Problem Statement

The NECSI (Network on Engineering Complex Software Intensive Systems for Automotive Systems) initiative is a collaboration between several Canadian universities, General Motors of Canada, IBM and Malina software. It is aimed at researching Model Driven Engineering methodologies and tools for increasing productivity when developing automotive software. Our work concentrates on the study of the role of model transformations in this scenario, in particular on their correction. Model transformations are ubiquitous in software development, some examples are data format interchange tools, language translators, small compilers or small language interpreters. Most of the times in industrial settings these tools are defined in an implicit fashion. By treating model transformations as first-class citizens of the development toolchain and verifying they are correct, we aim at increasing the reusability of quality software and thus increasing productivity.

Verifying transformations for language translators, small compilers (terminating transformations) [1, 2]

Verifying transformations for language interpreters (general case non-terminating transformations) [3]

Model transformations in automotive software

The power window case study

Identified domain specific languages

- Environment Description Language: for describing interactions between the power window and humans;
- Plant Description Language: for describing the hardware configuration of a power window;
- Controller Description Language: for describing the logical operation of the power window hardware components;
- Deployment Platform Language: for describing the whole infrastructure.

Identified transformations

- for verification: e.g. Control DL → Petri Nets
- for simulation: e.g. Plant DL → Causal Block Diagrams
- for composition: e.g. Env. DL + Ctrl. DL + Plant DL → Petri Nets
- for deployment: e.g. Control DL + Plant DL → Deployment DL

Conclusions & Future Work

The problem of verifying model transformations is not yet sufficiently well studied, or even well defined. We are studying the problem from two – ideally converging – directions: (1) what are the usable properties of model transformations and what techniques can be used to verify them; (2) what transformations and respective interesting properties emerge from industrial practice. We have started working on these two directions. Having identified transformations in the power window case study, we will now work on their properties’ verification.

Bibliography