

Preface

The hArtes project¹ was started as an innovative European project (funded by European Union) aiming at laying the foundations of a new holistic approach for the design of complex and heterogeneous embedded solutions (hardware and software), from the concept to the silicon (or B2B, from the brain to bits). The hArtes stands for “holistic Approach to reconfigurable real time embedded systems”. As defined in the Embedded Systems Chapter of the IST 2005-06 Work Programme the objective of the hArtes project is to “develop the next generation of technologies, methods and tools for modeling, design, implementation and operation of hardware/software systems embedded in intelligent devices. An end-to-end systems (holistic) vision should allow building cost-efficient ambient intelligence systems with optimal performance, high confidence, reduced time to market and faster deployment”.

The hArtes project aims to lay the foundation for a new holistic (end-to-end) approach for complex real-time embedded system design, with the latest algorithm exploration tools and reconfigurable hardware technologies. The proposed approach will address, for the first time, optimal and rapid design of embedded systems from high-level descriptions, targeting a combination of embedded processors, digital signal processing and reconfigurable hardware. The project ended with an important scientific and technical contribution that resulted in more than 150 international publications as well as a spin-off company, BlueBee.²

From the application point of view, the complexity of future multimedia devices is becoming too big to design monolithic processing platforms. This is where the hArtes approach with reconfigurable heterogeneous systems becomes vital. As a part of the project, a modular and scalable hardware platforms will be developed that can be reused and re-targeted by the tool chain to produce optimized real-time embedded products. The results obtained will be evaluated using advanced audio and video systems that support next-generation communication and entertainment facilities, such as immersive audio and mobile video processing. Innovations of the hArtes approach include: (a) support for both diagrammatic and textual formats

¹www.hartes.org.

²www.bluebee-tech.com.

in algorithm description and exploration, (b) a framework that allows novel algorithms for design space exploration, which aims to automate design partitioning, task transformation, choice of data representation, and metric evaluation for both hardware and software components, (c) a system synthesis tool producing near optimal implementations that best exploits the capability of each type of processing element; for instance, dynamic reconfigurability of hardware can be exploited to support function upgrade or adaptation to operating conditions.

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