Assignment 7

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Problem 9

Yes 000000 is a legal output for a distributed shared memory tat is FIFO consistent. If process a runs first prints 00. Let's now say that b runs second. It could print 00 also if the assignment in process a has not arrived yet. Process c prints 00 if neither the assignment from a nor b has arrived yet. The same stands if some other process runs first.

Problem 10

No, 001110 is not a legal output for a sequentially consistent memory. Every legal output should end with "11" because the statements must be executed in program order. But 001110 is a legal signature if the processes run in this order : a, then c and finally b. In this case the output would be 001011.

Problem 12

The six possible statement interleavings are :
(i) x=1; if(y==0)kill(P2); y=1; if(x==0)kill(P1);
(ii) x=1; y=1; if(y==0)kill(P2); if(x==0)kill(P1);
(iii) x=1; y=1; if(x==0)kill(P1); if(y==0)kill(P2);
(iv) y=1; if(x==0)kill(P1); x=1; if(y==0)kill(P2);
(v) y=1; x=1; if(x==0)kill(P1); if(y==0)kill(P2);
(vi) y=1; x=1; if(y==0)kill(P2); if(x==0)kill(P1);

Problem 27

An operation can be removed from a write queue as soon as it is known that the operation has been performed everywhere. The update propagation has to be modified and more information needs to be exchanged so as all copies to be assured that an operation was performed. In particular, whenever a copy L_i does an update that it has received from copy L_j, it should send an acknowledgement to that copy so as to inform it that it has completed the operation. The acknowledgements should be attached to the write operation in the queue, and an operation will be removed when it has acknowledgements from all copies. Acknowledgement must be propagated when queues are merged as well.

3.

Sequential consistency does not imply monotonic reads because sequential consistency does not order the operations in time. An example that violates monotonic reads is shown in Fig. 6-6a, where P3 and P4 do not read the most recent values. Sequential consistency does imply monotonic writes. That is because the operations of a process are ordered. Both read your writes and writes follow reads are not implied by sequential consistency. In Fig. 6-6a we can see again why these do not hold.