

ROOMtest

An Approach for the Structural Testing of ROOMcharts and UML-RT State Diagrams

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The use of object-oriented methods in the cost-intensive and safety-critical sector is tied to the existence of sufficient quality assurance techniques and tools. The object-oriented methods and tools for the development of real-time software systems enable the construction of high quality software systems. Despite the merits of these methods concerning software construction the analytical quality assurance is widely neglected. Only a few methods that are based on the structural and dynamical models of the new development methods were introduced and even less are realised in commercial tools.

The ROOMtest project aims the development of a tool set for structural module testing in a software development process with Real-Time Object Oriented Modeling, also referred to as ROOM. For the generation of test cases and the definition of test completeness are graph and automata theoretic methods applied. In order to apply automata-theoretic testing methods an test model with finite state machine semantics has to be derived from the ROOMchart specification. The derived finite state machine may serve as a model for test generation methods and for the application of graph-based coverage criteria.

Many testing problems occur when structural testing is based on a ROOM-chart with conditional properties, i.e. guard conditions and choicepoints. Other problems occur when flattening a ROOMchart in order to derive a testable finite state machine.

The ROOMtest approach includes methods to handle ROOMcharts with conditional and compositional properties and integrates ROOM into a phase driven software development process in the safety critical sector.