

# Modular Reasoning for Crosscutting Concerns with Contracts

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**Abstract:** Separation of concerns into modules is an active research area since four decades. Modularization is beneficial for complex software systems, as it enables a divide-and-conquer strategy to software development and maintenance. A key ingredient for modularization is that modules can be studied to a certain extent in isolation, which is important for program comprehension as well as for verification. Design by contract is a means to formalize implicit assumptions for module boundaries and thus facilitates modular reasoning. While design by contract was initially proposed for object-oriented programming, we focus on the modularization of crosscutting concerns. We discuss several approaches to combine design by contract with modularization techniques for crosscutting concerns. While some of these approaches have been discussed previously, we unify them to achieve synergies. Our experience with case studies suggests that we can achieve fine-grained trade-offs between openness to extensions by other modules and closeness for modular reasoning. We argue that our approach generalizes the open-closed principle known from object-oriented programming to crosscutting concerns.

In this talk, we give an overview on our experiences in specifying crosscutting concerns with modular contracts. For further reading and a list of all involved co-authors, we refer to previously published articles [TSKA11, STAL11, TSAH12, Thü12, TAZ<sup>+</sup>13, Thü13, SST13, AvRTK13].

## References

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