Bonus Project Report

Name: Jacob Ville Name: Shaifil Maknojia
UFID: 4540 7373 UFID: 7805 9466

For Failure model, we created the whole network first after that we removed some of the nodes arbitrarily from the system depending on the input parameter given. E.g. If number of nodes = 200 and % failure input given is 20% then we arbitrarily select 40 nodes from the network and remove them. This will lead to no-reply from these nodes, i.e whenever a key is looked up and the node to which it was supposed to map is removed from the network, the key then will have to be mapped to its successor. To implement this we have used the recursive approach, in this approach whenever a node is not present the key will look for the nodes immediate successor. To understand it with an example, let's suppose a lookup for key 24 is fired and it was supposed to be mapped to node 27, initially node 27 was present in the network, then 24 would be mapped to 27, now when we do failure simulation and assuming node 27 is removed from the network then key 24 would be mapped to the next node present and active in the network, if the next present node is 31 then key 24 would be mapped to Node 31.

As per the paper and implementation, the correctness of the Chord protocol relies on the fact that each node knows its successor. So, when we implement the successor model, the process can work as before even though nodes leave the network. It is also worth noting that the complexity of lookup process still remains the same. It takes O (log n) time to resolve a lookup for the query.

Finding - It is to be noted that for the System to work correctly at least one of the successor node needs to be present/active and this is supported by the paper too. "Assuming each node fails independently with probability p, the probability that all r successors fail simultaneously is only p raise to r. Increasing r makes the system more robust." As we see the probability of all nodes failing is very minor. Therefore, the system can be satisfactorily said to be resilient to failures.