Information Flow for Timed Automata

One of the key demands of cyberphysical systems is that they meet their safety goals. Timed Automata has established itself as a formalism for modelling and analysing the real-time safety aspects of cyberphysical systems. Increasingly it is also demanded that cyberphysical systems meet a number of security goals for confidentiality and integrity. Information Flow Control is an approach to ensuring that there are no flows of information that violate the stated security policy.

Time dependent policy-based access control

Access control policies are essential to determine who is allowed to access data in a system without compromising the data’s security. However, applications inside a distributed environment may require those policies to be dependent on the actual content of the data, the flow of information, while also on other attributes of the environment such as the time. In this paper, we use systems of Timed Automata to model distributed systems and we present a logic in which one can express time-dependent policies for access control. We show how a fragment of our logic can be reduced to a logic that current model checkers for Timed Automata such as UPPAAL can handle and we present a translator that performs this reduction. We then use our translator and UPPAAL to enforce time-dependent policy-based access control on an example application from the aerospace industry.
Publication information
Journal: Leibniz International Proceedings in Informatics
Volume: 90
ISSN (Print): 1868-8969
Ratings:
Scopus rating (2016): CiteScore 0.73 SNIP 0.681
Scopus rating (2015): SJR 0.425 SNIP 0.777
Scopus rating (2014): SJR 0.574 SNIP 0.812
Scopus rating (2013): SJR 0.57 SNIP 0.746
ISI indexed (2013): ISI indexed no
Scopus rating (2012): SJR 0.577 SNIP 0.958
ISI indexed (2012): ISI indexed no
Scopus rating (2011): SJR 0.542 SNIP 0.987
ISI indexed (2011): ISI indexed no
Scopus rating (2010): SJR 0.467 SNIP 1.342
Scopus rating (2009): SJR 0.101 SNIP 0.139
Original language: English
Electronic versions:
LIPIcs_TIME_2017_21.pdf
DOIs:
10.4230/LIPIcs.TIME.2017.21
Source: FindIt
Source-ID: 2392096119
Publication: Research - peer-review › Conference article – Annual report year: 2017

Projects:

Abstract Interpretation for Secure Information Flow
Department of Applied Mathematics and Computer Science
Period: 01/09/2016 → 31/08/2019
Number of participants: 3
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Financing sources
Source: Internal funding (public)
Name of research programme: Samfinansieret - Andet
Project: PhD