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MODULE StateSpace
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The graph representation of n-ary ordered state spaces and $2D$ state spaces used in *CJupiter* and *XJupiter*, respectively.

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EXTENDS JupiterCtx, GraphsUtil
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A state space is a directed graph with labeled edges. Each node is characterized by its context, a set of operations. Each edge is labeled with an operation.

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\begin{aligned}
&IsSS(G) \triangleq \\
&\quad \land IsGraph(G) \\
&\quad \land G.node \subseteq (\text{SUBSET } Oid) \\
&\quad \land G.edge \subseteq [from : G.node,\ to : G.node,\ cop : Cop]
\end{aligned}
$$

$$EmptySS \triangleq EmptyGraph$$

Locate the node in a state space that matches the context ctx of cop.

$$Locate(cop,\ ss) \triangleq \text{CHOOSE } n \in ss.node : n = cop.ctx$$

Do transformation on state space. Return the extra state space.

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\begin{aligned}
&xFormSS(cop,\ copprime) \triangleq \\
&\quad \text{LET } u \triangleq cop.ctx \\
&\qquad v \triangleq u \cup \{cop.oid\} \\
&\qquad uprime \triangleq u \cup \{copprime.oid\} \\
&\qquad vprime \triangleq u \cup \{cop.oid,\ copprime.oid\} \\
&\qquad cop2copprime \triangleq COT(cop,\ copprime) \\
&\qquad copprime2cop \triangleq COT(copprime,\ cop) \\
&\quad \text{IN } [node \mapsto \{u,\ v,\ uprime,\ vprime\}, \\
&\qquad edge \mapsto \{[from \mapsto u,\ to \mapsto v,\ cop \mapsto cop], \\
&\qquad\qquad [from \mapsto u,\ to \mapsto uprime,\ cop \mapsto copprime], \\
&\qquad\qquad [from \mapsto v,\ to \mapsto vprime,\ cop \mapsto copprime2cop], \\
&\qquad\qquad [from \mapsto uprime,\ to \mapsto vprime,\ cop \mapsto cop2copprime]\}]
\end{aligned}
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\* Modification History
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