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Project 2 Extra Credit

This extra credit included the use of Simulation.java to analyze p_malicious along with other parameters. There are 54 combinations of command line arguments, and all of them were tested (several times). Running the java file would return a set of transactions that every node consensus on, and we were tasked with identifying the maximum percentage of malicious nodes that can be tolerated, given the other three parameters. The results from testing are recorded on the last three pages.

Interestingly, it seems that the percentage of malicious nodes can be tolerated in every combination. However, the Simulation was run multiple times, and there were instances where it would not be tolerated for the same combination. I found this a little weird because this was the case for all combinations. Despite this, I thought it would be good to cover the trends (frequency of tolerated vs not tolerated results) that I saw while testing the different combinations.

As the value for p_malicious increased from 15% to 30% to 45%, the odds of the result being “not tolerated” increased. As the value for p_graph (10% to 20% to 30%) and p_txDistribution (1% to 5% to 10%) increased, so did the probability of more “not tolerated” results. Surprisingly, as numRounds increased from 10 to 20, the likelihood of malicious nodes being not tolerated decreased.

With this in mind, the maximum percentage of malicious nodes that can be tolerated, given the other three parameters can be seen by combination 45 below. Here, p_malicious is 45%, p_graph is 30%, p_txDistribution is 10%, and numRounds is 10. This was the combination that gave the lowest probability of tolerating malicious nodes. Despite this, it did in fact tolerate malicious nodes from time to time (even after testing the same combinations multiple times).

Combination Number	The maximum percentage of malicious nodes (p_malicious)	Prob. that an edge will exist (p_graph)	Prob. of assigning an initial transaction to each node (p_txDistribution)	Number of simulation rounds your nodes will run for (numRounds	Tolerated (at least for 1 simulation)
1	15%	10%	1%	10	TRUE
2	15%	20%	1%	10	TRUE
3	15%	30%	1%	10	TRUE
4	15%	10%	5%	10	TRUE
5	15%	20%	5%	10	TRUE
6	15%	30%	5%	10	TRUE
7	15%	10%	10%	10	TRUE
8	15%	20%	10%	10	TRUE
9	15%	30%	10%	10	TRUE
10	15%	10%	1%	20	TRUE
11	15%	20%	1%	20	TRUE
12	15%	30%	1%	20	TRUE
13	15%	10%	5%	20	TRUE
14	15%	20%	5%	20	TRUE
15	15%	30%	5%	20	TRUE
16	15%	10%	10%	20	TRUE
17	15%	20%	10%	20	TRUE
18	15%	30%	10%	20	TRUE

Combination Number	The maximum percentage of malicious nodes (p_malicious)	Prob. that an edge will exist (p_graph)	Prob. of assigning an initial transaction to each node (p_txDistribution)	Number of simulation rounds your nodes will run for (numRounds	Tolerated (at least for 1 simulation)
19	30%	10%	1%	10	TRUE
20	30%	20%	1%	10	TRUE
21	30%	30%	1%	10	TRUE
22	30%	10%	5%	10	TRUE
23	30%	20%	5%	10	TRUE
24	30%	30%	5%	10	TRUE
25	30%	10%	10%	10	TRUE
26	30%	20%	10%	10	TRUE
27	30%	30%	10%	10	TRUE
28	30%	10%	1%	20	TRUE
29	30%	20%	1%	20	TRUE
30	30%	30%	1%	20	TRUE
31	30%	10%	5%	20	TRUE
32	30%	20%	5%	20	TRUE
33	30%	30%	5%	20	TRUE
34	30%	10%	10%	20	TRUE
35	30%	20%	10%	20	TRUE
36	30%	30%	10%	20	TRUE

Combination Number	The maximum percentage of malicious nodes (p_malicious)	Prob. that an edge will exist (p_graph)	Prob. of assigning an initial transaction to each node (p_txDistribution)	Number of simulation rounds your nodes will run for (numRounds	Tolerated (at least for 1 simulation)
37	45%	10%	1%	10	TRUE
38	45%	20%	1%	10	TRUE
39	45%	30%	1%	10	TRUE
40	45%	10%	5%	10	TRUE
41	45%	20%	5%	10	TRUE
42	45%	30%	5%	10	TRUE
43	45%	10%	10%	10	TRUE
44	45%	20%	10%	10	TRUE
45	45%	30%	10%	10	TRUE
46	45%	10%	1%	20	TRUE
47	45%	20%	1%	20	TRUE
48	45%	30%	1%	20	TRUE
49	45%	10%	5%	20	TRUE
50	45%	20%	5%	20	TRUE
51	45%	30%	5%	20	TRUE
52	45%	10%	10%	20	TRUE
53	45%	20%	10%	20	TRUE
54	45%	30%	10%	20	TRUE