

# Specifying Event/Data-based Systems (keynote)

Alexander Knapp

Augsburg University, Germany

## Abstract

Event/data-based systems are controlled by events, their local data state may change in reaction to events. Numerous methods and notations for specifying such reactive systems have been designed, though with varying focus on the different development steps and their refinement relations. We first briefly review some of such methods, like temporal/modal logic, TLA, UML state machines, symbolic transition systems, CSP, synchronous languages, and Event-B with their support for parallel composition and refinement. We then present  $E\downarrow$ -logic for covering a broad range of abstraction levels of event/data-based systems from abstract requirements to constructive specifications in a uniform foundation.  $E\downarrow$ -logic uses diamond and box modalities over structured events adopted from dynamic logic, for recursive process specifications it offers (control) state variables and binders from hybrid logic. The semantic interpretation relies on event/data transition systems; specification refinement is defined by model class inclusion. Constructive operational specifications given by state transition graphs can be characterised by a single  $E\downarrow$ -sentence. Also a variety of implementation constructors is available in  $E\downarrow$ -logic to support, among others, event refinement and parallel composition. Thus the whole development process can rely on  $E\downarrow$ -logic and its semantics as a common basis.

Acknowledgments: Joint work with Rolf Hennicker and Alexandre Madeira.

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29th International Workshop on Concurrency, Specification and Programming (CS&P'21)


✉ [knapp@informatik.uni-augsburg.de](mailto:knapp@informatik.uni-augsburg.de) (A. Knapp)

🌐 <https://www.uni-augsburg.de/de/fakultaet/fai/informatik/prof/swtsse/> (A. Knapp)

🆔 0000-0002-4050-3249 (A. Knapp)



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