

Course ISE 431: Distributed Information Systems

Recitation 2 Exercise

Michael J. May

October 27, 2009

Answer the following questions:

1. Describe precisely what is meant by a scalable system.
2. Scalability can be achieved by applying different techniques. What are those techniques?
3. When a transaction is aborted, we have said that the world is restored to its previous state, as though the transaction had never happened. We lied. Give an example where resetting the world is impossible.
4. Executing nested transactions requires some form of coordination. Explain what a coordinator should actually do.
5. If a client and a server are placed far apart, we may see network latency dominating overall performance. How can we tackle this problem?
6. What is a three-tiered client-server architecture?
7. What is the difference between vertical distribution and horizontal distribution?
8. Consider a chain of processes P_1, P_2, \dots, P_n implementing a multitiered client-server architecture. Process P_1 is client of process P_{i+1} , and P_i will return a reply to P_{i-1} only after receiving a reply from P_{i+1} . What are the main problems with this organization when taking a look at the request-reply performance at process P_1 ?
9. In a structured overlay network, messages are routed according to the topology of the overlay. What is an important disadvantage of this approach?
10. Consider the CAN network. How would you route a message from the node with coordinates (0.2, 0.3) to the one with coordinates (0.9, 0.6)?
11. Considering that a node in CAN knows the coordinates of its immediate neighbors, a reasonable routing policy would be to forward a message to the closest node toward the destination. How good is this policy?
12. Consider an unstructured overlay network in which each node randomly chooses c neighbors. If P and Q are both neighbors of R , what is the probability that they are also neighbors of each other?
13. Consider an unstructured overlay network in which each node randomly chooses c neighbors. To search for a file, a node floods a request to its neighbors and requests those to flood the request once more. How many nodes will be reached?
14. Not every node in a peer-to-peer network should become superpeer. What are reasonable requirements that a superpeer should meet?