C.

This is all well and good—when the values of A and B in context C are scalars and the C function is a scalar × scalar → scalar function. Things get more problematical when, as is often the case, the C function takes arrays as arguments and/or returns arrays as results. How can the GLU terms A and B evaluate to (produce) arrays, and how can the result of the whole GLU term (an array) be used in the enclosing Lucid term (of which the GLU term is just a sub-term)?

In most GLU programs these problems are avoided by having A and B just be C terms (no Lucid operations or functions) and by having the whole GLU term be enclosed only within C functions or be the second argument of a fby operation. In other words, in most GLU programs, there is no way to switch from being intensional to being extensional or switch from being extensional to intensional. The two worlds are kept separate and don’t interact or commingle. This is sad.

In this paper I will investigate ways of being more general, more liberal, and look at the consequences of being so. In particular, I will look at the possibility of transitioning smoothly from Lucid programs to GLU programs.

Making the whole thing work depends on having a hybrid semantics where the intensions, mapping contexts to values, may actually map to extensional values like arrays. These are the "extensional intensions" of the title.