



G1079

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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 (S), MAY 2019

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 and explain the three generations of distributed systems. (4)
Explanation – 3 marks
- 2 Differentiate between synchronous and asynchronous Inter Process (4)
Communication.
 - a) Synchronous IPC (2 marks)
 - b) Asynchronous IPC (2 marks)
- 3 What are the different placement strategies followed in a distributed system. (4)
Any 4 strategies – 1 mark each
- 4 Explain briefly any four transparency requirement for distributed file system. (4)
 - a) Access transparency
 - b) Location transparency
 - c) Mobility transparency
 - d) Performance transparency
 - e) Scaling transparency(4 marks each)
- 5 Differentiate between forward and backward validation. Which is better? (4)
Forward and Backward Validation with Algorithm (1.5 marks each)
Better evaluated based on the comparison of Forward and Backward
Validation (1 mark)
- 6 Mention the factors that evaluate the performance of communication channels (4)
Jitter, bandwidth, latency – explanation – 4 marks
- 7 How does Andrew File System ensure that the cached copies of files are up-to- (4)

- date?
- Cache Consistency in AFS (4 marks)
- 8 With an example describe the working of ring based election algorithm. (4)
 Example with Diagram (1 mark)
 Explanation (3 marks)
- 9 Why are hierarchic locks required? Explain with example. (4)
 Hierarchic locks - Explanation (2 marks)
 Example – Lock Hierarchy for a diary (2 marks)
- 10 In Maekawa's Voting algorithm for all $i, j=1, 2, \dots, N$; P_i belongs to set V_i , what (4)
 problems can arise if the sets V_i are chosen so that $V_i \cap V_j = \phi$.
 $P_i \in V_i$
 $V_i \cap V_j \neq \phi$
 $|V_i| = K$ - to be fair, each process has a voting set of the same size.
 Each process P_j is contained in M of the voting sets V_i
 * There is no common member of any two voting sets. (4 marks)

PART B

Answer any two full questions, each carries 9 marks.

- 11 a) How can the security of a distributed system be achieved? How can processes (5)
 and their interactions be secured?
 Security model – explanation – 5 marks
- b) Distinguish between mini computer model and work station model. (4)
 mini computer model – 2 marks
 work station model -2 marks
- 12 a) Consider two communication services for use in asynchronous distributed (9)
 system. In service A, messages may be lost, duplicated or delayed and check
 sums apply only to headers. In service B, messages may be lost, delayed or
 delivered too fast for the recipient to handle them, but those that are delivered
 arrive with the correct contents.
 Describe the classes of failure exhibited by each service. Classify their failures
 according to their effects on the properties of validity and integrity. Can service

B, be described as a reliable communication service?

Failure model and types of failures -explanation – 9 marks

- 13 a) Explain how multimedia services are supported in distributed systems. (4)
Explanation – 4 marks
- b) Summarize the challenges in designing a distributed system. (5)
Any 5 challenges – 1 mark each

PART C

Answer any two full questions, each carries 9 marks.

- 14 a) Explain request reply protocol with an example. (5)
Explanation (2 marks)
Example (HTTP) – 3 marks
- b) Describe the major design issues for RPC (4)
3 design issues – 4 marks
- 15 a) What are the different failures mentioned in the failure model for UDP datagrams? (4)
Explanation of two possible failures – 4 marks
- b) Briefly explain different types of navigations used for name resolution. (5)
Explanation (Iterative, multicast, non-recursive and recursive server controlled navigations) – 5 marks
- 16 a) With appropriate diagram explain the distribution of processes in the Andrew File System (5)
Figure – 2 marks
Explanation – 3 marks
- b) Describe the caching mechanism used in NFS (4)
Explanation – 4 marks

PART D

Answer any two full questions, each carries 12 marks.

- 17 a) Implement the two methods of locking, namely lock class and lock manager class (6)
Lock class – 3 marks
Lock manager class – 3 marks
- b) How does an optimistic approach to the serialization of transactions avoid (6)

drawbacks of locking?

Explanation – 4 marks

Example – 2 marks

- 18 a) Why do we make any pair of transactions serially equivalent? Explain serial equivalence with the help of an example. (6)

Explanation – 3 marks

Example – 3 marks

- b) Compare the central server algorithm and ring based algorithm. Which is better and why? (6)

Central server algorithm + figure – 2.5 marks

Ring based algorithm + figure – 2.5 marks

Comparison – 1 mark

- 19 a) Explain Ricart and Agrawala's multicast based mutual exclusion algorithm. (6)

Explanation – 4 marks

Example – 2 marks

- b) In a ring topology 7 processes are connected with different ID's as shown: (6)

P20->P5->P10->P18->P3->P16->P9

If process P10 initiates election, after how many message passes will the coordinator be elected and known to all the processes? What modification will take place to the election message as it passes through all the processes?

Ring based election algorithm – explanation -(6 marks)
