Coloured Petri Nets and CPN Tools for Modelling and Validation of Concurrent Systems

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Abstract. Coloured Petri Nets (CPNs) is a language for the modelling and validation of systems in whichconcurrency, communication, and synchronisation playa major role. Coloured Petri Nets is a discrete-event modelling language combining Petri nets with the functional programming language Standard ML. Petri nets provide the foundation of the graphical notation and the basic primitives for modelling concurrency, communication, and synchronisation. Standard ML provides the primitives for the definition of data types, describing data manipulation, and for creating compact and parameterisable models. A CPN model of a system is an executable model representing the states of the system and the events (transitions) that can cause the system to change state. The CPN language makes it possible to organise a model as a set of modules, and it includes a time concept for representing the time taken to execute events in the modelled system.

CPN Tools is an industrial-strength computer tool for constructing and analysing CPN models. Using CPN Tools, it is possible to investigate the behaviour of the modelled system using simulation, to verify properties by means of state space methods and model checking, and to conduct simulation-based performance analysis. User interaction with CPN Tools is based on direct manipulation of the graphical representation of the CPN model using interaction techniques, such as tool palettes and marking menus. A license for CPN Tools can be obtained free of charge, also for commercial use.