

Exercise Session 4

Consensus

October 25, 2010

Problem 1

Consider all our fail-stop consensus algorithms (Consensus Algorithm I and Consensus Algorithm II). Explain why none of those algorithms would be correct if the failure detector turns out not to be perfect.

Problem 2

Explain why any fail-noisy consensus algorithm (one that uses a $\diamond P$ failure detector) actually solves uniform consensus.

Problem 3

Explain why any fail-noisy consensus algorithm (one that uses a $\diamond P$ failure detector) requires a majority of the correct processes. More precisely, provide a “bad run” in the case where there isn't a majority correct.

Problem 4

Improve Consensus Algorithm I (Algorithm 5.2 “Hierarchical Consensus”) to save one communication step. Consensus Algorithm I requires N communication steps for all correct processes to decide. By a slight modification, it can run in $N - 1$ steps: suggest such a modification.