CSI3344 Distributed Systems

Workshop Solution 05

Processes

Q1. In a hierarchical location service with a depth of *k*, how many location records need to be updated at most when a mobile entity changes its location?
A: Changing location can be described as the combination of an insert and a delete operation. An insert operation requires that at worst *k* +1 location records are to be changed. Likewise, a delete operation also requires changing *k* +1 records, where the record in the root is shared between the two operations. This leads to a total of 2*k* +1 records.

Q2. In this problem you are to compare reading a file using a single-threaded file server and a multithreaded server. It takes 15 msec to get a request for work, dispatch it, and do the rest of the necessary processing, assuming that the data needed are in a cache in main memory. If a disk operation is needed, as in the case one-third of the time, an additional 75 msec is required, during which time the thread sleeps. How many requests/sec can the server handle if it is single threaded? If it is multithreaded?
(Note: 1 sec = 1000 msec)
A: In the single-threaded case, the cache hits take 15 msec and cache misses take 90 msec. The weighted average is 2/3 × 15 + 1/3 × 90 = 40 msec. Thus the mean request takes 40 msec and the server can do 25 (=1000 ÷ 40) per second. For a multithreaded server, all the waiting for the disk is overlapped, so every request takes 15 msec, and the server can handle 66 2/3 (=1000 ÷ 15) requests per second.

Naming

Q3. Give some examples of true identifiers.
A: Examples are ISBN numbers for books, identification numbers for software and hardware products, employee numbers within a single organization, and Ethernet addresses (although some addresses are used to identify a machine instead of just the Ethernet board).

Q4. Is an identifier allowed to contain information on the entity it refers to?

A: Yes, but that information is not allowed to change, because that would imply changing the identifier. The old identifier should remain valid, so that changing it would imply that an entity has two identifiers, violating the second property of identifiers.

END OF THE WORKSHOP SOLUTION