MP2: Distributed Group Membership

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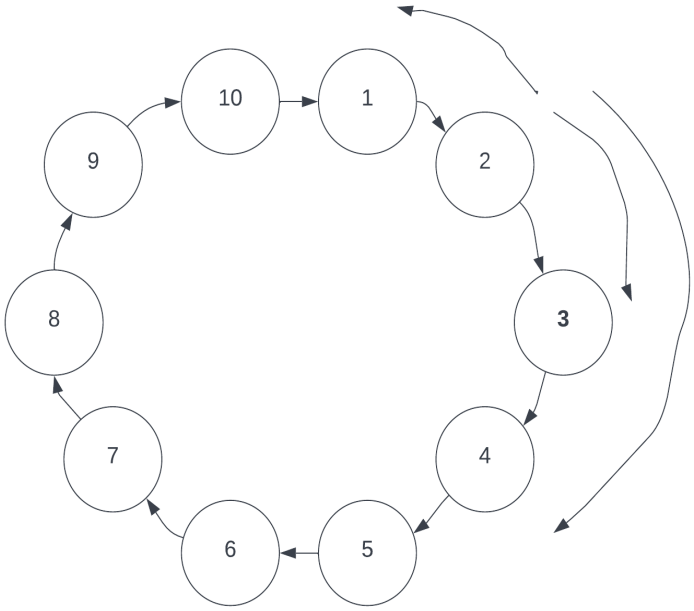
In order to account for the simultaneous failure of three nodes for a ring backbone structure the following topology with each node having four neighbours in its ping list has been selected. For example, node 2 contains node 1, node 3 and node 4 as its neighbours whom it keeps pinging at constant intervals to check whether the nodes are up and thus acts a a monitor for these nodes. Thus for node i (, i-1, i+1, i+2)%no.of.nodes are its neighbours. With a failure timeout of 600 ms, an event such as node failure will be dissipated in



O(log(10)*dissipation_timeout) ms to all the nodes in the network. This results in the failure of a particular node being reached in ~ 2.665 s (i.e < 5 s). Additionally, with the neighbour list as shown, 3 simultaneous failures will be detected by at least 1 node. For example, if nodes 2, 3, and 4 fail, the failure of 2 and 3 will be detected by 1 whereas the failure of 4 will be detected by 5. And by following the previous argument, these three failures will be dissipated into the network within 6 seconds. However, if node 2, 3, 4 and 5 fail the failure of 2 and 3 will be detected by 1 whereas the failure of 4 will not be detected by any of the nodes. And, thus it is unless a new node sends updated results in the violation of time completeness. As we are piggybacking different payloads on one particular message type (say for Ack message) we are also including the payload type before the corresponding payload and this results in the following marshaled message format:

messageType:ipAddress_ts:payloadType_ipAddress_timeStamp_Inc:payload:payloadType…

Furthermore, the Distributed Grep that we developed as part of MP1 was helpful in debugging why a particular node join or leave is not being properly reflected in the membership list of certain nodes and made the fixing process efficient.

Please find the Bandwidth values for various events for N = 6 nodes in Bps.

Background	Node Join	Node Leave	Node fail
1227.15	1559.97	1401.435	958.35

Further, we calculated False positive rate for N = 2,6 nodes for message loss rate at 3% and 30%. We found that for N = 6 nodes the False positive rate increased as compared to N = 2. This is because more nodes are now falsely being identified as failed due to more Ack from the nodes not being sent back to the monitor. Also with an increase in Message loss rate the False positive rate increased with it being the highest for N=6 nodes and Message loss rate of 30%. Please find the corresponding graphs below.