Concurrent Algorithms December 16, 2019

Exercise 9

Problem 1. Consider the Disk Paxos algorithm in slides 14-15 of the lecture. The algorithm is reproduced below. If we omit line 11, is the algorithm still correct? Why or why not?

Algorithm 1 Obstruction-free consensus with Memory Failures

```
1:  procedure PROPOSE(v)
2:      while true do
3:          for every memory m in parallel do
4:              Reg[m][i].T.write(ts)
5:              temp[m][1...n] ← Reg[m][1...n].read()
6:          until completed for majority of memories
7:          val ← temp[1..m][1..n].highestTspValue()
8:          if val = ⊥ then val ← v
9:          for every memory m in parallel do
10:             Reg[m][i].V.write(val, ts)
11:             temp[m][1...n] ← Reg[m][1..n].read()
12:         until completed for majority of memories
13:         if ts = temp[1...m][1...n].highestTsp() then return (val)
14:             ts ← ts + n
```

Problem 2. Consider the following variant of the Non-equivocating Broadcast algorithm seen today in class. Does this algorithm satisfy the Non-Equivocating Broadcast properties? Why or why not?

Algorithm 2 Non-equivocating Broadcast

```
1:  procedure BROADCAST(m)
2:      R[s].write(m)
3:  procedure RECEIVE
4:      senderMsg = R[s].read()
5:      for i = 1...n do
6:          recvMsg = R[i].read()
7:          if recvMsg ≠ ⊥ ∧ recvMsg ≠ senderMsg then
8:              ▷ found conflicting values (Byzantine sender), don't deliver
9:              return
10:     R[i].write(senderMsg)
11:     deliver(senderMsg)
```