Benha University
2nd Term (June 2017) Final Exam
Class: 4th Year Students (Computer Science Major)
Subject: Distributed Computing
Course Code: CSC 345

Faculty of Computers & Informatics
Date: 04/06/2017
Time: 3 Hours
Examiner(s): Dr. R. Orban

Answer the following questions:

Question One (10 Marks/ 1 each)

For each of the following statements, choose the Correct Answer from the Multiple-Choice List.

1.1 The distributed system is a collection of
a) loosely coupled software on tightly coupled hardware
b) Loosely coupled hardware on tightly coupled software
c) Tightly coupled hardware on loosely coupled software

1.2 The capability of a system to adapt the increased service load is called
a) Scalability
b) Tolerance
c) Capacity

1.3 Data inconsistency occurs due to _____.
a) Concurrent access to shared data
b) Access on inconsistent data
c) Time clash on access of data

1.4 Multi processor system that computer system have are also called
a) Parallel systems
b) Tightly coupled system
c) both a and b

1.5 Which technique is based on compile-time program transformation for accessing remote data in a distributed-memory parallel system?
a) Cache coherence scheme
b) Computation migration
c) Remote procedure call

1.6 There is no need to establish and terminate a connection through open and close operation in
a) Stateless file service
b) Stateful file service
c) both (a) and (b)

1.7 Which of the following are not content of IPC message structure:
a) Actual data and number of byte
b) Sequence number or message ID
c) Sending process address

1.8 In the token passing approach of distributed systems, processes are organized in a ring structure
a) Logically
b) Physically
c) both (a) and (b)

1.9 What are the characteristics of tightly coupled system? (Choose two)
a) Same clock, usually shared memory
b) Different clock
c) Communication is via this shared memory

1.10 In distributed systems, election algorithms assumes that
a) There is no priority number associated with any process
b) Priority of the processes is not required
c) A unique priority number is associated with each active process in system

Question Two (49 Marks)

2.1. **List** the key design goals of distributed system? **What** are the disadvantages of it? (5 Marks/ 2.5 each)

2.2. **Sketch** the Connection-oriented communication pattern using sockets. (3 Marks)

2.3. **Discuss** in short the available models for Code Migration. **Use** figures to support your answer. (10 Marks)

2.4. **Compare** between each of the following : (20 Marks/ 5 each)

- *Blocking* and *non-blocking* communication
- *Thin* and *fat* client
- *Weak* and *strong* mobility.
- *Closely* and *loosely coupled* system.

2.5. **Discuss** in short the System Architectures for Distributed Systems. (3 Marks)

2.6. **What's** Multiprocessor? **Discuss** in short the types of Multiprocessors' OS. (2+6 Marks)

Question Three (16 Marks)

3.1. **Find** the speedup and cost of a parallel system consists of *four* processor elements, where the execution time is in the table shown below: (3 Marks)

	1 *CPU*	**2 *CPU***	**4 *CPU***	**8 *CPU***
T(p)	150	72	30	12

3.2. **Draw** a 3-D hypercube network. **Calculate** its *no. of nodes, node degree, network diameter*, and *bisection width*. (2+4 Marks)

3.3. **Give** short definition of distributed algorithm. **Design** a flooding algorithm for broadcast. The source sends a Flood message, with a unique message *id* to all neighbors. The message has:

- Type Flood
- Unique id: (source id, message seq.)
- Data

- Every node *p* that receives a flood message *m*, does the following:
  - If *m.id* was seen before, discard *m*
  - Otherwise, Add *m.id* to list of previously seen messages and send *m* to all neighbors of *p*
- The initiator runs init_flood_broadcast, and the noninitiators flood_broadcast. (2+5 Marks)

Best Wishes & Good Luck