QBF-Hardness Benchmark Suite

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Bounded Model Checking for incomplete designs [1] is able to prove the unrealizability of an invariant when using universal quantified variables to model the unknown behavior of the black box outputs. However, it is not guaranteed that BMC using the QBF-based modeling leads to a result at all and BMC would consecutively produce unsatisfiable instances (we call such verification problems QBF-hard). This benchmark suite contains the QBF encoding of our iterative QBF-hardness procedure which is applied to an arbiter-bus-system (see Figure 1) with a parameterized number of connected abstract components. Modeling the arbiter as a black box makes the system QBF-hard for the mutual exclusion property. We provide QBF formulas for systems containing 5 to 10 components and inserted two errors into the first component leading to different depths for a successful QBF-hardness prove (satisfiable instance).

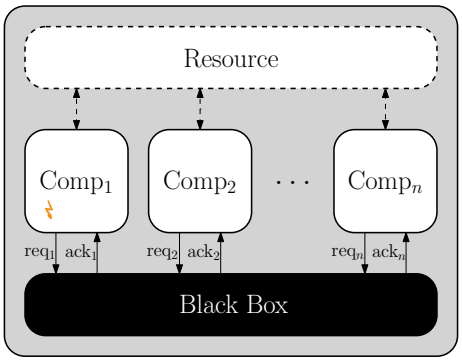

Figure 1: Incomplete Arbiter-Bus-System.

References

[1] C. Miller, S. Kupferschmid, M. Lewis, and B. Becker. Encoding Techniques, Craig Interpolants and Bounded Model Checking for Incomplete Designs. In O. Strichman and S. Szeider, editors, *Theory and Applications of Satisfiability Testing - SAT 2010, 13th International Conference, Edinburgh, UK, July 11-14, 2010. Proceedings*, volume 6175 of *Lecture Notes in Computer Science*. Springer, 2010.