Contribution ID: **204** Type: **not specified**

Testing the Red-Black tree implementation of the Linux kernel against a formally verified variant

Wednesday, 22 September 2021 08:30 (25 minutes)

In this talk, we will show how to construct evidence of correctness through testing and formal verification. In our case study, we test the long-standing Red-Black tree implementation in the kernel against a variant in a functional programming language. This variant has been formally verified in the interactive theorem prover Isabelle [1]. To our surprise, the kernel Red-Black tree implementation is a variant that is not known in the literature of functional data structures so far. We are glad that we still found it to be correct with newly identified invariants for the correctness proof.
[1] https://isabelle.in.tum.de/

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Primary authors: Mr POLAT, Mete (Technische Universität München); BULWAHN, Lukas (Elektrobit Automotive GmbH)

Presenters: Mr POLAT, Mete (Technische Universität München); BULWAHN, Lukas (Elektrobit Automotive GmbH)

Session Classification: Testing and Fuzzing MC

Track Classification: Testing and Fuzzing MC