1 Tapestry

Suppose a node is to be deleted in Tapestry (it didn’t just temporarily fail — it was sold). Explain what must be done to remove it completely, without losing any important information or data. Note that some information about nodes being deleted can be safely ignored — be sure to indicate what this information is and why it can be ignored.

2 RPC Semantics

An RPC request is said to have “at-least-once” semantics if, once the request returns to the calling application, it is guaranteed that the remote procedure was executed at least once on the server. This makes sense for idempotent procedures. The other extreme is “at-most-once” semantics, where the remote procedure is guaranteed not to be executed more than once. This makes sense for a non-idempotent procedure (though one certainly hopes that most of the time it is in fact executed once).

Of course, what we really want is “exactly-once” semantics: a guarantee that the remote procedure is executed exactly one time.

Assume we have a server that never crashes. Unfortunately, the network isn’t so reliable, but we are using TCP.

a. Assume the server does no caching of client requests: it simply responds to requests as it receives them. Give a scenario in which, for non-idempotent procedures, exactly once semantics cannot be achieved.

b. Explain how exactly-once semantics can be achieved. Assume that clients have unique IDs they transmit to the server along with their RPC requests.
3 Hashing

In Tapestry, what is the difference between publishing multiple copies of an object (that hash to the same value) from different nodes vs. a single node publishing the same object but with three different salted hashes? What are the benefits of either way?

4 Handing in

Once finished, you should hand in a PDF containing your hw1 answers by running:

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/course/cs138/bin/cs138_handin hw1
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