Project Phase 1 Report

Programming Languages 2024/2025 @ IST

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Here is the big-step environment-store semantics for the L1++ lazy list primitives that were implemented:

$\mathcal{E}$; $\mathcal{S}$; M ⇓ N; $\mathcal{S}'$ (M evaluates to N in environment $\mathcal{E}$ and store $\mathcal{S}$)

$$\frac{U = M :? N}{\mathcal{E};\ i\text{cons}(M, N) \Downarrow U}$$

$$\frac{\mathcal{E};\mathcal{S};M \Downarrow i\text{cons}(V,L);\mathcal{S}' \qquad \mathcal{F};\mathcal{S}';V \Downarrow W;\mathcal{S}'' \quad \mathcal{F};\mathcal{S}'';L \Downarrow Y;\mathcal{S}''' \qquad \mathcal{E}[x \to W][l \to Y];\mathcal{S}''';R \Downarrow U;\mathcal{S}''''}{\mathcal{E};\mathcal{S};\text{match } M\ \{\text{nil} \to N \mid \text{cons}(x,l) \to R\ \} \Downarrow U;\mathcal{S}''''}$$

When a lazy list is created with icons(M,N), both expressions M and N are not evaluated. Only when the match destructor is called, are the expressions M and N evaluated (in their old environment) and the respective results are then passed to x and l in the cons(x,l) branch of the match.

For the implementation of lazy lists, I created a new IValue for VIcons that has as attributes the head expression, tail expression and the environment where it was created.
In the ASTMatch, when a given list is an instance of VIcons, the semantics (as explained previously) is executed.