Cuts

1. Transition annotations
2. Cut Examples, Firedset
3. Construct the TBA for this LSC.

Educational Objectives:
• Give one example which (non-)trivially satisfies this LSC.
• What is a cut, fired-set, etc.?
• How is the semantics of LSCs constructed?

Last Lecture:
Contents & Goals

This Lecture:
Symbolic Büchi Automata
• Software Design, Modelling and Analysis in UML
• Language of a UML Model
• Automaton construction

Forbidden scenarios
• Transition annotations
• Cut Examples, Firedset
• Construct the TBA for this LSC.
The partial order of \((L, \preceq)\) and the simultaneity relation \(\sim\) induce a direct successor relation on cuts of \(L\) as follows:

**Definition.**

Let \(C, C' \subseteq L\) be cuts of an LSC body with locations \((L, \preceq)\) and messages \(\text{Msg}\).

- \(C'\) is called direct successor of \(C\) via fired-set \(F\), denoted by \(C \rightarrow F C'\), if and only if:
  1. \(F \neq \emptyset\),
  2. \(C' \setminus C = F\),
  3. for each asynchronous (!) message reception in \(F\), the corresponding sending is already in \(C\), \(\forall (l, E, l') \in \text{Msg}, l \not\sim l'\):
     - \(l' \in F \implies l \in C\), and
  4. locations in \(F\), that lie on the same instance line, are pairwise unordered, i.e. \(\forall l, l' \in F:\ l \neq l' \land i_l = i_{l'} \implies l \not\preceq l' \land l' \not\preceq l\).

**Note:** \(F\) is closed under simultaneity.

**Note:** locations in \(F\) are direct \(\preceq\)-successors of locations in \(C\), i.e. \(\forall l' \in F\exists l \in C: l \prec l' \land \nexists l'' \in C: l' \prec l'' \prec l\).
if and only if $q_i \equiv q'_i = 0$, otherwise called the activation condition.

LocInv, Cond, $\sim \preceq (\forall (0, \iota))$

Finally: The LSC Semantics of firedset $S$.
Existential LSC Example: Buy A Softdrink

Activation Condition

Finally: The LSC Semantics
Exhaustive analysis of LSCs (and negative/anti-scenarios) in general need an acceptance test for the existential constraints, which may hint at the presence of soft constraints.

\[
\begin{align*}
&\neg \Box C_50 \\
&\neg \text{SOFT} \\
&\neg \text{SOFT} \\
\end{align*}
\]

Forbidden Scenario Example: Don't Give Two Drinks

There's a scenario and a permissive

Universal LSC: Example

Pre-Charts Semantics
References
