Practicals

5. Implement token ring based mutual exclusion algorithm.

Theory :

In a distributed system, there are multiple computers (nodes) that communicate and work together. Sometimes, all nodes want to access a shared resource - like a printer, a file or a database — but only one node can use it at a time. This is to avoid conflicts and ensure data consistency.

This is called mutual exclusion - making sure that only one node at a time is allowed to access the shared resources, and other needs to wait for it.

Token ring Algorithm

Token ring algorithm is one way to solve mutual exclusion in distributed systems.

In this algorithm,

i) All nodes are arranged in a logical ring. (not physically)
ii) A special message called a "token" circulates around the ring
iii) Only the node that has the token can access the shared resources.
iv) After using the resources, the token is passed to the next node in the ring.

→ Every node goes to three sections.

1) Entry section - The node waits for the token to enter the critical section
2) Critical section - The node has the token as it is using the shared resource.

5) Exit section – The node finishes work and passes the token to the next node.

Example

Let's say we have 4 computers in a ring.

Node 1 → Node 2 → Node 3 → Node 4 → (back to Node 1)

1. The token starts at Node 1.
2. Node 1 wants to print a file. It has token – It prints the file
3. Done! It passes the token to Node 2.
4. Node 2 doesn't want to print – it just passes the token to Node 3.
5. and so on.