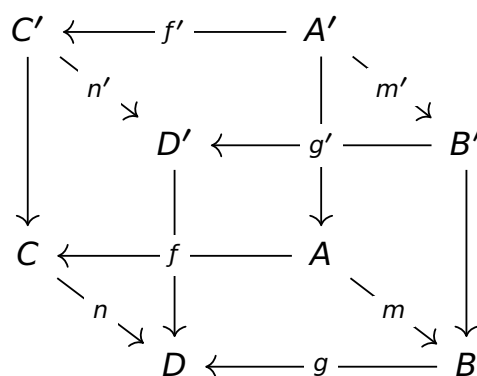


## Bachelor/Master Thesis

# Formalisation of Adhesive Categories



*Category Theory* provides us with a general, abstract framework for talking about relations between various kinds of objects, generalising many notions of set theory.

A category is called *adhesive* if its pushouts along monomorphisms are stable along pullbacks (and vice versa) in what is called a *van Kampen square*. Such categories admit an easy definition of rewrite rules based on pushouts called *Higher-Level Rewrite systems*, which form a generalised version of rewrite rules on graphs, typed graphs, Petri nets, and many more. In particular, properties like independence of rules as well as local and global confluence can be described in this general setting.

In Model-driven development (MDD), where the development of a complex system is commonly split into several distinct *models* of which each describes a different domain's view on the system, models are usually given in languages like UML or SysML. However, by discarding their concrete syntax, they can also be formalised as (attributed, typed) graphs, and as thus, they also form adhesive categories.

However, there currently exists no thorough formal, machine-checked formulation of such approaches. Your task would be to develop such a formal treatment of the existing literature, in particular of the definitions of the general concept of adhesive categories and HLR systems, and their particular instantiation for attributed typed graphs (ATGs), in an interactive theorem prover of your choice.

**Your Profile.** You should have prior experience with an interactive theorem prover (any of Isabelle, Lean, ...) and be curious about category theory.

## Contact

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