

Question 1

Answer saved

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Flag question

Answer the following question keeping in mind the value assigned to the parent variable in Synchronous Single-Initiator Spanning Tree Algorithm using Flooding.

In the Synchronous Single-Initiator Spanning Tree Algorithm using Flooding, each node can have

Select one:

- ☐ exactly three parent nodes
- ☐ multiple parent nodes
- ☐ exactly two parent nodes
- ☒ exactly one parent node

Question 2

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Flag question

A distributed system consists of 5 processes - P1, P2, P3, P4, P5 and uses the Raynal-Schiper-Toueg algorithm. If $DELIV_4 = [2\ 2\ 3\ 0\ 1]$, which of the following is true?

Select one:

- ☐ 2 messages sent by P1 have been delivered to P4
- ☐ a total of 8 messages sent by all the other processes have been delivered to P4
- ☐ 3 messages sent by P3 have been delivered to P4
- ☒ all the given statements are true

Question 3

Answer saved

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Flag question

Which of the following is false?

Select one:

- ☐ between every pair of nodes in a spanning tree, only a single path exists
- ☐ for N nodes, a spanning tree has N - 1 edges
- ☐ a spanning tree never has a cycle
- ☒ removing an edge from a spanning tree does not partition the nodes into two disjoint sets, i.e., removing an edge does not make the spanning tree disconnected

Question 4

Answer saved

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Flag question

Lamport's algorithm for implementing distributed mutual exclusion is applicable for

Select one:

- ☒ only FIFO communication channels
- ☐ neither FIFO nor non-FIFO communication channels
- ☐ only non-FIFO communication channels
- ☐ both FIFO and non-FIFO communication channels

Question 5

Answer saved

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Flag question

A distributed system contains 15 processes and uses the Schiper-Eggli-Sandoz protocol. The size of the vector V_P of each process is

Select one:

- ☐ 30
- ☐ 16
- ☐ 15
- ☒ 14

Question 6

Answer saved

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Flag question

Point-to-point message communication is known as

Select one:

- ☐ convergecasting
- ☐ multicasting
- ☐ broadcasting
- ☒ unicasting

Question 7

Answer saved

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Suppose you are given a graph G containing N nodes. Node A is one of the nodes of G. The neighbors of A are B, C, D, E and F. In round x, A received QUERY messages from B and D. The nodes to which A will be sending QUERY messages in round x+1 are

Select one:

- ☐ B, C and E
- ☐ B, C, D, E and F
- ☒ C, E and F
- ☐ C and E

Question 8

Answer saved

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Flag question

A distributed system consisting of 50 sites uses Suzuki-Kasami's Broadcast Algorithm. The size of the RN array of each site is

Select one:

- ☒ 50
- ☐ 49 x 49
- ☐ 50 x 50
- ☐ 49

Question 9

Answer saved

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Flag question

Broadcast on a spanning tree is initiated by

Select one:

- ☐ by multiple leaf nodes
- ☐ by a non-leaf node
- ☐ by a leaf node
- ☒ the root node

Question 10

Answer saved

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Maekawa's algorithm is

Select one:

- ☐ broadcast based algorithm
- ☐ assertion based algorithm
- ☐ token based algorithm
- ☒ quorum based algorithm

Question 11

Answer saved

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Flag question

A distributed system contains 15 sites and uses Lamport's algorithm for implementing distributed mutual exclusion. Calculate the number of messages required per CS invocation for this system.

Select one:

- ☐ 45
- ☐ 30
- ☒ 42
- ☐ 48

Question 12

Answer saved

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A distributed system consists of 6 processes - P1, P2, P3, P4, P5 and P6. This system uses the Birman-Schiper-Stephenson protocol. P2's current clock value is $C_2 = [2 \ 3 \ 1 \ 2 \ 4 \ 3]$. P2 receives a message m from P3 with timestamp $tm = [3 \ 4 \ 2 \ 2 \ 4 \ 3]$. Which of the following is true?

Select one:

- ☐ m should never be delivered to P2 and should be discarded
- ☐ after delivering m to P2, the vector clock of P2 should be updated
- ☐ it is safe to deliver m to P2
- ☒ it is currently not safe to deliver m to P2

Question 13

Answer saved

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Flag question

Suppose you are given a spanning tree with 100 nodes. How many messages are required to execute the convergecast algorithm on this tree?

Select one:

- ☐ 200
- ☐ 100
- ☐ 101
- ☒ 99

Question 14

Answer saved

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Flag question

The height of a spanning tree is defined as the number of edges on the longest path from the root node to a leaf node. State which of the following is true.

Select one:

- ☐ height of a spanning tree is twice the diameter of the tree
- ☐ height of a spanning tree is half of the diameter of the tree
- ☐ height of a spanning tree is equal to the diameter of the tree
- ☒ there is no relation between height and diameter of a spanning tree

Question 15

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Flag question

The maximum time required by a broadcast for an N node spanning tree is

Select one:

- ☐ $O(\log N)$
- ☐ $O(2^N)$
- ☐ $O(N^2)$
- ☒ $O(N)$

Question 16

Answer saved

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Flag question

Which of the following is true for the Synchronous Single-Initiator Spanning Tree Algorithm using Flooding?

Select one:

- ☐ In a single round, a node can receive QUERY message from exactly one node
- ☒ In a single round, a node can receive QUERY messages from multiple nodes
- ☐ In a single round, a node can receive QUERY messages from exactly two nodes
- ☐ In a single round, a node can receive QUERY message from only the root node

Question 17

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Flag question

Consider a distributed system that uses Raymond's tree based algorithm. A node X of this distributed system has 5 neighbors. What is the maximum size of REQUEST_Q of X?

Select one:

- ☐ 4
- ☐ 5
- ☒ 6
- ☐ 7

Question 18

Answer saved

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Flag question

Suppose a graph G has a diameter of 10. The number of rounds for which the Synchronous Single-Initiator Spanning Tree Algorithm using Flooding will execute on G is

Select one:

- ☐ exactly 10
- ☐ exactly 5
- ☒ at most 10
- ☐ at most 5

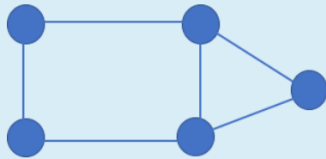
Question 19

Answer saved

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Flag question

What is the diameter of the following graph?



Select one:

- ☐ 3
- ☐ 4
- ☐ 1
- ☒ 2

Question 20

Answer saved

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Which of the following is false for Maekawa's algorithm?

Select one:

- ☒ The algorithm is prone to deadlocks
- ☐ Each site is contained in its own request set
- ☐ The algorithm uses REQUEST, REPLY and RELEASE messages
- ☐ The sizes of the request sets of the sites are different

Question 21

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Flag question

The variable visited used in the Synchronous Single-Initiator Spanning Tree Algorithm using Flooding can take on the following value(s)

Select one:

- ☐ 0, 1 and 2
- ☐ only 0
- ☐ -1, 0 and 1
- ☒ 0 and 1

Question 22

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A causal ordering protocol should ensure

Select one:

- ☒ both safety and liveness properties
- ☐ only the safety property
- ☐ channel encryption
- ☐ only the liveness property

Question 23

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Flag question

A message M arrives at process P and is stored in a local buffer of P. M is never delivered to P. P uses a causal ordering protocol to order the arriving messages. What can be inferred from the given information?

Select one:

- ☐ both safety and liveness properties are violated
- ☒ liveness property is violated
- ☐ no property is violated
- ☐ safety property is violated

Question 24

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Suppose a distributed system contains 6 processes - p1, p2, p3, p4, p5 and p6. This system uses the Raynal-Schiper-Toueg algorithm. Suppose the value contained in row number 2 and column number 4 of the SENT array of p2 contains the value 5. What does this imply? Assume the first row to be row number 1 and the first column to be column number 1.

Select one:

- ☒ p2 has sent 5 messages to p4
- ☐ p5 has sent 5 messages to p3
- ☐ p4 has sent 5 messages to p2
- ☐ p3 has sent 5 messages to p5

Question 25

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A distributed system contains 30 processes and uses the Raynal-Schiper-Toueg algorithm. In this system, the size of the SENT array of each process is

Select one:

- ☐ 15 x 15
- ☐ 15
- ☐ 30
- ☒ 30 x 30