Introduction

Our contracts are consisted of three different parts: two **super nodes**, one **clause**, and a **red vis edge**.
The interpretation for the red vis edge is that *"the vis relation that must be enforced"*. We call the two special effects connected by this edge η_s and η_d.
Super nodes (depicted as blue circles in the figures) have two different types: StartNode, which contains the beginning of the red vis edge starts and EndNode where the vis edge ends.

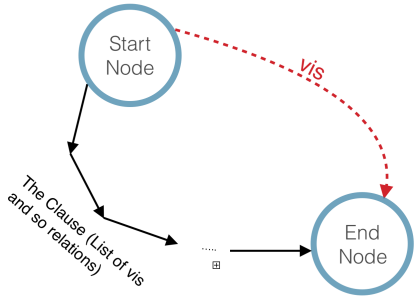

Figure 1: General form of a contract (The blue circles can contain either a single effect, or two effect connected by a txn edge)

Super Nodes are just syntactical packages for different types of consistency requirements: for session guarantees (without transactions) the super nodes are just η_s or η_d. However, to capture the transactional requirements it can include two effects that are related by txn relation, which relates the operations from a transaction in their session order.

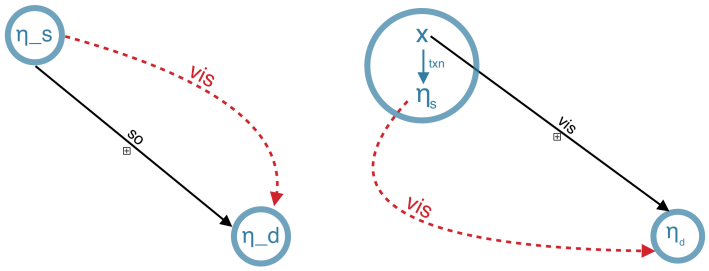

Figure 2: Two examples: left is RMW with no transaction and single effects at super nodes. The right figure however captures RC with its StartNode containing $x \xrightarrow{txn} \eta_s$

I believe the system is complete for all contracts of this type, and the lan-

guage is also able to generate the known interesting contracts.

Syntax

$$
\begin{array}{ll}
\eta_s, \eta_d, x \in \text{EffVis} & Op \in \text{OperationName} \\
N_s \in \text{StartNode} ::= \eta_s | x \xrightarrow{txn} \eta_s & \\
N_e \in \text{EndNode} ::= \eta_d | x \xrightarrow{txn} \eta_d | \eta_d \xrightarrow{txn} x & \\
R \in \text{Relation} ::= vis | so | R \cup R | R^* & \\
C \in \text{Clause} ::= empty | R :: C & \\
\pi \in \text{Prop} ::= (< N_s, N_e >, C) | \pi \vee \pi & \\
\psi \in \text{Contract} ::= \pi \Rightarrow vis(\eta_s, \eta_d) &
\end{array}
$$

Figure 3: The Contract Language

Examples

- **Read My Write (RMW)**

  $(< \eta_s, \eta_d >, [so]) \Rightarrow vis(\eta_s, \eta_d)$

- **Monotonic Reads (MR)**

  $(< \eta_s, \eta_d >, [vis, so]) \Rightarrow vis(\eta_s, \eta_d)$

- **Monotonic Writes (MW)**

  $(< \eta_s, \eta_d >, [so, vis]) \Rightarrow vis(\eta_s, \eta_d)$

- **Writes Follow Reads (WFR)**

  $[(< \eta_s, \eta_d >, [vis, vis]) \vee (< \eta_s, \eta_d >, [vis, so, vis])] \Rightarrow vis(\eta_s, \eta_d)$

- **Read Committed (RC)**

  $(< x \xrightarrow{txn} \eta_s, \eta_d >, [vis]) \Rightarrow vis(\eta_s, \eta_d)$

- **Monotonic Atomic View (MAV)**

  $[(< x \xrightarrow{txn} \eta_s, x \xrightarrow{txn} \eta_d >, [vis]) \vee (< x \xrightarrow{txn} \eta_s, \eta_d \xrightarrow{txn} x >, [vis])] \Rightarrow vis(\eta_s, \eta_d)$

- **Repeatable Read (RR)**

  $(< x \xrightarrow{txn} \eta_s, x \xrightarrow{txn} \eta_d >, [vis]) \Rightarrow vis(\eta_s, \eta_d)$