Towards Parallelizing Legacy Embedded Control Software Using the LET Programming Paradigm

Julien Hennig, Hermann v. Hasseln, Hassan Mohammad Daimler AG

Stefan Resmerita, Stefan Lukesch, Andreas Naderlinger University of Salzburg and Chrona

Work-in-Progress session at 22nd Real-Time and Embedded Technology and Applications Symposium (RTAS 2016)
The Challenge

• evolutionary development of automotive powertrain software
• increasing demand for processing power → migration to multi-core
• rewriting of our complete SW would be too much effort
The Challenge

• evolutionary development of automotive powertrain software
• increasing demand for processing power → migration to multi-core
• rewriting of our complete SW would be too much effort

→ migration of CPC-SW from single-core to multi-core
  • minimize changes in application source code and functional behavior
  • intuitive, standard-supported specification of parallel behavior
  • built-in robustness
1\textsuperscript{st} Step: Parallelization

- based on analysis of data dependencies between runnables
- forward dependencies are to be preserved
- some backward dependencies may change to forward
2nd Step: LET-based Implementation with TDL

- Logical Execution Time (LET) paradigm for synchronization
- specification with the Timing Definition Language (TDL)
Future Work

• LET integration in AUTOSAR for multi-core
  • first concept already developed for integration of runtime components
  • AUTOSAR interface development under way
  • we are seeking minimal extension of AUTOSAR specification

• evaluation in prototypic implementation
• extension to distributed functions
Thank you!

For further information, come meet us at the poster