43139

Page No.
Date: / /

Assignment No. 4

Election Algorithms

* Problem Statement :

Election - Ring : Implement a Ring Election Algorithm for distributed systems in Java. In this algorithm assume that the link between the process are unidirectional and every process can message to the process on its right only. Each process is associated with name, priority and state (Active/Inactive). Accept the number of processes from the user with their priorities and states. Selut the process with highest priority as co-ordinator. Allow user to choose any active process to initialize election.

* Objectives :

To learn election algorithms.

* Theory :

Distributed Algorithm

Distributed Algorithm is an algorithm that runs on distributed system. Each processor has its own memory & they communicate via communication networks. Many algorithms running in distributed system require

43139

a co-ordinator that performs functions needed by other process in the system. Election algorithms are designed to choose the co-ordinator.

Assumptions:

Each process has a unique number to distinguish them & processes know each others process numbers

Types:

1) Bully Algorithm

This algorithm applies to the systems where every process can send a request or a message to every other process in the system.

Algorithm:

Process 'P' sends a message to co-ordinator

A] If co-ordinator does not respond to it within a time interval 'T'. then it is assumed that co-ordinator has failed.

B] Process P sends an election message to every process with higher priority number.

C] waits for responses. If no one responds in time T then process elects itself as the co-ordinator.

D] Sends message to all lower priority number that P is the new co-ordinator.

E] If answer is received within time T from any other process Q.

① Process P waits for time T to recieve another message from Q that it has been selected as co-ordinator

② If Q doesn't respond, it is assumed Q failed and algorithm restarts.

Ring Algorithm

This algorithm applies to systems organised as rings links are unidirectional and on process to right only. It uses list data structure.

Algorithm

A] If process P1 detects a coordinator failure, it creates a new active list which is empty initially. It sends election message to its neighbour on the right & add number 1 to its active list.

43139

B] If process P2 receives message from P1 it responds in 3 ways.

i) If the message received doesn't contain 1 in active list then P1 adds 2 to its active list & forwards the message.

2) If this is the first election message, it has received or sent P1 creates a new active list with numbers 1 & 2. It then sends election message 1 followed by 2

3) If process P1 receives its own message 1 then the active list for P1 now contains numbers of all the active processes in the system. Now process P1 deletes the highest priority number from the list and elects it as the new co-ordinator.

* Conclusion:

Election algorithms were studied both Bully & Ring algorithms were implemented successfully.