Assignment 3

Q12: RPC Basics

a. Depict the basic operation of an RPC invocation. Explain the role of client and server stub, respectively.

b. What is the purpose of marshalling?

c. What is dynamic binding (in the context of RPC) and how does it work?

d. DCE-RPC has a so-called DCE-daemon running on every server machine. What is the purpose of that service?

Q13: RPC en detail

a. In which respects does RPC fail to provide distribution transparency?

b. How can call-by-reference be emulated for use with RPC?

c. Typically the arguments of an RPC are explicitly tagged as pure input (in), pure output (out) or both input and output (inout) operands. How can the system use this information for the benefit of its users?

d. Suppose you had a function void incr(int a, int b) {a++; b++;}, which increments its arguments. Compare the results obtained using call-by-reference vs. call-by-copy/restore.

e. In C, unions can be used to hold an object of one of multiple possible types; the type of the currently stored object cannot be determined at runtime. Explain why or why not this construct affects RPC.

f. What are the key differences between RPC and RMI?

Q14: Failure Scenarios with RPC/RMI

a. Due to packet loss or duplication, exactly-once semantics is hard to guarantee for RPCs across nodes. What other semantics are used instead and how can they be realized?

b. What can happen if the client retransmits its request too early (retransmission timeout too short)?

Q15: Alternative Forms of Communication

a. What preconditions must be met so that lightweight RPC can be used? How does it achieve its improved performance?

b. Explain briefly the concept of active messages. What preconditions must be met so that active messages can be used?

c. Depict message-based communication (message-passing systems) and point out differences to RPC/RMI.
Q16: Message-Oriented Communication

a. What are the major (orthogonal) design parameters of a message-oriented communication facility?

b. According to the lecture, there exist various forms of transient, synchronous communication. To what extent do they differ?

Q17: Message-Queuing Systems

a. Depict the general architecture of a message-queuing system. How are communication endpoints addressed?

b. Why can the usage of queue managers that act as routers/relays help to improve scalability of a message queuing system?

c. What is the role of a message broker?