

CS 5523: Operating Systems

Homework 5

!!!! No late HW will be accepted !!!!!

(Check BlackBoard Learn for due date and submission)

Solve various problems from [TS] ch 1 to ch 8

Problems

-----TS Ch 1-----

2. Q: What is the role of middleware in a distributed system?

7. Q: What is an open distributed system and what benefits does openness provide?

-----TS Ch 2-----

1. Q: If a client and a server are placed far apart, we may see network latency dominating overall performance. How can we tackle this problem?

13. Q: We gave two examples of using interceptors in adaptive middleware. What other examples come to mind? [Give at least one example and explain how interception works (a figure may help)?]

-----TS Ch 3-----

1. Q: 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 is 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?

14. Q: Imagine a Web server that maintains a table in which client IP addresses are mapped to the most recently accessed Web pages. When a client connects to the server, the server looks up the client in its table, and if found, returns the registered page. Is this server stateful or stateless?

-----TS Ch 4-----

8. Q: Instead of letting a server register itself with a daemon as in DCE, we could also choose to always assign it the same endpoint. That endpoint can then be used in references to objects in the server's address space. What is the main drawback of this scheme?

23. Q: Despite that multicasting is technically feasible, there is very little support to deploy it in the Internet. The answer to this problem is to be sought in down-to-earth business models: no one really knows how to make money out of multicasting. What scheme can you invent?

-----TS Ch 5-----

3. Q: [What are the key properties of true identifiers] Give some examples of true identifiers.

18. Q: High-level name servers in DNS, that is, name servers implementing nodes in the DNS name space that are close to the root, generally do not support recursive name resolution. Can we expect much performance improvement if they did?

-----TS Ch 6-----

2. Q: Consider the behavior of two machines in a distributed system. Both have clocks that are supposed to tick 1000 times per millisecond. One of them actually does, but the other ticks only 990 times per millisecond. If UTC updates come in once a minute, what is the maximum clock skew that will occur?

12. Q: How do the entries in Fig. 6-17 change if we assume that the algorithms can be implemented on a LAN that supports hardware broadcasts?

-----TS Ch 7-----

2. Q: Explain in your own words what the main reason is for actually considering weak consistency models.

10. Q: Consider a personal mailbox for a mobile user, implemented as part of a wide-area distributed database. What kind of client-centric consistency would be most appropriate?

-----TS Ch 8-----

3. Q: Consider a Web browser that returns an outdated cached page instead of a more recent one that had been updated at the server. Is this a failure, and if so, what kind of failure?

7. Q: For each of the following applications, do you think at-least-once semantics or at most once semantics is best? Discuss.

- (a) Reading and writing files from a file server.
- (b) Compiling a program.
- (c) Remote banking.

Grading: This is a 160-point homework. Each question is 10-point.

Submission

You must submit your work using Blackboard Learn and respect the following rules:

Please scan your solutions and submit all as a single pdf file **lastname_hw6.pdf** file....

- 1) All assignments must be submitted as either a zip or tar archive file unless it is a single pdf file.
- 2) Assignments must include all source code.
- 3) Assignments must include an output.txt file which demonstrates the final test output run by the student.
- 4) If your assignment does not run/compile, the output.txt file should include an explanation of what was accomplished, what the error message was that prevented the student from finishing the assignment and what the student BELIEVES to be the underlying cause of the error.