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Christian Williams* (williams@math.ucr.edu), 720 El Cerrito Drive, Unit 10, Riverside, CA 92507. *Predicate Calculus for Algebraic Type Theory*. Preliminary report.

An algebraic theory T is a category which encapsulates a form of algebraic structure. We present a notion of predicate for algebraic theories, which admits a calculus of both logical and algebraic operations. We thereby extend equational logic by first-order logic, and provide a natural type theory for algebraic structures. The process can be understood as providing the theory T with a polymorphic type system.

We demonstrate the idea with the theory of monoids, and derive the example predicate "prime". This and many algebraic examples are useful only when they are mapped from a theory into models. However our motivation is programming languages: we focus on applying the idea to a more general notion of theory with variable binding.

The motivation of this work is a logic for concurrency, known as Namespace Logic. This applies to the reflective higher-order π calculus, which is the language of the distributed computing platform RChain. We demonstrate the predicate calculus by constructing Namespace Logic. This gives a general framework for logic computation, and provides a glimpse into a large field of potential application. (Received February 23, 2020)