Non token Based Algorithms

III Maekawa's Algorithm

* a site does not request permission from every other site, but only from a subset of the sites.
* Request set $\forall i \forall j : 1 \le i, j \le N :: R_i \cap R_j = \phi$
* a site can send out only one REPLY message at a time.
* A site can only send a REPLY message only after it has received a RELEASE message for the previous REPLY message. Therefore, a site S_i locks all the sites in R_i in exclusive mode before executing its CS.

Construction of Request Sets:

M1: $(\forall i \forall j : i \neq j, 1 \le i, j \le N :: R_i \cap R_j \neq \phi)$

M2: $(\forall i : 1 \le i \le N :: S_i \in R_i)$

M3: $(\forall i : 1 \le i \le N :: |R_i| = K)$

M4: Any site S_j is contained in K number of R_is, $1 \le i, j \le N$. Relation between N & K as $N = K(K-1)+1$, this gives $|R_i| = \sqrt{N}$.

* Algo requires the delivery of messages to be in the order they are sent between every pair of sites.

The Algo

Requesting the CS

1. A site S_i requests access to the CS by sending REQUEST(i) messages to all the sites in its request set R_i.
2. When a set S_j receives the REQUEST (i) message it sends a REPLY (j) message to S_i provided it hasn't sent a REPLY message to a site from the time it received the last RELEASE message. Else, it queues up the REQUEST for later consideration.

Executing the CS

3. Site S_i accesses the CS only after receiving REPLY messages from all the sites in R_i.

Releasing the CS

4. After the execution of the CS is over, site S_i sends RELEASE (i) message to all the sites in R_i.
5. When a site S_j receives a RELEASE (i) message from site S_i, it sends a REPLY message to the next site waiting in the queue & deletes that entry from the queue. If the queue is empty, then the site updates its state to reflect that the site has not sent out any REPLY message.