Assignment 7

Q33: Replication Basics
a. What is the motivation for replicating data in a distributed system? What problems can occur with replication?
b. What measure can be used to estimate the benefits of replication?
c. How can the degree of (tolerated) consistency be formally specified? What is a conit?

Q34: Replica Management
a. What measures might be taken into account to decide when a server should dynamically create new replicas?
b. What possibilities exist to propagate updated content to relevant replica servers? What are the respective strengths of each approach?
c. Compare push-based and pull-based protocols. Which one is more suitable in which cases?

Q35: Strong Ordering Models
a. Explain the (strong) ordering models (1) strict, (2) sequential, (3) linear, (4) causal, and (5) FIFO/PRAM. Order them according to their degree of strictness.
b. Verify your ordering with examples discriminating each successive pair of models: if A is stricter than B, your example should satisfy B but not A.

Q36: Weak Ordering Models
a. What is the basic idea of weak ordering models?
b. What is the main drawback of weak consistency?
c. What is the difference between release consistency and entry consistency?

Q37: Client-Centric Consistency Models
a. Outline the general ideas of implementing client-centric consistency.
b. Enumerate and explain the four different types of client-centric consistency that were introduced in the lecture.

Q38: Consistency Protocols
a. What are primary-based protocols? How can they be classified further?
b. What is the main disadvantage of primary-based protocols? What protocols can be used instead?
c. Explain how epidemic protocols work, and what kind of consistency they can achieve.
Q39: Distributed Shared Memory

a. What is the motivation for implementing distributed shared memory? What disadvantages do exist, compared to message passing?

b. What is false sharing? How can we avoid it?

c. Discuss possible DSM implementations and the consistency models that can be realized with the respective implementation.

d. What happens if different nodes simultaneously try to write to the same page in a sequentially consistent DSM?