1. **How does mutual exclusion maintain synchronization in distributed system? Explain Ricart-Agrawala mutual exclusion algorithm along with an example. - 2069 Sample-Question**

Mutual exclusion ensures that concurrent processes make a serialized access to shared resources or data. In distributed system mutual exclusion has to be based on message passing.

It states that no two process can exist in the critical section at any given given point of time.

Let us take an example

In clothing store A and B are heading to changing room to try them out. While A is on changing room there is occupied sign given and after that B has to wait moreover when A is out then vacant sigh is given so B can use that room. B should wait until A is inside the room and only one person can get inside the changing room.  
  
Thus A and B can be explained as process , changing room as the critical section and sign outside room indicates process synchronization.

To remove mutual exclusion three approaches are used:

* Token Based Algorithm
* Non token based approach
* Quorum based approach

Richard agrawala Mutual exclusion algorithm:

.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. It is non token based algorithm

Algorithm:

Initially each of them are in released state.

* To enter Critical section:

->When a site Si wants to enter the critical section, it send a time stamped 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.

* To release the critical section:

->Upon exiting site Si sends REPLY message to all the deferred requests.

example:

A request issued by a process Pj is blocked by another process Pi only if Pi is holding the resource or if it is requesting the resource with a higher priority (this means a smaller timestamp) then Pj

