Worksheet 3

File, Name and Time Services

Group discussion questions

1. To what extent does Sun NFS deviate from one-copy file update semantics? Construct a scenario in which two user-level processes sharing a file would operate correctly in a single UNIX host but would observe inconsistencies when running in different hosts.

2. How does caching help a name service's availability?

3. Explain how the Jini lookup service uses leases to ensure that the list of services registered with a lookup server remains current although services may crash or become inaccessible.

4. What are the advantages of server-controlled *recursive* navigation compared to the non-recursive navigation?

Problem solving questions

5. A scheme for implementing at-most-once reliable message delivery uses synchronised clocks to reject duplicate messages. Processes place their local clock value (a timestamp) in the messages they send. Each receiver keeps a table giving, for each sending process, the *largest* message timestamp it has seen. Assume that clocks are synchronised to within 100 ms, and that messages can arrive *at most* 50 ms after transmission.

(i) When may a process ignore a message bearing a timestamp *T*, if it has recorded the last message received from that process as having timestamp *T'*?

(ii) When may a receiver remove a timestamp 175,000 (ms) from its table? (*Hint*: use the receiver's local clock value.)

(iii) Should the clocks be internally synchronised or externally synchronised?

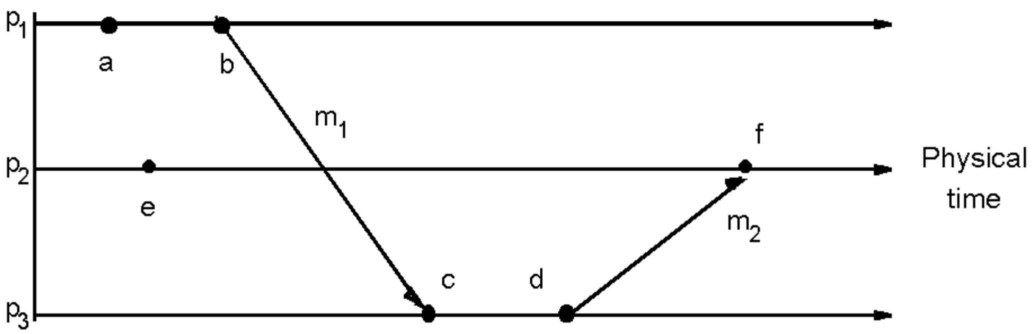
6. A client attempts to synchronise with a time server. It records the round-trip times and timestamps returned by the server in the table below. Which of these times should it use to set its clock? To what time should it set it? Estimate the accuracy of the setting with respect to the server's clock.

Round-trip (ms)	*Time (hr:min:sec)*
22	*10:54:23.674*
25	*10:54:25.450*
20	*10:54:28.342*

7. Consider the Berkeley algorithm for clock synchronisation. Assume that time service contains one master and two slaves. The master clock reads 8:00:00 while the slaves 7:59:40 and 8:00:14 respectively. Assuming these readings are within the tolerance level and zero time passes between the request to read and adjustment, calculate the clock adjustments for the three clocks.

How is the fault-tolerant average calculated?

8. Deduce the values of Lamport logical timestamps for the following scenario:



Are the following pairs of events causally related:

a and b, a and c, e and d