Dept. Math. & Comp. Sc. Vrije Universiteit

Distributed Systems 10.08.1998

1a	Explain how remote procedure calls work. Be accurate.	5pt
1b	For most RPC systems you can either use a TCP-based or a UDP-based implementation. What are the advantages and disadvantages of using a UDP implementation? Also explain how an application will notice the difference between the two.	5pt
<i>1c</i>	What is the major problem of using RPCs in a wide-area network. Describe solutions to make this problem less severe.	10pt
2a	Describe several forms of <i>file sharing semantics</i> in distributed file systems, and explain why these semantics are so important when it comes to implementing distributed file systems.	5pt
2b	What are the conditions for hierarchical file caches to be effective. Be sure to motivate your answer.	5pt
2c	Explain how file sharing can take place in a distributed filesystem where each user has his own name space.	5pt
2d	Name a few disadvantages of a distributed file system in which the server invalidates client caches.	5pt
3a	Explain how you can implement totally ordered multicasts by using Lamport's logical clocks.	10pt
<i>3b</i>	Explain how Amoeba implements reliable totally ordered multicasts.	10pt
<i>3c</i>	Do you need totally ordered multicasting in a system that guarantees only weak consistency between replicas? Clearly motivate your answer!	5pt
4a	Describe the <i>two-phase commit</i> protocol and its relation to <i>atomic multicas-ting</i> .	5pt
<i>4b</i>	Explain how optimistic concurrency control for transactions works.	5pt
<i>4c</i>	What is the difference between a <i>flat transaction</i> and a <i>nested transaction</i> ? Name a few advantages of nested transactions.	5pt
4d	What is the benefit of <i>strict two-phase locking</i> for nondistributed transactions? Explain also what the additional benefit is when using strict two-phase locking for distributed transactions.	10pt

Grading: The final grade is calculated by accumulating the scores per question (maximum: 90 points), and adding 10 bonus points. The maximum total is therefore 100 points.