Building a layer-2 DAPP on top of Blockchain
CS 765 Assignment 3

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We report the results of 3 experiments by varying the number of joint accounts. Number of users is fixed to 100 and the number of total transactions is fixed to 1000 (as specified in the problem statement).
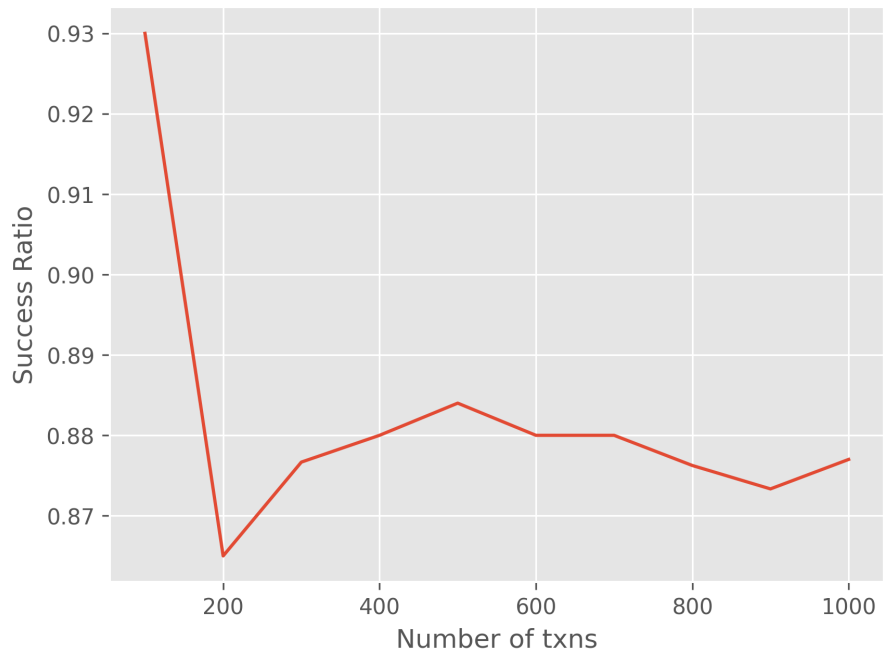
Experiment 1
Number of joint accounts = 300
Plot of successful transactions to total transactions:
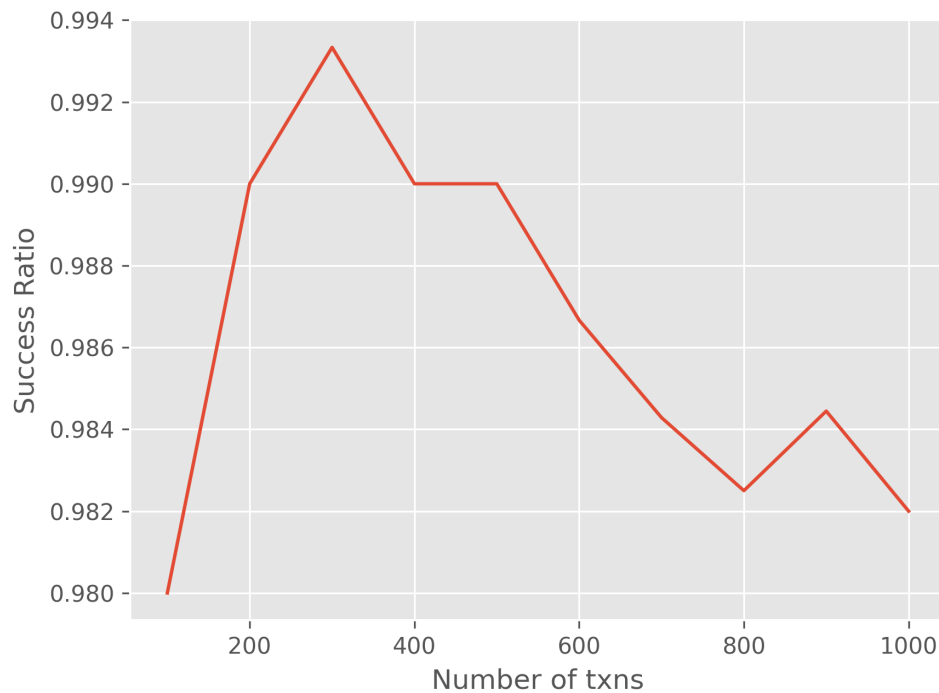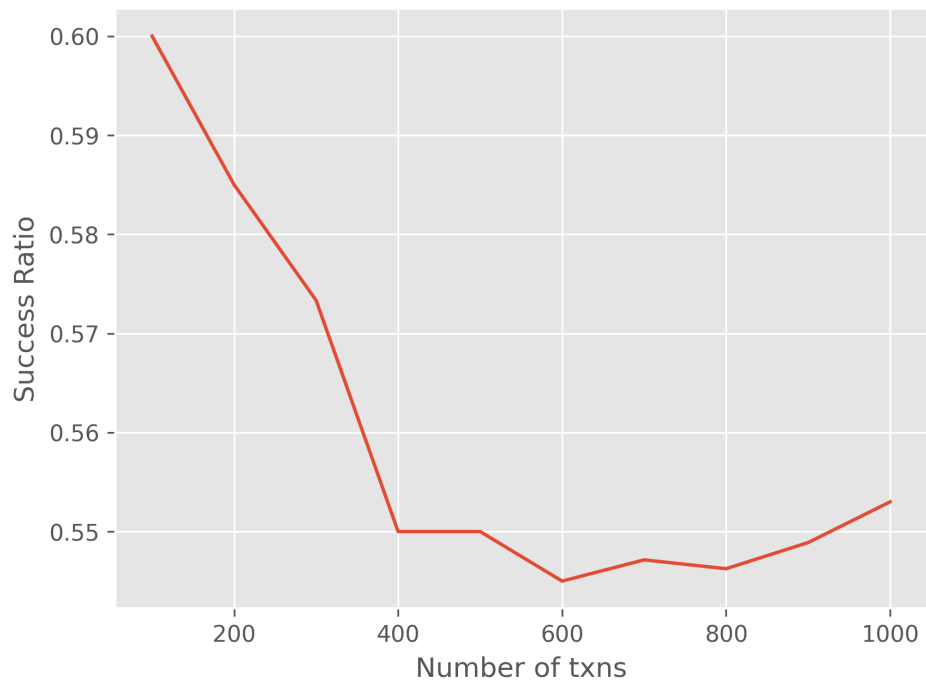

Experiment 2
Number of joint accounts = 200
Plot of successful transactions to total transactions:

Experiment 3

Number of joint accounts = 110

Plot of successful transactions to total transactions:

From the above set of experiments, we can observe the following trends:

1. Success ratio decreases on average as the number of transactions increases. This is expected to happen since initially, each joint account has an equal distribution of coins. As time progresses, the balances in joint accounts will be unevenly distributed, hence the chances of a node having 0 balance (i.e. less than the transaction amount of 1 coin) increases. The presence of such nodes will create more bottlenecks in the network and hence increase the number of unsuccessful transactions, and reduce the ratio of successful transactions overall.

2. Success ratio decreases as the number of joint accounts decreases. In experiments 1, 2, 3 we have been reducing the number of joint accounts. We can notice that when the number of joint accounts = 300, the success ratio is in the range 0.98-0.99. When the number of joint accounts = 200, success ratio is in the range 0.87-0.93. And when the number of joint accounts = 110, success ratio is in the range 0.54-0.60. This trend is well justified by the fact that as the number of joint accounts is decreasing, total coins in the network are decreasing as well. Also, a lesser number of joint accounts directly implies that the number of paths in the network is reducing. Hence, the chances of transactions not being able to find a valid path between nodes increases, thereby reducing the success ratio.