Recreating the algorithms proposed in "Reducing Context-bounded Concurrent Reachability to Sequential Reachability"

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1 Introduction

In this work, we recreated the algorithms proposed in [1]. [1] proposes two algorithms for reducing concurrent programs to sequential. We implemented both algorithms (Eager and Lazy). We utilized the bit permutation experiment performed by the authors, to experiment with the two algorithms. For the implementation of the Eager and Lazy algorithms we used the description of the algorithms in Sections 4 and 5, respectively, as well as the algorithmic representation in Figures 2 and 4. For the bit permutation experiment, we utilized the description of Section 3, page 8, as well as the description of the bit permutation experiment in Section 6.

2 Eager Approach

The implementation of the eager algorithm follows the implementation in Figure 2 of the paper. Additionally, we implemented the firstContext and nextContext functions, using the description provided by the paper in Section 4. Furthermore, we implemented the control code (Section 4) and

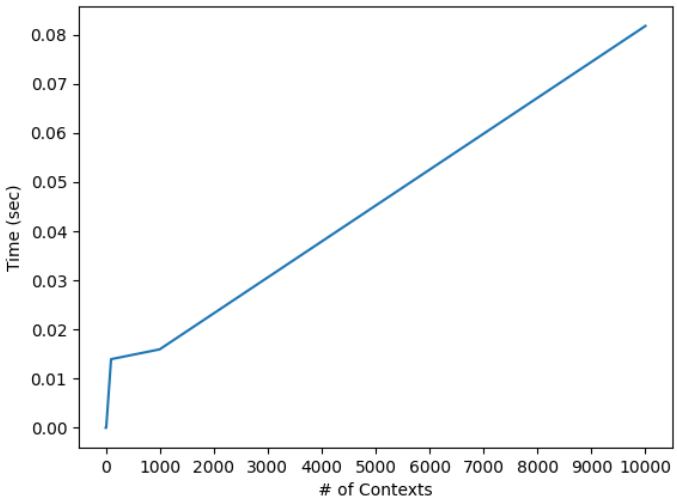

Figure 1: Eager algorithm

invoked it after shared values are read/written. As for the threads' implementation, the values of the 4 bits in thread2 are selected randomly (between the values of True or False), similar to what the authors did for the 16 bits experiment. Figure 1 shows the time performance of the Eager approach when varying the number of contexts of each thread.

3 Lazy Approach

The implementation of the lazy algorithm follows the implementation of the algorithm in Figure 4 of the paper. In the implementation of the lazy algorithm, we also invoke the control code after shared values are read/written. The implementation of the threads 1 and 2 is similar to the implementation found in Figure 1 of the paper. Figure 2 shows the time performance of the Eager approach when varying the number of contexts of each thread.

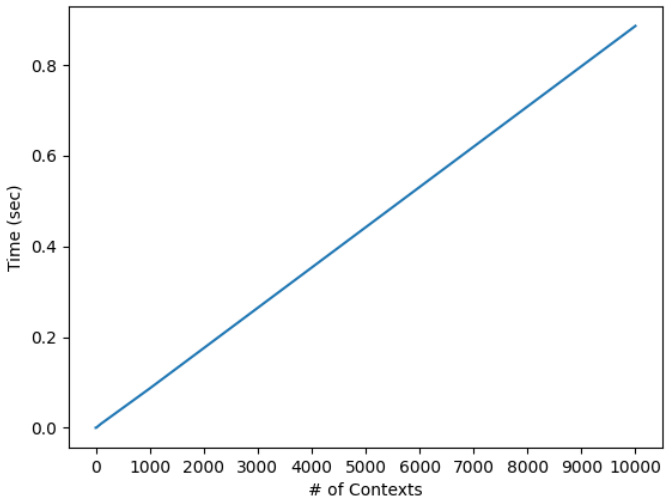

Figure 2: Lazy algorithm

References

[1] S. La Torre, P. Madhusudan, and G. Parlato. Reducing context-bounded concurrent reachability to sequential reachability. In A. Bouajjani and O. Maler, editors, *Computer Aided Verification*, pages 477–492, Berlin, Heidelberg, 2009. Springer Berlin Heidelberg.