

Project Results

AMALTHEA

For and with the community

A major stumbling block to software development is the computational limitation of single-core systems. The automotive sector is therefore increasingly turning to multicore systems for its electronic control units as the number of comfort and driver assistance systems in modern cars continues to grow and demand increasing computing power. The ITEA 2 project AMALTHEA, with its slogan 'Tune-up your software development', undertook to develop an open source development platform containing common data models and tools to significantly boost software development efficiency.

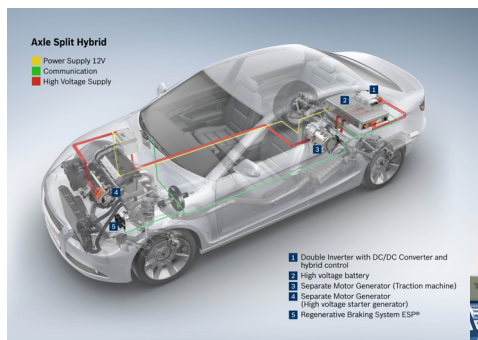
FACILITATING DATA EXCHANGE

In essence, the AMALTHEA project set out to reduce the effort needed to exchange data. The model-based approach provides not only the capability to model multicore software and hardware but also basic editors and tools to work on and visualise these models. With its plug-in mechanism enabling easy integration with other tools, Eclipse provided the basis for the development environment and the public licence for distributing the AMALTHEA tool platform. This means that the results are available to the generic public and allows free use and access to all source codes so that tool vendors can easily integrate their tools into the AMALTHEA platform. The practical relevance and applicability of the AMALTHEA platform are

ensured by the composition of the AMALTHEA consortium that consists of partners from the embedded systems industry with strong focus on automotive domain including European automotive Tier-1 suppliers, tool vendors and research institutes.

KEY ACHIEVEMENTS

One of the major achievements of AMALTHEA is a common meta-model for multicore software and hardware modelling and definition of requirements/constraints that enables different tools of a customised tool chain to gain easy and efficient access to the overall model of a multicore system. Not only can tools read the data required for a particular task, the model can also be enriched with the results, i.e. the quality of the model is improved. In this way, the AMALTHEA platform supports data exchange between the different tools of a customised tool chain. Another response to an automotive need was the development in AMALTHEA of a method for the combined description of the wide range variants in automotive systems that enables dependencies between software and hardware components to be checked immediately and errors prevented. This method will be integrated into a new development platform that will use the common data model. The combined modelling of hardware and software variants reduces effort and allows for semi-automatic product generation in which the user only has to select variants.



Caption

AMALTHEA

(ITEA 2 ~ 09013)

Partners

BHTC
 Dortmund University of Applied Sciences and Arts
 ETAS GmbH
 Institut for Automation und Kommunikation (IFAK)
 Itemis
 Metso Automation
 Mobilera
 Nokia Solutions and Networks
 Regensburg University of Applied Science
 Robert Bosch GmbH
 Timing Architects Embedded Systems GmbH
 TOFAS
 University of Oulu
 University of Paderborn C-LAB
 University of Paderborn Software Engineering Group

Countries involved

Finland
 Germany
 Turkey

Project start

July 2011

Project end

April 2014

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Furthermore AMALTHEA has researched the methodological aspects of architectural modelling, partitioning, mapping, and tracing. A complete example tool chain based on open source tools (implemented as Eclipse plugins) covering these basic activities was realised and is publicly available. Several case studies on industry scale multicore systems were carried out.

The reduction in development costs and the building of a de-facto standard development environment platform will have a significant impact on car manufacturing in Europe and will also create new business opportunities around the tool platform, also opening up the automotive market for newcomers and accelerating the development of new functions for cleaner, safer and more comfortable vehicles.

BENEFITS ALL ROUND

Bosch sees the potential for in-house tooling combined with commercial tools, and is already making use of the AMALTHEA format to derive real benefit for development efficiency, whereby the exchange of data with customers, such as in BMW and Volkswagen, enhances collaboration and supports joint software development. The pre-release publishing of open source results is already being used in the commercial tool suite of Timing-Architects. Itemis and ETAS will also provide development tools that will use this technology. Volkswagen has expressed a desire to use the results for the exchange of timing data. So as a supporting technology, AMALTHEA has a key role to play in any application with embedded control systems that have hard real-time requirements. It was extended, for example,

to the telecom sector in which Finnish partners in the consortium operate. Furthermore, the results of the project provide the basis to resolve conflicts and challenges in the development of safety-critical systems. The extensibility of this open source development will take greater shape in a subsequent ITEA 2 project, AMALTHEA4public.

As an open source tool platform, AMALTHEA allows efficient data exchange not only between different cooperating companies but also between different tools used by a single organisation. Car manufacturers will acquire methods and tools that provide the flexibility to develop new architectures with a Safety-In-the-Loop approach while first tier suppliers will be able to demonstrate safety conformity and optimise development costs. In their turn, semiconductor manufacturers can develop new architectures for safe hardware components and tool vendors gain an opportunity to provide an integrated tool-chain including design and safety analysis. Finally, research organisations benefit from the possibility to subject their conceptual work to methods of analysis while certification bodies can gain accreditation for automotive certification of functional safety assessment.



Caption

Major project outcomes

DISSEMINATION

- More than ten publications (e.g. IDAACS2013, PROFES 2013)
- Presentations on Automotive/Eclipse-related events (e.g. EclipseCon Europe 2013)
- Booth award at ITEA/ARTEMIS Cosummit 2013, Stockholm

EXPLOITATION (SO FAR)

- Eclipse-based tool platform which contains models for data exchange
- Open source tools for main steps in multicore systems development (modeling, partitioning, mapping, tracing)
- Integration of external tools into AMALTHEA platform
- Timing-Architects TA Tool Suite provides for complete AMALTHEA model import and export capability
- Productive use of AMALTHEA model in multiple multicore mass production projects

STANDARDISATION

- AMALTHEA Trace Formats BTF and HTF are accessible by everyone free of charge (published on Eclipse Automotive Industry Working Group: wiki.eclipse.org/Auto_IWG#Publications)

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■ ITEA 2 – Information Technology for European Advancement – is Europe's premier co-operative R&D programme driving pre-competitive research on embedded and distributed software-intensive systems and services.

As a EUREKA strategic Cluster, we support co-ordinated national funding submissions and provide the link between those who provide finance, technology and software engineering. Our aim is to mobilise a total of 20,000 person-years over the full eight-year period of our programme from 2006 to 2013.

■ ITEA 2-labelled projects are industry-driven initiatives building vital middleware and preparing standards to lay the foundations for the next generation of products, systems, appliances and services. Our programme results in real product innovation that boosts European competitiveness in a wide range of industries. Specifically, we play a key role in crucial application domains where software dominates, such as aerospace, automotive, consumer electronics, healthcare/medical systems and telecommunications.

■ ITEA 2 projects involve complementary R&D from at least two companies in two countries. We issue annual Calls for Projects, evaluate projects and help bring research partners together. Our projects are open to partners from large industrial companies and small and medium-sized enterprises (SMEs) as well as public research institutes and universities.

