

# Automatic Generation of CCS Specification for Resource Sharing Problems

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## Abstract

In this work, we propose an algorithm for automatic generation of formal specification in CCS (Calculus for Communicating Systems) for Resource Sharing Problems like the Dining Philosophers. We present a solution for the general case and also for two particular variants: heavily load and ring cases. For each one, we study the combinatorial aspects of the number of states needed in each specification. This specification is synchronized using a mechanism called Scheduling by Edge Reversal SER. The use of SER guarantees that the specification generated by the algorithm has, by construction, some desirable properties such as mutual exclusion, absence of deadlock, absence of starvation, concurrency-wise optimality given the requirement that neighbors alternate, and the case with which a fully distributed implementation can be carried out.

CCS is the inspiration of some algebraic based formalism like the Pi-Calculus, and also of languages for formal specification like LOTOS. The algorithm presented here could be easily adapted for most of these specification formalisms and tools.

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