

# An Inflationary Fixed Point Operator in XQuery

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## 1 Abstract

The backbone of the XML data model, namely *ordered, unranked trees*, is inherently recursive and it is natural to equip the associated languages with constructs that can query such recursive structures. To get from the recursive axes in XPath, *e.g.*, `ancestor` and `descendant`, to XQuery’s recursive user-defined functions, language designers took a giant leap, however. User-defined functions in XQuery admit *arbitrary* types of recursion—a construct that largely evades optimization approaches beyond “procedural” improvements like tail-recursion elimination or unfolding.

We introduce a controlled form of recursion in XQuery, an *inflationary fixed point operator*, familiar in the context of relational databases. This imposes restrictions on the expressible types of recursion, but we show that inflationary fixed points nevertheless are sufficiently versatile to capture a wide range of interesting use cases, including the semantics of Regular XPath [2, 3] and its core *transitive closure* operator.

While the optimization of general user-defined recursive functions in XQuery appears elusive, we will describe how inflationary fixed points can be efficiently evaluated, provided that the recursive XQuery expressions exhibit a *distributivity* property. We show how distributivity can be assessed both, syntactically and algebraically, and provide experimental evidence that XQuery processors can substantially benefit during inflationary fixed point evaluation.

This work is covered in [1].

## References

- [1] L. Afanasiev, T. Grust, M. Marx, J. Rittinger, and J. Teubner. An Inflationary Fixed Point in XQuery. In *Proceedings of ICDE*, 2008.
- [2] M. Marx. XPath with conditional axis relations. In *Proceedings of EDBT 2004*, volume 2992 of *Lecture Notes in Computer Science*. Springer, 2004.
- [3] B. ten Cate. Expressivity of XPath with Transitive Closure. In *Proceedings of PODS*, pages 328–337, 2006.