

Functional Semantics of D-Clean

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Abstract

The D-Clean language represents a set of coordination primitives which manipulate computation nodes distributed over a Grid system. The language describes in functional style the coordination of nodes containing pure functional expressions. These nodes on intermediate level are D-Box expressions, and they execute Clean functional programming code according to the description given at the first level by the D-Clean skeletons. The double layered code generation is coordinated by the top level D-Clean distributed computation schemes applied on the dataflow passing through the computation nodes.

In this paper the semantics of D-Clean language elements is given by higher order Clean functions. The paper includes the detailed description of how a computation node deals with the dataflow and what is needed for this.

Every language element uses input channels for receiving the required arguments of their function expression parameters the results of the which are sent to the output channels. Channels are carrying data of a specified base type from one computational node to the connected one. Therefore, a coordination primitive usually deals with two parameters: a function expression (or a list of function expressions) and a sequence of input channels. The signature of the coordination primitive, i.e. the types of the input and output channels are inferred according to the type of the embedded Clean expressions.

The accurate functional descriptions increase the comprehensibility of the D-Clean layer of the system, and they provide more details about how it is designed and meant for distributed functional computations.

Keywords: D-Clean, distributed coordination language, semantics

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