

# Refinement notions for CSP-CASL

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In this talk we give a status report of an ongoing PhD project which develops and studies various notions of refinement for the specification language CSP-CASL [6]. CSP-CASL combines the description of *processes* written in the process algebra CSP [5, 7] with the specification of *data types* formulated in the algebraic specification language CASL [1].

The starting points for the PhD project are the various notions of refinement for CSP and CASL alone. For CSP, each of its semantic models induces a notion of refinement, i.e., the model  $\mathcal{T}$  induces the notion of trace refinement which preserves safety properties, the model  $\mathcal{N}$  induces the notion of failures-divergence refinement which preserves livelock-freedom, and the model  $\mathcal{F}$  induces the notion of stable-failures refinement which preserves deadlock-freedom. In algebraic specification [3], on the other side, we have model class inclusion as the simplest form of refinement, while, for instance, observational refinement [2] captures a more ‘refined’ relation between model classes.

In our project, we combine refinement notions on CSP and CASL alone into refinement notions for CSP-CASL. Having CSP-CASL available as an institution, every such CSP-CASL refinement for basic specifications can also be seen as a refinement that allows one to change the signature. The case study on the electronic payment system EP2 [4] yields good practical insight into the question if such a newly designed refinement notion is useful. On the theoretical side, we study decomposition theorems and the question if properties such as deadlock-freedom are preserved under CSP-CASL refinement.

## References

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