

## Distributed Systems – Part II

HS 2007

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### 1. Atomic Commitment:

Solve problems

7.1

7.2

7.3

7.17

From Chapter 7 of the Bernstein, Hadzilacos, and Goodman book (BHG).

### 2. Replication:

2.a) Assume a replicated system using a Read One – Write All (ROWA) strategy. Each write has to be done by all sites. Design a distributed protocol that will still ensure consistency but where an update does not need to be written to all sites (and, thus, where reads will have to be performed at more than one site). Hint: read Chapter 8 of the BHG book.

2.b) In the ROWA protocol, the cost of executing transactions is  $R+N \times W$ , where  $R$  is the read load,  $N$  the number of sites in the system, and  $W$  is the write load ( $R+W = 1$ ). That is, when the load is only reads, the cost is 1; when the load is only writes, the cost is  $N$ . For the protocol you have designed in 2.a, can you characterize the write and read load for the system to be better than ROWA?

2.c) In terms of the cost formula given above, can you explain why asynchronous replication has a lower cost than synchronous replication?