Understanding the trade-offs of causal replication solutions through simulation

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Abstract. Causal replication is a weak consistency model, that works by tracking causal dependencies between operations of a system, and making sure that they are propagated and displayed, to users of that system, in a causally consistent order. Many different ways of achieving causal consistency have been proposed in the literature over the years, (eg. usage of Logical Clocks[1], Logical Clocks with Physical Timestamps[5, 2], tracking Direct Dependencies[4], usage of specific node topologies that naturally ensure consistency[3]) but each comes with it's own set of trade-offs which turn the decision complicated and highly dependent on the specification of the system that one is looking to develop. The aim of this work, is exploring those trade-offs through the usage of a simulator, to more thoroughly understand the limits, and optimal use cases of each proposed solution.

Keywords: Causality Tracking · Consistency · Simulator

1 Introduction

2 Related Work

3 Causality Tracking

4 Progress Report

References

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