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Abstract

Different description techniques have to be used to describe properties of a system. This is the case if the properties belong to different aspects of a system. But even to describe properties of a single aspect it is often not sufficient to use a single one description technique.

We investigate in this dissertation how description techniques which are suitable for describing the aspect "behaviour" of reactive systems can be combined. This investigation is based upon a combination of the description techniques statecharts and TLA.

The description techniques statecharts and TLA differ w.r.t. the description style as well as w.r.t. the point of time when changes of entities become effective. The description technique statecharts is a representative of the class of model-oriented description techniques. By using such description techniques properties of a system are expressed by writing abstract models of a system. TLA is a representative of the class of property-oriented description techniques. Using them properties are often expressed by logical formulae. W.r.t. the point of time when changes become effective statecharts and TLA differ because in statecharts changes become effective after their stimuli. In TLA it is possible to describe that a change becomes effective together with its stimulus. Due to these differences it is not obvious how statecharts and TLA can be combined in a useful way.

In this dissertation we combined statecharts and TLA on a syntactical level by associating TLA-formulae with states of a statechart. The intended meaning is that the TLA-formulae are valid as long as the corresponding state is active. On the semantical level statecharts and TLA are combined by translating statecharts into equivalent TLA-formulae. These TLA-formulae can be combined with the TLA-formulae that are associated with statecharts-states.

We show how these description techniques can be used together in different kinds of descriptions. The descriptions differ w.r.t. their level of abstraction — descriptions of an uncontrolled plant versus a design of a controller — as well as w.r.t. the mode of its meaning — possible behaviour of a plant versus its intended behaviour.

It is an essential problem of such a combination of description techniques to ensure that such descriptions are consistent. That means, that such descriptions are satisfiable. We present approaches to show that a description is consistent.

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