

Session 7: Exercises

M2 MOSIG: Large-Scale Data Management and Distributed Systems

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1 Atomic broadcast

Question 1.1: Consider a group of n processes, p_1 to p_n , and $f = 0$ (there are no faulty processes). Give an implementation of a leader-based atomic broadcast in an asynchronous network with reliable links.

Question 1.2: Consider the modular atomic broadcast algorithm presented in the course (Figure 1). Suppose that in this algorithm, `rbcast(m)` is substituted with `send(m)` to all processes. Show that the algorithm is no more correct.
Hint: Consider one single invocation of atomic broadcast.

2 About LastVoting consensus algorithm

Question 2.3: In LastVoting algorithm, suppose that in a run a majority of the processes crash (in violation of the assumption that $f < n/2$). What happens in this case?

Question 2.4: Recall that we have assumed that for each phase ϕ there is one coordinator $Coord(\phi)$. We now suppose that (sometimes) two processes p and q may consider different coordinators in a phase. Thus we have $Coord(p, \phi)$ (coordinator of p for phase ϕ) instead of $Coord(\phi)$. Which properties of consensus are violated if the coordinator is not the same at all processes

1. in a single round,
2. in a finite number of rounds,
3. in an infinite number of rounds?

Question 2.5: Consider that (i) ts_p is not updated at line 101, and (ii) line 105 is removed. What property of consensus is violated in this case? Construct an execution in which this property is violated.