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COEMS

Continuous Observation of Embedded Multicore Systems

Newsletter

September 2018

Welcome to the COEMS Newsletter.
Within the COEMS project the five players, University of Lübeck, Accemic Technologies, Thales Austria and Romania, Høgskulen på Vestlandet and Airbus joined their forces to develop a novel continuous observation solution for embedded multicore systems.
We would like to inform you about our achievements, current developments and COEMS-related events in the near future. Topics in this issue include the successful mid-term review, updates on various meetings and dissemination events, and a look at how Thales uses COEMS technology.

Mid-term Review Meeting in Brussels

On 17th of May 2018 we passed the mid-term review meeting in Brussels with our Project Officer and three external evaluators.

At the meeting, we also gave the first demo based on the actual hardware, where artificial trace data was uploaded and analysed through a TeSSLa specification on the FPGA.

The Meeting was held in the premises of NTNU (Norwegian University of Science and Technology) in the heart of the European Quarter. The NTNU as well as the Brussels office of BayFor (Bayerische Forschungsallianz) supported us with meeting room facilities and many practical hints for turning our meeting into a successful event. We started at 9 o'clock and discussed the achievements obtained so far carefully with the reviewers. End of meeting was in the afternoon with a first, positive feedback on our COEMS project.

COEMS @ DATE in Dresden

In March, COEMS was represented with a booth at the DATE conference in Dresden. Alex Weiss from Accemic and Lukas Convent from University of Lübeck were there to present the COEMS project and discuss hardware-based runtime verification with the visitors, along a demonstration of the TeSSLa IDE.
The combination of being a first-class research conference and having an exhibition area for EU projects was well-suited for getting in touch with people from both academia and industry. Having now the first prototypes of the TeSSLa engines on FPGA, we are looking forward to demonstrating and discussing our further advancements at future exhibitions.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 732016.

COEMS & TAS Platform

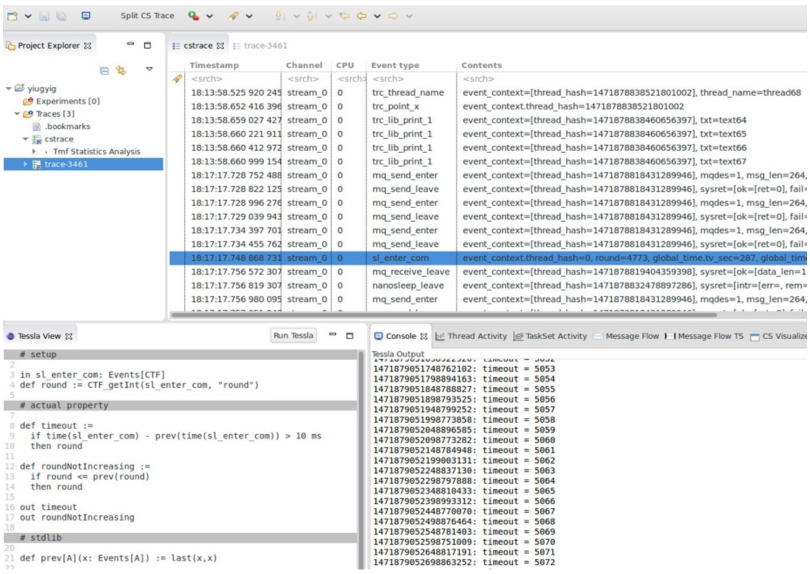
TAS Platform provides a generic platform used on a multitude of Thales ground transportation systems applications deployed all over the globe. Due to the strict separation between the TAS Platform generic components and the application specific characteristics TAS Platform is deployed in all kinds of railway systems like interlocking systems, radio block control, operation management center, on-board systems and way-side equipment.

When a problem in a TAS Platform based application is analyzed with a traditional tracing solution, a specialized engineer needs to know what to look for in the trace data and to imagine how to reproduce the detected problem in laboratory conditions.

Even if the data needed to detect the problem is present in the trace it is not straight forward to spot the exact point where the bug occurs. The process is in most cases very time consuming. The picture below shows the integration of event streams in the Common Trace Format (CTF) with a TeSSLa specification, where TeSSLa helps the developer to query the trace more effectively.

Often problems are caused by timing, by wrong order of events, etc. By using the COEMS solution, the time to analyze such a trace can be significantly shortened. Filters defined with the COEMS monitoring specification language TeSSLa will be used to automatically analyze the traces and detect potential problems. Such filters can be collected in a library and be reused to detect problems for specific families of applications.

In a first prototype of the COEMS demonstrator, TeSSLa was integrated within an Eclipse environment and successfully used to analyze TAS Platform applications traces.



COEMS General Assembly in Bergen

On 12th & 13th of June we held the General Assembly just outside of Bergen, Norway. The assembly brings all partners to the table to discuss the progress on future steps in the COEMS project. All partners gave technical updates on their work packages, and external experts Prof. Einar Broch Johnsen of the University of Oslo and Dr. Bernard Schmidt from Robert Bosch GmbH provided valuable input for our project.

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ARM Research Summit

The ARM Research Summit 2018 was held in Cambridge, UK from September 17 to 19.
It provided a perfect environment to present and discuss the technologies developed in COEMS: "At the Arm Research Summit, academics, researchers and industry experts meet to discuss the latest developments in computing research and practical computing challenges."

COEMS was present at the summit with a demonstration table where attendees got information about the latest results of our project. Two posters informed about the general idea of non-intrusive monitoring of processors through their embedded tracing units and provided the technological backgrounds. A live demonstration of the TeSSLa IDE integration and the compilers showed the power of the COEMS solutions. The demonstration table next to the entry of the lecture hall was a high-frequented meeting point. We had many inspiring discussions with potential users of our technology.
Hope to meet you again at the next event!

Papers & Talks

COEMS technology was featured in a presentation of a conference article submitted to the 33rd ACM Symposium On Applied Computing in Pau, France:
Martin Leucker, César Sánchez, Torben Scheffel, Malte Schmitz, and Alexander Schramm: "TeSSLa: Runtime Verification of Non-synchronized Real-Time Streams"

https://www.sigapp.org/sac/sac2018

PhD student Faustin Ahishakiye from HVL presented current results and further plans on measuring coverage at the PhD-iFM'18 in Maynooth, Ireland in September:
Faustin Ahishakiye and Felix Dino Lange: "Non-intrusive MC/DC Measurement based on Traces"

https://ifm2018.cs.nuim.ie/PhDSymposium

The paper on the COEMS application on data race detection by Svetlana Jakšić, Dan Li, Ka I Pun, and Volker Stolz: Stream-based dynamic data race detection and the COEMS overview poster were presented at the Norwegian Informatics Conference (NIK) in Svalbard

http://nikt2018.ifi.uio.no

The paper „Runtime Verification of Non-synchronized Real-Time Streams" has been chosen as best paper at the SVT track of the SAC conference and has been invited for publication in a special issue of the journal Formal Methods for Software Verification and Testing in the Software Quality.

http://sac-svt-2018.imag.fr/

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Workshop in Vienna

On 25th and 26th of July 2018 we held a 2 day- workshop for COEMS technical project members at Thales' facilities in Vienna. Key issue was to exchange knowledge about debugging embedded systems based on the current workflow by Thales Austria's TAS Platform, a safety critical railway platform. TeSSLa experts reported about the current implementation status and gave lectures on how TeSSLa can be used for selected examples derived from typical cases of field applications. Additionally, ideas to improve TeSSLa as a debugging/tracing language were discussed and some TAS Platform test cases were transformed to the TeSSLa specification language and the output was analyzed.
Additionally a first knowledge transfer for the installation and use of Accemic's equipment for hardware tracing of the Xilinx Zynq SoC took place.
The workshop provided a good basis for all participants to enhance knowledge about analysis of trace informationon COEMS technology as well as new ideas for developing future TeSSLa features for COEMS.

Upcoming

Martin Leucker will give a tutorial on Runtime Verification: Some Basics and Some Latest Developments at the ICTAC 2018 - 15th International Colloquium on Theoretical Aspects of Computing on October 15 in Stellenbosch, South Africa

https://www.ictac.org.za/tutorials.html

COEMS will be presented in a workshop at ISoLA - the 8th International Symposium on Leveraging Applications of Formal Methods, Verification and Validation on November 9 in Limassol, Cyprus

http://www.isola-conference.org/isola2018/

Daniel Thoma will give a tutorial on Hardware-based Runtime Verification with Embedded Tracing Units and Stream Processing at the RV2018 - the 18th International Conference on Runtime Verification which is part of the 8th International Symposium on Leveraging Applications of Formal Methods, Verification and Validation on November 10 in Limassol, Cyprus

https://rv2018.isp.uni-luebeck.de/tutorials/

Daniel Thoma will present
Lukas Convent, Sebastian Hungerecker, Martin Leucker, Torben Scheffel, Malte Schmitz and Daniel Thoma: TeSSLa: Temporal Stream-based Specification Language
at the XXI Brazilian Symposium on Formal Methods in on November 26 in Salvador, Brazil

http://www.sbmf2018.ufba.br/

In the course of the 14th HiPEAC conference which will take place in Valencia, Spain from January 21 to 23, 2019, COEMS will be presented in a workshop on January 21.

https://www.hipeac.net/2019/valencia/

For more information about the project please visit the COEMS website:

www.coems.eu

Consortium:

Universität zu Lübeck – Institute for Software Engineering and Programming Languages · Accemic Technologies · Thales · Høgskulen på Vestlandet · Airbus

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