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FACULTY OF EGINEERING AND TECHNOLOGY

Distributed Systems (BCS-701)

LECTURE -13

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OUTLINE

- Non Token Based Algorithm
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Non Token Based Algorithm

2. Ricart–Agrawala Algorithm in Mutual Exclusion in Distributed System

Ricart–Agrawala algorithm is an algorithm to for mutual exclusion in a distributed system proposed by Glenn Ricart and Ashok Agrawala. This algorithm is an extension and optimization of Lamport's Distributed Mutual Exclusion Algorithm. Like Lamport's Algorithm, it also follows permission based approach to ensure mutual exclusion.

Non Token Based Algorithm

2. Ricart–Agrawala Algorithm in Mutual Exclusion in Distributed System

In this algorithm:

- Two type of messages (REQUEST and REPLY) are used and communication channels are assumed to follow FIFO order.
- A site send a REQUEST message to all other site to get their permission to enter critical section.
- A site send a REPLY message to other site to give its permission to enter the critical section.
- A timestamp is given to each critical section request using Lamport's logical clock.
- Timestamp is used to determine priority of critical section requests. Smaller timestamp gets high priority over larger timestamp. The execution of critical section request is always in the order of their timestamp

NON TOKEN BASED MUTUAL EXCLUTION

Algorithm

- **To enter Critical section**
  - When a site Si wants to enter the critical section, it send a timestamped REQUEST message to all other sites.
  - When a site Sj receives a REQUEST message from site Si, It sends a REPLY message to site Si if and only if
  - Site Sj is neither requesting nor currently executing the critical section.
  - In case Site Sj is requesting, the timestamp of Site Si‘s request is smaller than its own request.
  - Otherwise the request is deferred by site Sj.
- **To execute the critical section**
  - Site Si enters the critical section if it has received the REPLY message from all other sites

NON TOKEN BASED MUTUAL EXCLUTION

Algorithm

➢**To release the critical section**

Upon exiting site S_i sends **REPLY** message to all the deferred requests.

Message Complexity

Ricart–Agrawala algorithm requires invocation of 2(N – 1) messages per critical section execution. These 2(N – 1) messages involves

1. (N – 1) request messages
2. (N – 1) reply message

Drawbacks of Ricart–Agrawala algorithm:

Unreliable approach:

failure of any one of node in the system can halt the progress of the system. In this situation, the process will starve forever.

The problem of failure of node can be solved by detecting failure after some timeout.

Performance

- ❑ Synchronization delay is equal to maximum message transmission time
- ❑ It requires 2(N – 1) messages per Critical section execution

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

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