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Abstract: The Compositional Security Checker (CoSeC for short) is a semantic-based tool for the automatic verification of some compositional information flow properties. The specifications given as inputs to CoSeC are terms of the Security Process Algebra, a language suited for the specification of concurrent systems where actions belong to two different levels of confidentiality.

The Compositional Security Checker: a tool for the ...

Pris: 1689 kr. Inbunden, 2002. Skickas inom 10-15 vardagar. Köp Compositional Verification of Concurrent and Real-Time Systems av

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Correct(T)C,C.C=T(C)=CC. (1.1) That is, for any source program Cacceptable byT,T(C)is a refinement of C. When the source and the target are shared-state concurrent programs, the refinement needs to...

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Theoretical Computer Science

ELSEVIER Theoretical Computer Science 140 (1995) 95138 On using temporal logic for refinement and compositional verification of concurrent systems Abdelillah Mokkedem*, Dominique Mery CRINCNRS INRIALorraine, BP239,

On using temporal logic for refinement and compositional ...

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Toward Implicit Learning for the Compositional Verification of Markov

Decision Processes. Redouane Bouchekir, Mohand Cherif Boukala. Pages 200-217. Back Matter. ... methods and techniques, and especially those developed for concurrent and distributed hardware/software systems. Keywords.

With the rapid growth of networking and high-computing power, the demand for large-scale and complex software systems has increased dramatically. Many of the software systems support or supplant human control of safety-critical systems such as flight control systems, space shuttle control systems, aircraft avionics control systems, robotics, patient monitoring systems, nuclear power plant control systems, and so on. Failure of safety-critical systems could result in great disasters and loss of human life. Therefore, software used for safety critical systems should preserve high assurance properties. In order to comply with high assurance properties, a safety-critical system often shares resources between multiple concurrently active computing agents and must meet rigid real-time constraints. However, concurrency and timing constraints make the development of a safety-critical system much more error prone and arduous. The correctness of software systems nowadays depends mainly on the work of testing and debugging. Testing and debugging involve the process of de tecting, locating, analyzing, isolating, and correcting suspected faults using the runtime information of a system.

However, testing and debugging are not sufficient to prove the correctness of a safety-critical system. In contrast, static analysis is supported by formalisms to specify the system precisely. Formal verification methods are then applied to prove the logical correctness of the system with respect to the specification. Formal verifica tion gives us greater confidence that safety-critical systems meet the desired assurance properties in order to avoid disastrous consequences.

Abstract: "This thesis presents a collection of techniques and tools for avoiding the State Explosion Problem in verification of State/Event Systems and real time systems. The algorithms uses [sic] symbolic representations and compositional reasoning as basic means for making verification feasible for large systems. The thesis consists of six papers denoted A-F. In papers A and B we present symbolic techniques for verification of state/event systems. Both techniques uses [sic] compositional reasoning together with a dependency analysis. In paper A an implicit symbolic representation using BDDs is used to keep the state space small during verification. Paper B uses an explicit representation of the intermediate state/transition graphs which are kept small using a context dependent minimization. In paper C we present a method for automatically constructing real time systems directly from their specifications. The model-construction problem is considered for implicit specifications. First symbolic contexts transducing actions and time are introduced as transformers for properties in a timed modal logic.

Next, a direct model construction of a regular timed agent from a logical specification is presented. Paper D presents the application of the model checker UPPAAL on the modelling and verification of Philips Audio Control Protocol with bus collision detection. When presented in 1996 this was the largest case study for real time systems that had ever been carried out. Paper E presents a compositional proof of a real time protocol for mutual exclusion. The proof is carried out using a quotient technique. Paper F is an early paper presenting the modelling and analysis of a steam generator using the model checker UPPAAL."

An advanced 2001 textbook on

verification of concurrent programs using a semantic approach which highlights concepts clearly.

This monograph presents two formal methods for the specification and compositional verification of real-time systems. One uses a real-time extension of temporal logic and the other is based on extended Hoare triples. Programs consist of concurrent processes with synchronous message passing. The maximal parallelism model is extended to multiprogramming.

This book constitutes the refereed proceedings of the 23rd Symposium on Formal Methods, FM 2019, held in Porto, Portugal, in the form of the Third World Congress on Formal Methods, in October 2019. The 44 full papers presented together with 3 invited presentations were carefully reviewed and selected from 129 submissions. The papers are organized in topical sections named: Invited Presentations; Verification; Synthesis Techniques; Concurrency; Model Checking Circus; Model Checking; Analysis Techniques; Specification Languages; Reasoning Techniques; Modelling Languages; Learning-Based Techniques and Applications; Refactoring and Reprogramming; I-Day Presentations.

Concurrent systems are getting more complex with the advent of multi-core processors and the support of concurrent programs. However, errors of concurrent systems are too subtle to detect with the traditional testing and simulation. Model checking is an effective method to verify concurrent systems by exhaustively searching the complete state space exhibited by a system. However, the main challenge for model checking is state explosion, that is the state space of a concurrent system grows exponentially in the number of components of the system. The state space explosion problem prevents model checking from being applied to systems in realistic size. After decades of intensive research, a large number of methods have been developed to attack this well-known problem. Compositional verification is one of the promising methods that can be scalable to large complex concurrent systems. In compositional verification, the task of verifying an entire system is divided into smaller tasks of verifying each component of the system individually. The correctness of the properties on the entire system can be derived from the results from the local verification on individual components. This method avoids building up the global state space for the entire system, and accordingly alleviates the state space explosion problem. In order to facilitate the application of compositional verification, several issues need to be addressed. The generation of over-approximate and yet accurate environments for components for local verification is a major focus of the automated compositional verification. This dissertation addresses such issue by proposing two abstraction refinement methods that refine the state space of each component with an over-approximate environment iteratively.

Abstract: "We show how epistemic logic may be used to reason about concurrent programs. Starting out from Halpern & Moses 'interpretation of knowledge in the context of distributed systems, where they use the interleaving model, we extend this to a setting where also truly concurrent computations can be modeled, viz. posets of action labels. Moreover, and more importantly, we present an epistemic proof system for the compositional verification of concurrent programs. As our programming language, we fix a channeled variant of Hoare's well-known Concurrent Sequential Processes (CSP). Proofs of soundness and (relative) completeness of the proof system are provided."