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A formal description of a leader election algorithm using communicating finite-state machines

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Abstract

Communicating finite-state machines (CFM) [1] (or message-passing automata) are suitable models for distributed systems. A system model consists of a finite number of processes communicating through FIFO channels. In my TID talk, I will present CFM, and its different variants, particularly CFM with bounded channels [2], lossy communication [3], and priority channels [4]. The applications of CFM will be demonstrated for the formal description of a leader election algorithm to provide unambiguous specifications amenable to correct implementation.

A leader election algorithm enables the selection of one node in a distributed system and gives it some special powers that can include the ability to assign work, modify a piece of data, or even the responsibility of handling all requests in the system. The goal of the leader election is to select a processor who will coordinate the system's actions. We propose a new implementation of this distributed algorithm for P4 programmable network switches. Thus we consider including P4-specific mechanisms in our formal model.

References

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