Roucairol-Carvalho Algorithm

The Roucairol-Carvalho algorithm was proposed by Marcelo A.P. Roucairol and Maria E.S. Carvalho in their 1992 paper "An Improved Algorithm for Mutual Exclusion in Computer Networks." It is an improvement on the Ricart-Agrawala (RA) algorithm, which was itself an improvement on the original Lamport mutual exclusion algorithm.

Algorithm Description

Roucairol-Carvalho (RC) is an algorithm for distributed mutual exclusion in computer networks. It allows multiple processes on different machines to access a shared resource in a mutually exclusive way, ensuring that only one process can access the resource at a time.

The RC algorithm works by using a logical clock and a request queue to allow processes to request access to the shared resource. When a process wants to access the resource, it sends a request message to all other processes in the network, along with its logical clock value. The receiving process then compares the logical clock value of the request with its own logical clock value. If the requesting process has a larger logical clock value, the receiving process adds the request to its request queue. If the requesting process has a smaller or equal logical clock value, the receiving process sends a grant message back to the requesting process.

The requesting process then waits for grant messages from all other processes. Once it has received all the grant messages, it can access the shared resource. After it finishes accessing the resource, it sends a reply message to all other processes, indicating that it is no longer using the resource.

The RC algorithm has some distinct advantages over other Mutual Exclusion algorithms such as Lamport's Clock or Ricart-Agrawala algorithm. Some of them can be listed as follows;

- Simplicity; RC has a simpler implementation compared to other mutual exclusion algorithms since it doesn't require a logical clock or clock to be maintained.
- Fairness; The algorithm ensures that all processes are given an equal chance to request access to the shared resource.
- Efficiency; RC algorithm has a lower message complexity (0…2(N-1)) compared to other algorithms. Meaning that fewer number of messages can be enough for the communication.

Overall, RC is a good choice for the systems where distributed mutual exclusion is required.