



COMP2121

Lab 8

Consensus

The goal of this lab is to understand how to reach consensus despite the presence of failures.

Exercise 1: Failure-free consensus

How many round(s) minimum could a consensus protocol take in a failure-free environment?

Duration: 5 min

Exercise 2: Crash-tolerant consensus

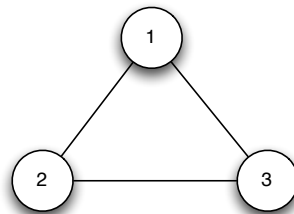


Figure 1: A distributed system comprising three participants trying to solve the consensus problem

Consider the synchronous network depicted in Figure 1, where up to $f = 1$ participant may fail. Assume that during the execution of the crash tolerant consensus, participant 1 fails in round 1, right before sending its value, and does not recover. Is the consensus still reached after 2 rounds? Why?

Duration: 10 min

Exercise 3: The Byzantine-tolerant consensus game

Form groups of $n = 4$ or $n = 5$ students to run the Byzantine synchronous consensus seen during the lecture with $f = 1$. Assign an identifier from 1 to n to each of your group member.

Stack n other papers with "Byzantine" written on one paper and "correct" on the $n - 1$ others, place them upside down and mix them. Each group member picks one paper to know how to behave:

- If you pick "Byzantine" your goal is to try to make the algorithm fail by proposing the values of your choice to others and without revealing that you are misbehaving.
- If you pick "correct" your goal is to run the Byzantine synchronous consensus algorithm correctly.

Each pair of members exchange values without letting others know and writes down the values they receive. Do the same secret exchanges with the vectors of values. If the game is successful, all correct should have the same values. If not, try to identify what you did wrong during the protocol.

Duration: 35 min