ALL-TIMES

Integrating European Timing Analysis Technology

KEYWORDS: timing measurement, timing analysis, timing tools, integrated tool chains, scheduling analysis, WCET, worst-case execution time, WCRT, worst-case response time

Introduction

Correct timing of real-time embedded systems is a subject with wide industrial relevance and there is a significant body of European research and experience in this area including a number of hi-tech SMEs.

Timing measurement/analysis is vital for improving the reliability, performance, and efficiency of embedded systems. It helps to reduce the overall system costs by validating timing requirements, reducing the cost of development, and reducing unit costs in production.

Existing tool support (including tools from SMEs and academic tools) provides a set of powerful analysis techniques. Nevertheless, there is a growing and identifiable need that is addressed in the ALL-TIMES project for the combination and integration of existing timing measurement/ analysis tools with the latest academic results in this area.

Objectives

The ALL-TIMES project will combine major European research and development results of timing tools to strengthen the European lead in the area of timing measurement and analysis. The ALL-TIMES project will enable interoperability of tools from SMEs and universities, and develop integrated tool chains using open tool frameworks/interfaces. By combining research results and commercial tools, ALL-TIMES will ensure the flow of ideas from basic research into practice.

The two principal project objectives are:

- to integrate different timing measurement/ analysis tools using an open tool framework.
- to achieve 25% improvement in the design time pertaining to timing issues of embedded systems development projects.

One of the overall objectives of the project is the provision of new integrated toolsets for timing measurement and analysis targeted at the embedded real-time systems market. This relates to the advancement of new analysis techniques for integrated scheduling analysis, WCET analysis and timing measurement. In particular, the project will deliver new methods for timing measurement and analysis at both the system level and the code level in an open framework. An important aspect is a precise characterisation of industrial requirements regarding timing. The project will provide a detailed requirements study at the end of the first phase of the project.

A demonstrable 25% improvement in design time of embedded systems development can be achieved by enabling a quick, safe, automatic and efficient mechanism for deriving timing data instead of conventional manual and laborious approaches. By "design time pertaining to timing issues" we mean all the time devoted to dimensioning/constructing hardware and software to meet timing requirements, and to testing and analyzing the resulting solution to find whether the timing requirements are met. This objective will be measured by interviewing the companies participating in case studies on the efforts and quality of the results obtained from previous projects. The efforts for and results of the case studies will then be compared against the previous cases.

Expected Results

ALL-TIMES will strengthen the competitiveness of several key industries in Europe, most notably the automotive and aerospace areas (where partial awareness already exists, providing a good starting point). Beyond these industries, automation, manufacturing, robotics, medical, communication, and multimedia are markets where timing is important. These industries will also be able to benefit from the project results as their awareness grows. The ALL-TIMES project will thus:

- interface the five different analysis techniques (three code-level and two system-level techniques) that are represented in the project;
- provide an open interface to integrate additional timing measurement/analysis techniques and tools, aiming at becoming a de-facto standard;
- provide solutions for timing analysis/ estimation in early design phases as part of design-space exploration and architecture optimization.

Partners and their roles

The All-Times project comprises leading members of industry and academia in the area of timing measurement and analysis. Two of its partners are university groups:

- Mälardalen University (coordinator)
- Vienna University of Technology.

The other four partners are SMEs with a lot of experience in the area. They will contribute to the development, evaluation and exploitation of different parts of the project:

- AbsInt Angewandte Informatik GmbH
- Gliwa GmbH
- Symtavision GmbH
- Rapita Systems Ltd

All-Times
CONTRACT NUMBER
No 215068

FULL NAME
Integrating European Timing Analysis Technology

TYPE OF PROJECT
Small or medium-scale focused research Project

PROJECT PARTICIPANTS
- **Mälardalen University (Sweden)**
- **AbsInt Angewandte Informatik GmbH (Germany)**
- **Vienna University of Technology (Austria)**
- **Gliwa GmbH (Germany)**
- **Symtavision GmbH (Germany)**
- **Rapita Systems Ltd (UK)**

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PROJECT WEBSITE
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BUDGET
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Funding: € 1 600 000

TIMETABLE
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Duration: 27 months