ADAPTIVE COMPUTING ARCHITECTURES FOR REAL-TIME APPLICATIONS

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Computing systems, which are based only on the technological concept, have already entered in a development deadlock. An alternative development direction of the computing systems is offered by the adaptive computing architectures application, which are able to self-adaptive, for solving each problem separately, implying for it an optimal configuration of Hardware devices and Software applications as price and time.

An important direction today is the development of computing systems for real-time applications [1,2], where the time constraints require some performance criteria for Hardware devices and Software applications involving processing of large volumes of data stored on decentralized resources (like Cloud Computing). These problems are specific for embedded systems and IoT, that are based on computing systems with limited resources, access to communication media and simplified algorithms of data processing.

In this paper is described the problem of developing adaptive computing architectures for real-time applications designed to solve complex problems based on high volume data processing and limited response time.

The system architecture has a lot of heterogeneous computing devices, interconnected, that form a Mesh network. Each device has necessary resources to solve a part of problem solving global algorithm and to store limited volume of data required only to initiate the reconfiguration process, to obtain an optimal algorithmic and data architecture.

The interaction between the devices in the system architecture is presented based on the sequence diagram UML. The modeling of the concurrent processes of data processing and transfer was performed based on the Timed Petri Nets models.

As a result of performed modeling, was obtained the graph "the relation between the data processing time and the result requested convergence". The concept of optimal time for generating a satisfying response is defined.

Keywords: *Adaptive Computing; Self-Adaptive Architectures; Real-Time Applications; Embedded Systems; IoT; Cloud Computing; Concurrent Data Processing.*

References

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