

The Library of Distributed Protocols

Aleksandar Lazic

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Distributed computing aims to solve computational problems using multiple hardware and software components connected over a network and potentially geographically distant. The management of distributed systems is really challenging because processes must achieve some form of cooperation despite the fact that some of them may fail or be disconnected. In this work, we also look at Byzantine processes that can behave in an arbitrary manner, either intentionally or because of a bug, thus interfering with the proper execution of an algorithm. In order to deal with such processes, some cryptographic abstractions are integrated in the design of the algorithms.

We implemented a library of distributed algorithms in a modular way, focusing on the creation of programming abstractions interacting together. The development starts from the ground up with the abstraction of processes and communication links, and then gradually progresses to various broadcast versions or the well-known consensus problem. The technology used is DistAlgo, a high-level programming language very close to pseudo-code. Its ease of use as well as its complex synchronization conditions make it a serious contender for the implementation of distributed algorithms.

Prof. Christian Cachin