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CS5320: Distributed Computing, Spring 2020

Report: Efficient Anonymous Leader Election Algorithm for Connected Topologies

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Introduction

Leader election is the process of designating a single process as the organizer of some task distributed among several computers (nodes).

Existence of a leader is very important in many of the distributed applications. System-wide management and can be a coordinator, initiator, etc. Choosing an optimal leader would result in less communication overhead, ideally being the central node. Example usage: broadcasting something to the network. The proposed algorithm can then be used for Mutual Exclusion, Termination Detection and Global Snapshots.

Our method is better than other methods for leader election because it does not need the processes to be in a fixed shape topology (like Frankfurt and Peterson's algorithms). It treats all the processes equally instead of giving inherent advantage to some processes without a reason (like giving priority to the node with lowest/highest process id in case of the normal bully algorithm). It also handles dynamic network topology where new nodes are added and some removed.

We use conditional pthreads for the simulation so that all the receiver threads are ready before the sender threads start sending data so that simulation only accounts for the time taken in electing the leader.

Algorithm