Applied Informatics / Cooperative Systems AICOS

Distributed Applications SS 2012
(Prof. Dr. J.Schlichter, Dr. W.Wörndl, Dr. F.Schütz)

Test Exam

Name: _____

Matrikelnr.: _____

Date: ...

This exam consists of 9 tests with a total maximum of 40 points.

The duration of the exam is 90 minutes.

Lecture material or other auxiliary material is not allowed during the exam.

Please write your name on all 6 pages of the exam.

Complete sentences are not required, you can answer by using (meaningful) catchwords and/or labeled drawings. If the provided space is not sufficient, you can use the back side of the pages.

You can answer in either German or English. /
Sie können Ihre Antwort in deutscher oder englischer Sprache formulieren.

Grading:

1.0	*38-40*	*2.0*	*29-31*	*3.0*	*23-24*	*4.0*	*17-18*
1.3	*35-37*	*2.3*	*27-28*	*3.3*	*21-22*	*4.3*	*10-16*
1.7	*32-34*	*2.7*	*25-26*	*3.7*	*19-20*	*4.7*	*5-9*

Points between the grades will lead to the better grade (e.g.: 34.5 P. → 1,3).

Test 1: Definitions and Concepts (7 Points)

a) Briefly explain the concept *„replication transparency“*.

b) Briefly explain the concepts *„marshalling“* and *„unmarshalling“*.

c) Briefly explain the *„Edge Chasing“* approach for deadlock detection.

Test 2: LDAP Directory Service (8 P.)
Lightweight Directory Access Protocol (LDAP) is a protocol to support the access of a directory service.

a) Explain two significant differences between a *directory* and a *database*.

b) Briefly explain the *LDAP information model* and thereby also explain the acronyms *DN*, *RDN* and *DIT*.

c) What is the name of the *LDAP data exchange format*? (Abbreviated and long form, no explanation needed)

Test 3: Synchronization of Physical Clocks (8 P.)
The *Network Time Protocol* is an approach to synchronize physical clocks in a distributed system.

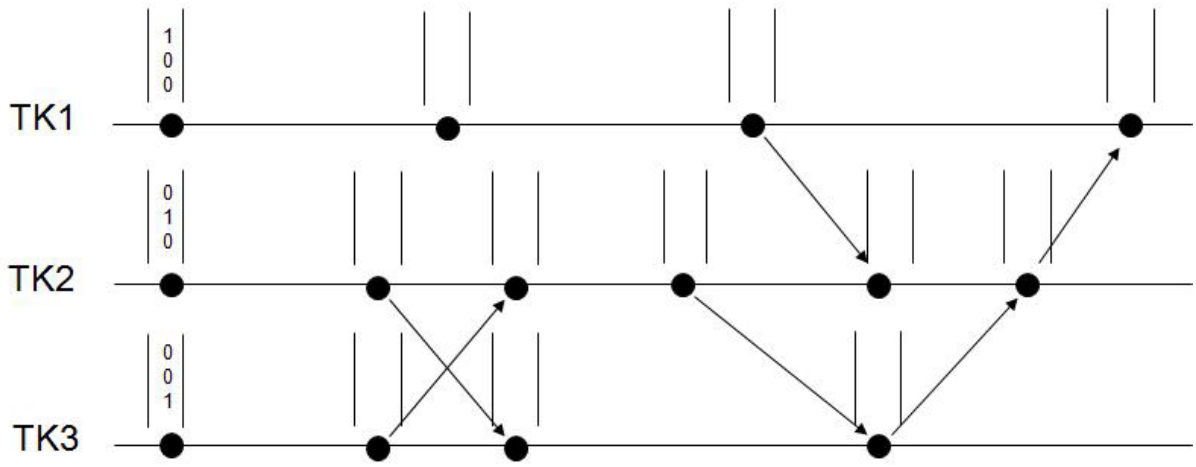
a) Explain the Network Time Protocol (NTP) approach to synchronize clocks.

b) Briefly explain how to estimate the accuracy of the Network Time Protocol.

c) The lecture covered three methods for the synchronization of physical clocks. Which one of those is best suited for the Internet? (no justification needed)

Test 4: Logical Clocks (6 P.)
Logical clocks based on vectors can be used to model events in a distributed application.

a) Determine the values for the vector clocks of TK1, TK2 and TK3 in the depicted example. The arrows represent the message exchange between the components. *(Note: Just write the correct values directly in the example. The vectors in the messages are not needed.)*



b) Give an example what for vector clocks can be used in distributed applications.

c) Are vector clocks strictly consistent? (no justification needed)

Test 5: Enterprise Java Beans and Web Services (8 P.)

a) In Enterprise Java Beans (EJB), there are entity beans and session beans, for example.

(i) Which functions are conceptually assigned to them?

(ii) Why are there no stateless entity beans?

(iii) Name and explain an advantage of the usage of stateless session beans.

b) A Web Service for weather data shall be offered. It shall to be possible to directly ask for weather data belonging to a location and a point of time. Additionally by handing in your email address, you shall be able to register for regularly receiving weather data for a certain location. Obviously, there shall be a possibility to deregister for this service.
(i) Describe your Web Service by offering a Java interface for the Web Service.

(ii) Additionally present Java beans for the data elements your Web Service uses.

Test 6: Failure Tolerant Services (3 P.)
Briefly explain the *"Modular Redundancy"* approach to design a failure tolerant service.