



Using Linearizable Objects in Randomized Concurrent Programs

Jennifer L. Welch  

Dept. of Computer Science and Engineering, Texas A&M University, Texas, USA

Abstract

Atomic shared objects, whose operations take place instantaneously, are a powerful technique for designing complex concurrent programs. Since they are not always available, they are typically substituted with software implementations. A prominent condition relating these implementations to their atomic specifications is linearizability, which preserves safety properties of programs using them. However linearizability does not preserve hyper-properties, which include probabilistic guarantees about randomized programs. A more restrictive property, strong linearizability, does preserve hyper-properties but it is impossible to achieve in many situations. In particular, we show that there are no strongly linearizable implementations of multi-writer registers or snapshot objects in message-passing systems. On the other hand, we show that a wide class of linearizable implementations, including well-known ones for registers and snapshots, can be modified to approximate the probabilistic guarantees of randomized programs when using atomic objects.

This is joint work with Hagit Attiya and Constantin Enea.

2012 ACM Subject Classification Theory of computation

Keywords and phrases Concurrent objects, strong linearizability, impossibility proofs, message-passing systems, randomized algorithms

Digital Object Identifier 10.4230/LIPIcs.DISC.2022.3

Category Invited Talk



© Jennifer L. Welch;

licensed under Creative Commons License CC-BY 4.0

36th International Symposium on Distributed Computing (DISC 2022).

Editor: Christian Scheideler; Article No. 3; pp. 3:1–3:1

Leibniz International Proceedings in Informatics



LIPICs Schloss Dagstuhl – Leibniz-Zentrum für Informatik, Dagstuhl Publishing, Germany