159.355: Concurrent Systems
Assignment 4

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1 Introduction

This is the fourth and final assignment for this course. It is worth 25% of the marks for the course. You have to solve three variants of a particular problem, using the Byzantine Generals algorithm,

Once you have solutions, submit a zip file containing your solution together with any comments about your code via Stream. Make sure you include your name and Massey ID number.

Remember that the course is about concurrency. It is your solutions to the concurrency problems that we want to see, the rest of your code should be as simple as possible. Make sure that you have included sensible comments so that the marker can understand the code even if it is not running properly.

2 Your Task: Planning a Joint Activity

Four friends living in different suburbs of Auckland have decided to meet for a joint activity once each month for a whole year. Depending on the weather, this will be either an outdoor activity or an indoor activity.

The day before the planned activity, each of the friends checks the weather forecast and then decides whether it will be an outdoor activity or an indoor activity. They communicate with each other to reach a consensus of which one it will be. If there is no majority for one or the other, they will stay indoors.

Unfortunately, one of the friends is not very reliable and forgets to send messages, or he sends wrong messages to his friends. Regardless of that, the other friends still need to reach a decision of whether to do an outdoor activity or an indoor one.

Write a simulation for this scenario using the Byzantine Generals algorithm. Each of the four friends decides every month whether to do an outdoor activity or an indoor one, and then uses the algorithm to communicate with the others to reach a consensus.

Test your algorithm multiple times for each of the following scenarios to check whether consensus has been reached among the friends:

- There are no failures at all during any of the runs of the algorithm.
- The first friend exhibits crash failures during the runs of the algorithm. These failure can occur at any time during the runs in a random way.
- The first friend exhibits Byzantine failures during the runs of the algorithm. Again, these occur randomly.