

Abstract

Progressing Collaborative Systems

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This paper builds on existing models for collaborative systems with confidentiality policies. The actions in these models are balanced, namely, they have an equal number of facts in their pre- and post-conditions. Here we consider a further restriction that each instance of an action is used at most once in a process. Administrative processes usually involve such progressing behavior, that is, whenever a transaction is performed, it does not need to be repeated. We investigate the complexity of the decision problem whether there exists a sequence of transitions from an initial state to a final state that avoids any critical states, e.g., states which conflict with the given confidentiality policies. We show that this problem is NP-complete when balanced actions do not involve fresh values and when the system is progressing. The same problem is shown to be PSPACE-complete when the system is not progressing, and PSPACE-hard when the system is progressing, but when actions may update values with fresh ones. The bounds hold even when balanced actions change only one fact in a configuration. We implement some examples in logic-based verification tools and model-check that they comply with certain policies.