APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
Scheme for Valuation/Answer Key
Scheme of evaluation (marks in brackets) and answers of problems/key
SEVENTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018
Course Code: CS407
Course Name: DISTRIBUTED COMPUTING

Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions, each carries 4 marks.   Marks

1   List any 4 issues in the design of a distributed system.   (4)

       1 mark each

2   What is the need of safety and liveness as requirements in an Election (4) algorithm?

       Safety – 2 marks

       Liveness – 2 marks

3   Explain the key techniques used for indirect communication.   (4)

       Group communication
       Publish-subscribe systems
       Message queues
       Shared memory approaches   1 mark each

4   Why Skype is called an Overlay network?   (4)

       Explanation – 4 marks

5   Evaluate the performance of Maekawa's voting algorithm with respect to fault (4) tolerance.

       When messages lost- 2 marks, When process crashes-2marks

6   Why is "*send_group*" group communication primitive preferred over "*send*" (4) primitive?

       Explanation – 4 marks

7   What is the difference between two-phase locking and strict two-phase locking (4) in transactions?

       two-phase locking – 1 mark

       strict two-phase locking – 1 mark

       Comparison: 2 marks

8   What do you mean by Vice and Venus in AFS?. What are their roles?   (4)

       Vice – 1 mark

Venus – 1 mark

Role: 2 marks

9   State the rules for committing of nested transactions.   (4)

Any Four rules – 1 mark each

10   Define mobile agents. How can they be potential security threats?   (4)

Definition – 2 marks

Security threat – 2 marks

PART B
Answer any two full questions, each carries 9 marks.

11 a) What are the two variants of the interaction model in distributed systems? On   (4)
       what points do they differ?

       Synchronous – 1 mark

       Asynchronous – 1 mark

       Comparison: 2 marks

    b) Describe any 4 key architectural patterns used in distributed systems.   (5)

       Layered, Tiered, Thin clients, Proxy, Brokerage, Reflection etc

       Explanation of any 4 with relevant figures – 5 marks

12 a) List and explain the different types of communication paradigms used within   (6)
       distributed systems.

       (Interprocess communication, Remote invocation, Indirect communication)

       Explanation of three paradigms – 2 marks each

    b) A distributed system is defined as one in which hardware or software   (3)
       components located at networked computers communicate and coordinate their
       actions only by passing messages. What are the consequences of defining a
       distributed system in this manner?

       Design issues in a message passing system – 3 marks

13 a) Write notes on mobile and ubiquitous computing.   (4)

       Mobile Computing- 2 marks

       Ubiquitous computing – 2 marks

    b) Compare work station server model with processor pool model.   (5)

       work station server model – 2.5 marks

       processor pool model – 2.5 marks.

PART C

Answer any two full questions, each carries 9 marks.

14 a) Describe IP multicast in detail   (6)

Explanation – 6 marks

   b) Give notes on failure model for multicast datagrams   (3)

Explanation – 3 marks

15 a) Explain the implementation of RPC mechanism with a neat diagram.   (4)

Diagram – 1 mark

Explanation – 3 marks

   b) Summarize any five Distributed File System requirements.   (5)

1 mark each

16 a) Explain NFS Architecture with diagram   (5)

Diagram – 2 marks

Explanation – 3 marks

   b) Differentiate Andrew file system and NFS   (4)

Andrew file system – 2 marks

NFS – 2 marks

PART D
Answer any two full questions, each carries 12 marks.

17 a) Explain the lost update and inconsistent retrievals problems in concurrent   (6)
transactions with the help of examples.

Lost update – explanation + example – 3 marks

Inconsistent retrievals – explanation + example – 3 marks

   b) Why serial equivalence requires that once a transaction has released a lock on an   (6)
object, it is not allowed to obtain any more locks?

 A server manages the objects a_1, a_2, ..., a_n. The server provides two operations
for its

clients: *read (i)*   returns the value of a_i;

             write (i, Value)   assigns *Value* to a_i.

The transactions *T* and *U* are defined as follows:

T: *x = read(j); y = read (i); write(j, 44); write(i, 33);*

U: *x = read(k); write(i, 55); y = read (j); write(k, 66).*

Describe an interleaving of the transactions T and U in which locks are released
early with the effect that the interleaving is not serially equivalent.

Explanation – 3 marks

Non serially equivalent interleaving operations of transactions T and U – 3 marks

18 a) Describe a deadlock detection scheme for a single server with an example. (6)

Explanation – 4 marks

Example – 2 marks

b) Write an algorithm to implement mutual exclusion between N processes that is based upon multicast and logical clocks. Illustrate the algorithm using the situation involving three processes p1,p2, p3. (6)

Algorithm(Ricart and Agrawala's) – 3 marks

Illustration with three processes: 3 marks

19 a) With an example and suitable figure describe the operation of bully algorithm. Justify whether it meets the requirements of election, during run of the algorithm. Also evaluate the performance of the above algorithm. (12)

Bully algorithm – example+figure+explanation-8 marks

Justification – 2 marks

Performance evaluation – 2 marks

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