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FACULTY OF EGINEERING AND TECHNOLOGY

Distributed Systems (BCS-701)

LECTURE -9

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OUTLINE

- Mutual exclusion in distributed system
- Mutual exclusion in single computer system Vs. distributed system
- Requirements of Mutual exclusion Algorithm
- Solution to distributed mutual exclusion
- MCQ
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MUTUAL EXCLUSION IN DISTRIBUTED SYSTEM

Mutual exclusion in distributed system

Mutual exclusion is a concurrency control property which is introduced to prevent race conditions. It is the requirement that a process can not enter its critical section while another concurrent process is currently present or executing in its critical section i.e. only one process is allowed to execute the critical section at any given instance of time.

Mutual exclusion in single computer system Vs. distributed system

❑In single computer system, memory and other resources are shared between different processes. The status of shared resources and the status of users is easily available in the shared memory so with the help of shared variable (For example: Semaphores) mutual exclusion problem can be easily solved.

❑In Distributed systems, we neither have shared memory nor a common physical clock and there for we can not solve mutual exclusion problem using shared variables. To eliminate the mutual exclusion problem in distributed system approach based on message passing is used.

A site in distributed system do not have complete information of state of the system due to lack of shared memory and a common physical clock.

MUTUAL EXCLUSION IN DISTRIBUTED SYSTEM

Requirements of Mutual exclusion Algorithm

No Deadlock:

Two or more site should not endlessly wait for any message that will never arrive.

No Starvation:

Every site who wants to execute critical section should get an opportunity to execute it in finite time. Any site should not wait indefinitely to execute critical section while other site are repeatedly executing critical section

Fairness:

Each site should get a fair chance to execute critical section. Any request to execute critical section must be executed in the order they are made i.e. Critical section execution requests should be executed in the order of their arrival in the system.

Fault Tolerance:

In case of failure, it should be able to recognize it by itself in order to continue functioning without any disruption.

MUTUAL EXCLUSION IN DISTRIBUTED SYSTEM

Solution to distributed mutual exclusion

As we know shared variables or a local kernel can not be used to implement mutual exclusion in distributed systems. Message passing is a way to implement mutual exclusion. Below are the three approaches based on message passing to implement mutual exclusion in distributed systems:

There are three major approaches to handle mutual exclusion in distributed system.

1. **Token Based Algorithm**
2. **Non-token based approach**
3. **Quorum based approach**

MCQ

1. What is the access point (AP) in a wireless LAN?

a) device that allows wireless devices to connect to a wired network

b) wireless devices itself

c) both device that allows wireless devices to connect to a wired network and wireless devices itself

d) all the nodes in the network

2. In wireless ad-hoc network _____

a) access point is not required

b) access point is must

c) nodes are not required

d) all nodes are access points

3. Which multiple access technique is used by IEEE 802.11 standard for wireless LAN?

a) CDMA

b) CSMA/CA

c) ALOHA

d) CSMA/CD

4. In wireless distribution system _____

a) multiple access point are inter-connected with each other

b) there is no access point

c) only one access point exists

d) access points are not required

5. A wireless network interface controller can work in _____

a) infrastructure mode

b) ad-hoc mode

c) both infrastructure mode and ad-hoc mode

d) WDS mode

REFERENCES

- https://www.geeksforgeeks.org/mutual-exclusion-in-distributed-system/