

Problem Solving with Different Models

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Abstract. In this paper a concrete Boolean problem is considered and its solution is represented in three different approaches, as follows: (1) a diagrammatic model of the associated logical circuit, (2) a transition-based model using *Finite State Machine*, and (3) an algebraic model for the system specification. The three models are equivalent, in the sense of system behaviour, but they are differently treated as specification and verification supports.

As practical dimension, the considerations of this paper start from the behaviour of a logical system and provide an interesting connection with the classical concurrent *producer-consumer* buffer.

1 Introduction

Computer science offers different models for specifying the behaviour of practical systems, each of this model becoming suitable for a certain class of target systems. As for, we will distinguish some categories of systems and, accordingly, specific representations for their specifications.

This paper is structured as follows. In the Section 2, we consider two elementary classifications (sequential systems and non-sequential systems, and on the other hand, analogue systems and logical systems) and we refer to the main models for specifying the behaviour of these classes of systems. As the core of this paper, in the Section 3 we analyze a given practical problem concerning the behaviour of the concrete sequential logic circuit. We are starting from the theoretical models specified in the previous section and we specify this problem solution using three different models: a diagrammatic model, a transition-based model and an algebra-based model. For the third model, we remark the advantage of automatic verification of the model using a specific tool. In Section 4 we establish a connecting result between the given sequential logic circuit behaviour and a classic concurrent problem, namely the producer-consumer problem. It is an interesting result because it joins two completely different domains, as far as it seems.

The main target of this paper consists in analyzing the behaviour of the given logical system from different points of view, namely different specification models. During this modelling approach, for each of the proposed model, we will remark the main characteristics of the system the model is focusing on. Thus, the first two models are focusing on the behaviour of the system in terms

