Basic Object System Signature

Definition: A Basic Object System Signature is a quadruple
\[\langle \Sigma, M, SD, SM \rangle\]
where
- \(\Sigma\) is a set of (basic) types
- \(M\) is a finite set of (basic) classes
- \(SD\) is a finite set of attribute maps
- \(SM\) is a finite set of state maps

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Example: A Basic Object System Signature Example
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Basic Object System Signature Example

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Course Map

Contents & Goals

Software Design, Modelling and Analysis in UML

Lecture 2: Semantical Model

Educational Objectives:

1. Introduction: Motivation, Content, Formalia
2. This Lecture:
   - Introduction: Motivation, Content, Formalia
   - The Basic Object System
   - UML State Machine
   - UML Class Diagrams

How do Basic Object System Signatures relate to UML class diagrams?
We use $D \in C(D, c)$ to denote the set of all system states of system state.

Alternative $\{v \in x \mapsto x \mapsto {\emptyset}, n \mapsto p \mapsto {\emptyset}, p, n \mapsto C, D \mapsto {\emptyset}\}$

That is, for each $D \in C(D, c)$, if and only if $D \in C(D, c)$.

Wanted: A Basic Object System Structure Example

A Basic Object System Structure

Structure: A Basic Object System Structure Example

Basic Object System Example

Basic Object System Signature Another Example

Basic Object System Structure

System State: Spot the 10 (?) Mistakes

\[ S_0 = (\{ \text{Int} \}, \{ \text{C, D} \}, \{ x : \text{Int}, p : \text{C} \}, 1, 2, n : \text{C} \}, \{ \text{C} \mapsto\ {p, n}, \text{D} \mapsto\ {x} \}) \]

\[ D(\text{Int}) = \emptyset, D(\text{C}) = \{ 1\text{C}, 2\text{C}, 3\text{C}, \ldots \}, D(\text{D}) = \{ 1\text{D}, 2\text{D}, 3\text{D}, \ldots \} \]

Wanted: \( \sigma : D(\text{C}) \not\rightarrow (V \not\rightarrow (D(T) \cup D(\text{C}^*)) ) \) such that (i) \( \text{dom}(\sigma(u)) = \text{attr}(\text{C}) \), and (ii) \( \sigma(u)(v) \in D(\tau) \) if \( v : \tau, \tau \in T \), (iii) \( \sigma(u)(v) \in D(\text{C}^*) \) if \( v : \text{D}^* \) with \( D \in \text{C} \).

\begin{align*}
\sigma &= \{ 1\text{C} \mapsto\ {p \mapsto\ \emptyset, n \mapsto\ \{ 5\text{C} \}}, 5\text{C} \mapsto\ {p \mapsto\ \emptyset, n \mapsto\ {1\text{C} }}, 1\text{D} \mapsto\ {x \mapsto\ \{ 2, 3 \}} \} \\
\sigma &= \{ 1\text{C} \mapsto\ {p \mapsto\ \emptyset, n \mapsto\ \{ 5\text{C} }}, 5\text{C} \mapsto\ {p \mapsto\ \emptyset, n \mapsto\ \emptyset}, 1\text{D} \mapsto\ {x \mapsto\ \{ 23 \}} \} \\
\sigma &= \{ 1\text{C} \mapsto\ {p \mapsto\ \emptyset, n \mapsto\ \{ 5\text{C} }}, 5\text{C} \mapsto\ {p \mapsto\ \emptyset, n \mapsto\ \emptyset}, 1\text{D} \mapsto\ {x \mapsto\ \{ 22 \}} \} \\
\sigma &= \{ 1\text{C} \mapsto\ {p \mapsto\ \emptyset, n \mapsto\ \{ 5\text{C} }}, 5\text{C} \mapsto\ {p \mapsto\ \emptyset, n \mapsto\ \emptyset}, 1\text{D} \mapsto\ {x \mapsto\ \{ 22 \}, p \mapsto\ \{ 1\text{C} } \} \}
\end{align*}

References: