Abstract

Effects of preconditions in action model are made explicit by means of ‘longhand expansion’.

Definition 1 (Action models for a given language $\mathcal{L}$) Let a finite set of agents and an epistemic language $\mathcal{L}$ be given. An action model for $\mathcal{L}$ is a triple $A = (W, \text{pre}, R)$ where $W$ is a set of action states, $\text{pre}: W \rightarrow \mathcal{L}$ assigns a precondition to each action state, and $R: i \rightarrow \mathcal{P}(W^2)$ assigns an accessibility relation $i \rightarrow$ to each agent $i \in \mathcal{I}$.

A pair $A = (A, S)$ with $S \subseteq W$ is a multiple-pointed action model, indicating that the actual action that takes place is a member of $S$.

Root Unwinding  Let $A = (A, S)$ be an action model. For every $s \in S$ with arrows pointing at it ($\exists t \exists i t \xrightarrow{i} s$), add a fresh world $s'$ with $\text{pre}(s') = \text{pre}(s)$, $s' \xrightarrow{i} t$ iff $s \xrightarrow{i} t$.

The result has the same update effect as the original.

$n$ Step Tree Unwinding  First step: root unwinding.

$(n+1)$-th step: unwinding of states at distance $n$ from the root in the $n$-step unwinding.

This gives a model in the shape of a tree, with rooted Kripke models at the leafs.

Disentanglement  Let $A = (A, S)$ be an action model, and let