

Architectures Session

GENESYS: A Cross-Domain Architecture for Embedded Systems

R. Obermaisser, H. Kopetz, B. Huber, C. El-Salloum TUV, Austria, {ro,hk,hb,sc}@vmars.tuwien.ac.at
R. Zafalon, ST Microelectronics, Italy, roberto.zafalon@st.com
F. Auzanneau, CEA, France, Fabrice.AUZANNEAU@cea.fr
K. Kronlöf, Nokia, Finland, klaus.kronlof@nokia.com
P. Millet, Thales, France, philippe.millet@thalesgroup.com
M. Borth, ESI, Netherland, michael.borth@esi.nl
C. Couvreur, IMEC, Belgium, ykman@imec.be
N. Suri, TUD, Germany, suri@cs.tu-darmstadt.de
S. Campos, ESI-Tecnalia, Spain, Sergio.Campos@esi.es
E. Ovaska, VTT, Finland, eila.ovaska@vtt.fi
M. Gödecke, Infineon, Germany, Michael.Goedecke@infineon.com

Abstract

The FP7-ICT collaborative project GENESYS (GENERIC Embedded SYStem Platform) has started on January 1st 2008 and is aiming to give birth to novel technologies for embedded computer systems that are of universal importance across individual application domains. The research results will enable significant improvements concerning time-to-market, cost, and robustness for a wide range of applications, from mobile phones to safety-critical computers in airplanes. More and more electronics are applied in embedded systems to meet the customer expectations (e.g., energy efficiency, robustness), thereby driving embedded systems developers to increasingly complex embedded computer systems. Today's embedded system research is mainly concerned with tackling this increasing complexity of embedded systems. The GENESYS project is inspired by the insight that research and development of embedded systems are fragmented across different domains due to different business and technical constraints and requirements (e.g., time to market, safety,...). The goal of GENESYS is to provide solutions to challenges that are common to multiple domains, thereby enabling synergies in embedded systems research. Hence, we can fully exploit the economics of scale because embedded systems technologies can be used in much larger markets. Consider for example a state-of-the-art chip for which the development costs can amount up to 30 Mio. € Consequently such an investment can only be justified if the development cost can amortize over a large number of products. Furthermore, the GENESYS project aims at developing the basis for a converging world of embedded systems. Consider for example today's premium cars which combine multimedia systems, comfort systems, control systems and interact with mobile devices. This ambitious goal is supported by 23 project partners from all over Europe. The project partners include major European companies. In addition leading universities and research institutes contribute to the GENESYS.

The technical approach for the cross-domain reference architecture includes a consolidated cross-domain architectural style, a cross-domain development methodology, and a reference architecture template. The cross-domain architectural style comprises rules and guidelines for the partitioning of a system into sub-systems and for the design of interfaces. The style has resulted from the alignment of different views, concepts, and design principles from different application domains. The architectural style constrains an architecture in such a way that the resulting system meets the ARTEMIS challenges (e.g., facilitate robustness through fault and error containment). The cross-domain development methodology serves for the modeling, evaluation and validation of platform services and embedded systems based on the reference architecture template. Measurable quality characteristics are supported. The reference architecture template provides descriptions of platform services to achieve generic component libraries with platform service specifications. Examples of platform services are communication services, diagnostic services, security services, and resource management/reconfiguration services.