8. Component-based Distributed Systems

8.1. Basics of Enterprise JavaBeans
   a) Name the available types of EJBs and give an example of their usage!
   b) What is the purpose and difference of local and remote interfaces?
   c) What is the difference between application and container managed persistence?
   d) What is the purpose and content of a deployment descriptor?

8.2. Specify a simple banking application using EJBs which allows managing customers with multiple accounts, access customer and account data and performing money transactions.
   a) Explain purpose and design steps of the four views on components using the banking application as example.
   b) Sketch an UML component diagram for the banking application. Discuss the advantages of an explicit specification of required interfaces of components.
   c) Discuss the architecture of the banking application with respect to an n-tier application.
   d) What beans of what types are necessary to implement the application?
   e) Specify the interfaces of these beans.
   f) Discuss criteria that are relevant to choose an appropriate application server for the banking application?

8.3. OSGi is a Java-based component platform
   a) How is a component in OSGi defined?
   b) Compare the OSGi and EJB component model!

8.4. Debugging of Distributed Systems
   a) Explain the problems of “The lack of a global state”, “Indeterminism” and “Interference”. Suggest a solution for each problem.
   b) Three processes communicate with each other as described in the sequence diagram below. Insert the values of the event counter according to Lamport. (Local events and inter-process events are marked by points).
   c) With reference to the sequence example in the lecture (slide 8.24), give a causal distributed break point for the logical time point t34.
   d) For this example, give two ordered and unordered event pairs.