

## EINLADUNG

Zeit: Donnerstag, 06. April 2006, 16.30 Uhr

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Titel: From Quality to Quantity: Quantative Logics and System relations for quantitative transition systems

### Abstract:

Many system models contain quantitative information, such as time, probability, resource consumption, and continuous dynamics. Such quantitative models are usually analyzed in a boolean fashion, answering verification and refinement questions with a yes/no answer.

This boolean approach has two drawbacks.

\* It lacks expressivity, as one cannot quantify to what extent a property holds.

\* It is fragile, since small perturbations in the system model may lead to opposite truth values for a specification. This is a problem, since the numbers appearing in the model are often an estimation, obtained by measurements or learning, of the values in the physical system.

This talk presents a framework for quantitative specification, model checking and refinement. We consider quantitative transition systems (QTSs), where predicates are assigned a real number in  $[0,1]$ , rather than a boolean value. We present system metrics (distance functions) for QTSs, which are the quantitative analogi of refinement relations: rather than telling-whether one system correctly implements another one, metrics measure how closely one matches the other. We also consider quantitative versions of LTL and CTL, called QLTL and QCTL respectively. In every state, the value of a formula is a real number in the interval  $[0,1]$ . Then we show that QLTL characterizes is characterized by our linear distance and the QCTL by our branching distance. This generalizes the well-known fact that trace equivalence is characterized by LTL and bisimulation by CTL.

(Joint work with Luca de Alfaro and Marco Faella)

Es laden ein: Die Dozenten der Informatik