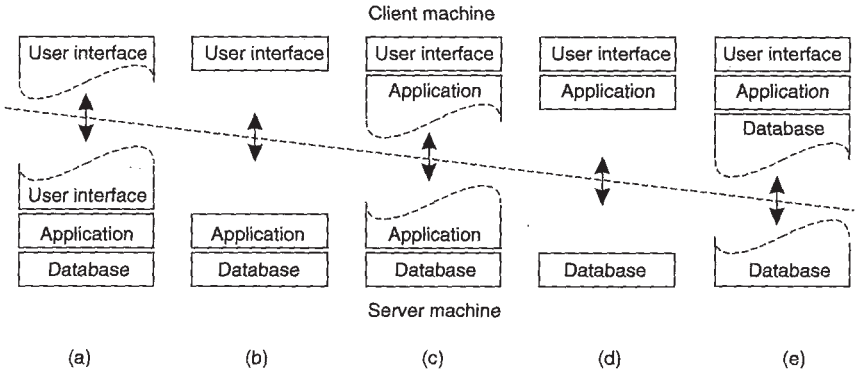
Department Computer Science	**Distributed Systems**
Vrije Universiteit	**14.06.2004**

1a What is meant by an open distributed system? *5pt*

1b What is meant by a three-tiered client-server architecture? *5pt*

1c Consider the following client-server organizations. Organization (e) used to be popular, but there is a trend towards going back to organization (a). Why? *5pt*



2a Remote procedure calls rely on a call-by-copy/restore parameter passing mechanism. Explain this mechanism. *5pt*

2b Consider a client performing an RPC, but the server crashes before it could send the response. What should the client do? *5pt*

3a What is the difference between an iterative and a concurrent server? *5pt*

3b Explain how a superserver works. *5pt*

4a Give a convincing example where using mobile agents is the obvious solution. *5pt*

4b Give an example of receiver-initiated code migration. *5pt*

5a Explain how Lamport timestamps work. *5pt*

5b Explain how totally-ordered multicasting can be implemented with Lamport timestamps. *5pt*

5c Explain what is meant by a distributed snapshot. *5pt*

6a What is the essential difference between caching and replication? *5pt*

6b What is meant by active replication? *5pt*

7a What is the difference between independent and coordinated checkpointing? *5pt*

7b Explain what a piecewise deterministic execution model is. *5pt*

8a Does NFS version 4 follow the remote access model, or the upload/download model? Motivate your answer. *5pt*

8b Explain what is meant with session semantics in the context of distributed file systems. *5pt*

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.*