SOLUTIONS ACTIVITIES UNIT 9 --> Activities 17 and 18

Activity 17

1.- It is a problem of consensus when several nodes adopt as a "consensus value" ~~the average of the values~~ **a value that was** estimated by **one of** them.

2.- It is a problem of consensus when several nodes adopt as a "consensus value" the maximum of the values estimated by them. **True**

3.- After executing the consensus algorithm, ~~only the nodes that initially proposed "estimate (V)"~~ **all the nodes** will provide "decision (V)" as output.

4.- A correct consensus solution must comply with the properties of ~~mutual exclusion, progress and non-pre-emption.~~ **termination, uniform integrity, agreement, and uniform validity.**

5.- At the end of the consensus algorithm, two correct processes ~~could~~ **cannot** lead to different decisions, as **even though** each will have initially proposed an "estimate (Vi)" ~~and, therefore,~~ they will result in ~~a different~~ **the same** "decision (Vi)".

6.- The property of "uniform integrity" is fulfilled when, ~~if a process decides "v", then "v" was proposed by some process.~~ **every node decides at most once.**

7.- The Paxos and Raft algorithms are widely used implementations of consensus algorithms. **True**

8. An example of a consensus algorithm is that all the nodes broadcast their "estimate(Vi)" and decide as "decision(V)" the value proposed by the node with the highest identifier. **True**

Activity 18

1.- In a distributed consensus algorithm, in which it is considered that the nodes can fail, the nodes have a "fault detector" to know if the node has failed ~~when calculating its "estimate (V)" value that needs to propose.~~ **based on timeouts.**

2.- They are called "eventually perfect failure detectors" because they are ~~detectors~~ **timers** that will sooner or later ~~determine a failure perfectly.~~ **be well-adjusted.**

3.- The consensus algorithm works if there is a ~~maximum~~ **minimum** of ~~N/2~~ $\lceil (N+1)/2 \rceil$ correct nodes.

4.- If we have 7 nodes, and 2 fail, the consensus algorithm will ~~not~~ work, because ~~the coordinator node will be blocked.~~ **less than** $\lfloor (N-1)/2 \rfloor$ **failures have occurred.**

5.- In the algorithm, the nodes execute rounds. The node terminates the algorithm when ~~the coordinator node is chosen~~ **it receives a "decide(lastEstimate)" message.**

6.- In each round, the ordinary nodes send a**n** ~~"propose"~~ **"estimate"** message to the coordinator of the round.

7.- In each round, the ordinary nodes wait to receive a "propose" message from the coordinator **until their maximum waiting timeout expires.**

8.- The coordinator chooses one of the ~~"estimate"~~ **"lastEstimate"** values that he receives from all those who have the maximum value of the ~~round.~~ **"lastR".**