Exercise Session 3

Causal Broadcast

Exercise 1
Can we devise a broadcast algorithm that does not ensure the causal delivery property but only its nonuniform variant: no correct process \( p_i \) delivers a message \( m_2 \) unless \( p_i \) has already delivered every message \( m_1 \) such that \( m_1 \rightarrow m_2 \)?

Exercise 2
Suggest an optimization of the garbage collection scheme of Algorithm 1’ (slide 24).

Exercise 3
Why is the condition on slide 30 \( VC[pk] \geq VC_x[pk] \) and not just \( VC[pk] = VC_x[pk] \)? Can you construct an execution where the local vector clock is greater than the received local clock for one place?

Exercise 4
Can we devise a best-effort broadcast algorithm that satisfies the causal delivery property without being a causal broadcast algorithm, i.e., without satisfying the agreement property of a reliable broadcast?