



MORPHEUS

D2.3.5 Data Assignment and Access Scheduling methodologies and Supporting Tools

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Context

This deliverable is part of the MORPHEUS project which is a European initiative financed under the 6th FP and addresses innovative solutions for embedded computing based on dynamically reconfigurable platform and tools.

MORPHEUS project aims at satisfying embedded systems new demanding requirements in terms of computing performance, cost-efficient development, functional flexibility and sustainability by developing a global solution based on a modular heterogeneous SOC platform providing dynamically reconfigurable computing completed by a software oriented design flow and a consistent toolset.

MORPHEUS is a 3-year project started in 2006 and gathering all the required expertises from several countries: academics, industrials, SMEs.

Aim of the deliverable

The goal of this document is to provide details concerning the dynamic memory management methodology developed within the context of MORPHEUS. This methodology offers solutions regarding the dynamic data type selection, the dynamic data assignment on the system's memory and the scheduling of data transfers.

Content of the deliverable

Modern computing platforms are becoming more and more complex encapsulating multiple cores and reconfigurable elements. This makes the design, implementation and mapping of applications into them a challenging task. Additionally, the complexity of the applications running on such systems is increasing, together with the dynamism of such applications. There are many factors that contribute to the dynamism of modern telecom applications. As far as these applications are concerned, the varying size and timing of the packets, that run the network, create an unknown set of requests in data storage and data access. This results in having variable resource requirements during the execution time. In order to cope with this dynamism applications rely in the usage of dynamic data in order to store and retrieve application data.

The developed methodologies are offering to the designer solutions on how to handle the dynamic data management more efficiently. The first step that the designer has to perform is the optimization of the dynamic data types. The data type optimization methodology and the prototype

automation tool offer the designer a set of choices (different data type implementations) in the form of a Pareto curve. In this way trade-offs are highlighted and the designer can choose the dynamic data type that satisfies the design constraints.

The second step is to efficiently assign the dynamic data on the memory hierarchy of the system. The problem is formulated as a knapsack one and solutions are provided about the assignment of dynamic memory pools on the memory system. As a last step the assignment of dynamic data transfers on dedicated data transfer units offered by the platform is performed.

The developed methodologies were applied in a traffic cell scheduling simulator. Developed prototype automation tools support the dynamic memory methodology allowing the increase of designer productivity. In this way a semi-automatic framework is offered alleviating the effort of the designer when having to deal with dynamic data.