MEMBRANE COMPUTING MODEL BASED ON JSON LANGUAGE

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Membrane computing (P-system) is a branch of natural calculation, which is inspired by the structure and way of activities of living cells [1,2]. The main concepts were formulated by Gh. Paun in 1998 and then were developed by many researchers, particularly, from the field of theoretical calculations. Membrane computing is based on the notion of membrane that structures the calculation system (i.e. creates a topology of calculation units (cells)) in conformity with the mathematical model or data processing algorithm. A membrane defines a region that may comprise objects, rules or other regions functioning in parallel or concurrently. This thesis suggests a technique of formal description of topology of Membrane computing systems as based on JSON (JavaScript Object Notation) language, thus allowing to translate them automatically to reconfigurable Hardware structures (FPGA) for parallel or concurrent data processing. We provide here the topology of membranous calculation system as defined basing on the model:

$$\Big[_{M1} \cdots [_{M2} \cdots]_{M2} [_{M3} \cdots]_{M3} \Big]_{M1}$$

where M_i is the membrane i, $\cdots$ is the region of the membrane.

The JSON model of the topology of the Membrane computing system as defined basing on () is the following:

{ //Membrane Computing JSON Model
"psystem" : [{"name" : "M1", "regiondescription" : "..."},
"membrane" : {"name" : "M2", "regiondescription" : "..."},
"membrane" : {"name" : "M3", "regiondescription" : "..."}] }

The JSON model gives a possibility to save the topology of the Membrane computing system to files, to organize the exchange of topologies between different applications and to realize dynamical processes in the topology thereof.

References:

1. Gh. Paun, G. Rozenberg, A. Salomaa, eds. *The Oxford Handbook on membrane computing.* Oxford University Press, Oxford, 2009.

2. R. Lefticaru, M. Gheorghe, F. Ipate. An empirical evaluation of P-system testing techniques. *Natural Computing*, **10** (2011), 151–165, Springer. DOI: 10.1007/s11047-010-9188-y.