Bigraphical Programming Languages

IT University of Copenhagen
http://www.itu.dk/research/theory/bpl/

Bigraphs

A bigraph is a model of a distributed, mobile system. Its main constituents are a place graph and a link graph describing orthogonally locality and connectivity in the system.

Bigraphs are compositional structures – a bigraph can have holes, in which other bigraphs can be inserted.

A bigraph $G$ is said to have an inner interface and an outer interface. The inner interface describes the holes of the bigraph; the outer interface describes the holes into which the bigraph can be inserted.

When composing bigraphs, we can insert a bigraph $G_A$ into the hole of another bigraph $G_B$ (written $G_B \circ G_A$), if the outer interface of $G_A$ matches the inner interface of $G_B$.

Example system

\[ G : \langle 3, X \rangle \rightarrow \langle 2, Y \rangle \]
\[ X = \{ x_0, x_1 \} \]
\[ Y = \{ y_0, y_1, y_2 \} \]

Reaction rules

\[ \text{val conR1} = \text{Room<doorlink>(Person<> | Ghost<> | \{0\})} \]
\[ \text{val conR2} = \text{Room<doorlink>(Ghost<>(Person<>)) | \{0\})} \]
\[ \text{rule connectRule} = \text{conR1 --> conR2} \]
\[ \text{rule disconnectRule} = \text{conR2 --> conR1} \]

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See also

- Laboratory for Context-dependent Mobile Communication — http://lacomoco.itu.dk/