Assignment 4

[43212]

Problem Statement:-

To develop any distributed algorithm for leader election.

Objectives

By the end of this assignment, the should be able to explain and implement concept of leader election algorithms.

Theory:-

Distributed algorithm:-

- Distributed algorithm is a algorithm that runs on a distributed system. each processor has its own memory and they communicate via communication networks.
- Many algorithms used in distributed systems require a co-ordinator proces that performs function needed by other processes in the system.
- Election algorithms are designed to choose a co-ordinator.

- **Election algorithm:-**

Assumptions:

Each proces has a unique number to distinguish them. Processes knows each others proces numbers.

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* There are two types of leader Election algorithms.
  1. Bully algorithm
  2. Ring algorithm

Bully algorithm:-

1.) This algorithm applies to system where every process can send message to every other process in the system.

2) Now, process P sends election message to every process with higher priority number.

3) It waits for responses, if no response for time interval T, then process P elects itself as the leader.

4) Then sends a message to all lower priority number processes that it is elected as their coordinator.

5). However, if an answer is received within time T from any other process Q,

a) Process P again waits for time interval T to receive another message from Q that it has been elected as co-ordinator.

b) If Q responds within time interval T, then it is assumed to have failed and algorithm is restarted.

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Ring algorithm:-

This algorithm applies to system of organized as a ring (logically and physically). In this algorithm, we assume that the connection between the process are unidirectional and every process can message to the process on its right side.

Data structure that is used for this algorithm is list. A list that has priority numbers of the active process in the system.

Algorithm:-

1) If a process P_1 detects a coordinator failure, it creates a new active list which is empty initially. It sends election message to its neighbour on right and adds number 1 to its active list.

2) If process P_2 receives message elect from processes on left, it responds in 3 way.

i) If message received does not contain 1 in active list then P_1 add 2 to its active list and forwards the message

ii) If this is the first election message, it has received or sent. P_1 creates new active list with numbers 1 and 2. It then sends election message 1 followed by 2.

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- If process P_i receives its own election message then active list for P_i, now contain numbers of all the active processes in the system. Now process P_i elects highest priority numbers from list and elects it as the new co-ordinator.

Conclusion:-

Thus, in the assignment, I have learned about election algorithms in distributed system and I implemented Bully and Ring election algorithm.