Part I

This part covers the same material as the midterm exam.

1a Explain the principle of a system that supports message-oriented persistent communication. *5pt*

1b What would be an important drawback of using an e-mail system as the technology for implementing a message-queuing system? *5pt*

1c Sketch a design of an RPC-based system that supports data streams for isochronous transmission mode. *5pt*

2a Why is using DNS for locating objects that change location regularly not such a good idea? *5pt*

2b When using forwarding pointers to locate mobile objects, we need to keep chains short. How can this be accomplished? *5pt*

2c Explain how hierarchical location services exploit locality by considering the general implementation of update and lookup operations. *10pt*

3a Consider a single-threaded object server. How would you implement a remote object that is to be hosted by this server such that remote invocations are atomic? *5pt*

3b Answer the same question as in (a), but now for a multi-threaded object server. *5pt*

Part II

4a Explain what is meant by active replication. *5pt*

4b Active replication generally requires a totally-ordered execution of update operations. Explain when such an ordering requirement can be relaxed. *5pt*

4c Explain how replicated invocations are caused and how they can be avoided. *10pt*

5a Explain the principle of subject-based addressing, and sketch its implementation in TIB/Rendezevous. *5pt*

5b Sketch two alternatives for implementing a distributed version of JavaSpaces, and explain how read and write operations would work for each. *10pt*

6a Alice can delegate access rights to Bob by means of a certificate. How can a server verify whether Bob received the certificate in a legitimate way without the server having to contact Alice? *5pt*

6b To protect a mobile agent against a malicious host, Ajanta uses a log to which servers can append information allowing an agent's owner to detect whether the log has been tampered with. Explain how this works. *5pt*

Final grade: (1) Add, per part, the total points. (2) Let T denote the total points for the midterm exam $(0 \leq T \leq 45)$; D1 the total points for part I; D2 the total points for part II. The final number of points E is equal to $\max\{T, D1\} + D2 + 10$.