Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

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)
2		What is the need of safety and liveness as requirements in an Election algorithm?	(4)
3		Explain the key techniques used for indirect communication.	(4)
4		Why Skype is called an Overlay network?	(4)
5		Evaluate the performance of Maekawa's voting algorithm with respect to fault tolerance	(4)
6		Why is "*send_group"* group communication primitive preferred over "*send"* primitive?	(4)
7		What is the difference between two-phase locking and strict two-phase locking in transactions?	(4)
8		What do you mean by Vice and Venus in AFS?. What are their roles?	(4)
9		State the rules for committing of nested transactions.	(4)
10		Define mobile agents. How can they be potential security threats?	(4)

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 what points do they differ?	(4)
	b)	Describe any 4 key architectural patterns used in distributed systems.	(5)
12	a)	List and explain the different types of communication paradigms used within distributed systems.	(6)
	b)	A distributed system is defined as one in which hardware or software 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?	(3)
13	a)	Write notes on mobile and ubiquitous computing.	(4)

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

PART C

Answer any two full questions, each carries 9 marks.

14 a) Describe IP multicast in detail (6)

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

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

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

16 a) Explain NFS Architecture with diagram (5)

b) Differentiate Andrew file system and NFS (4)

PART D

Answer any two full questions, each carries 12 marks.

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

b) Why serial equivalence requires that once a transaction has released a lock on an 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 *ai*; *write(i, Value)*assigns *Value* to *ai*. 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 earlywith the effect that the interleaving is not serially equivalent. (6)

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

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)

19 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)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

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)
2	Differentiate between synchronous and asynchronous Inter Process Communication.	(4)
3	What are the different placement strategies followed in a distributed system.	(4)
4	Explain briefly any four transparency requirement for distributed file system.	(4)
5	Differentiate between forward and backward validation. Which is better?	(4)
6	Mention the factors that evaluate the performance of communication channels.	(4)
7	How does Andrew File System ensure that the cached copies of files are up-to-date?	(4)
8	With an example describe the working of ring based election algorithm.	(4)
9	Why are hierarchic locks required? Explain with example.	(4)
10	In Maekawa's Voting algorithm for all i,j=1,2,....,N ; Pi belongs to set Vi, what problems can arise if the sets Vi are chosen so that $Vi \wedge Vj = \phi$.	(4)

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 and their interactions be secured?	(5)
	b)	Distinguish between mini computer model and work station model.	(4)
12	a)	Consider two communication services for use in asynchronous distributed 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.	(9)

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?

13 a) Explain how multimedia services are supported in distributed systems. (4)

b) Summarize the challenges in designing a distributed system. (5)

PART C

Answer any two full questions, each carries 9 marks.

14 a) Explain request reply protocol with an example. (5)

b) Describe the major design issues for RPC (4)

15 a) What are the different failures mentioned in the failure model for UDP datagrams? (4)

b) Briefly explain different types of navigations used for name resolution. (5)

16 a) With appropriate diagram explain the distribution of processes in the Andrew File System (5)

b) Describe the caching mechanism used in NFS (4)

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)

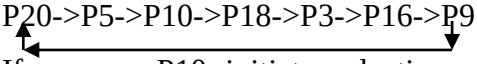
b) How the optimistic concurrency control to the serialization of transactions avoids drawbacks of locking (6)

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

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

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

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



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?

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SEVENTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 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 Explain network transparency. The e-mail addresses ensures network transparency, justify. (4)

2 Compare tightly coupled and loosely coupled systems with neat diagrams. (4)

3 Illustrate the following placement strategies used in a distributed system. (4)

i. mapping of services to multiple servers / proxy servers
ii. mobile code

4 What impact does the introduction of overlay networks have on the traditional Internet architecture, and in particular on the programmer's conceptual view of the Internet? (4)

5 Explain the directory service and its interface operations in a file service architecture. (4)

6 Illustrate the iterative navigation process in name resolution with a neat diagram. (4)

7 The operation create inserts a new bank account at a branch. The transactions T and U are defined as follows: (4)

T: *aBranch.create("Z");*

U: *z.deposit(10); z.deposit(20).*

Assume that Z does not yet exist. Assume also that the deposit operation does nothing if the account given as the argument does not exist. Consider the following interleaving of transactions T and U:

T	U
	z.deposit(10);
aBranch.create(Z);	
	z.deposit(20);

State the balance of Z after their execution in this order. Are these consistent with serially equivalent executions of T and U?

8 What is a deadlock? Illustrate the various ways of detecting deadlock in a (4)

distributed environment.

9 Illustrate the working of central server algorithm with a diagram. (4)

10 Explain the case of deadlock in Maekawa's voting algorithm. (4)

PART B

Answer any two full questions, each carries 9 marks.

11 a) Illustrate the processor-pool model with a neat diagram. How is it different from workstation-server model? (5)

b) Describe the heterogeneity and scalability issues in distributed computing. (4)

12 a) Explain distributed computing as a 'Utility'. (4)

b) Identify the different threats to communication channels and explain different mechanisms to overcome that. (5)

13 a) Explain the different categories of failures in a distributed environment. (6)

b) Outline three specific and contrasting examples of the increasing levels of heterogeneity experienced in contemporary distributed systems. (3)

PART C

Answer any two full questions, each carries 9 marks.

14 a) With a neat diagram, explain the tasks in group membership management. (5)

b) Describe the multicast support provided in IPv4. (4)

15 a) With a neat diagram, illustrate the implementation of RPC. (5)

b) Summarize the distributed file system requirements. (4)

16 a) Sketch the architecture of Sun NFS and explain the role of different components. (6)

b) Distinguish between whole file serving and whole file caching in Andrew file system. (3)

PART D

Answer any two full questions, each carries 12 marks.

17 a) Outline the lock implementation in distributed environment. (6)

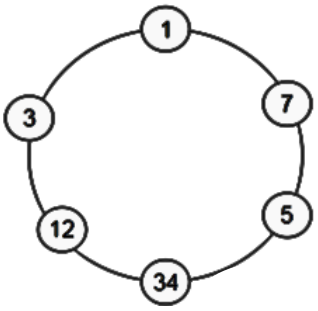
b) Explain dirty read and premature write problems associated with transactions with suitable examples. (6)

18 a) What are nested transactions? Summarize the rules for committing of nested transactions. (5)

b) Explain the steps in Maekawa's voting algorithm. (7)

19 a) In the ring topology shown below, if process with identifier 7 initiates election, explain the election process and show the modifications happening to the election message as it passes through all the processes. (8)

How many election and elected messages will be passed so that the coordinator be elected and known to all the processes?



b) Examine whether the Bully algorithm meets the necessary conditions for election. (4)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SEVENTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MARCH 2020

Course Code: CS407

Course Name: DISTRIBUTED COMPUTING

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 4 marks. Marks

1 Define mobile agents. How this will create security threats. (4)

2 Outline the layered and tiered architectural patterns used in distributed systems. (4)

3 Distinguish between the two variants of the interaction model in distributed systems. (4)

4 Explain the three RPC call semantics. (4)

5 What is file group? How will you generate a unique identifier for a file group? (4)

6 Explain the mount service in NFS. (4)

7 Suppose that there are 100 items currently in a stock. Given two transactions U and V as below. Explain the inconsistent retrievals problem in this scenario and propose a solution for that. (4)

U	V
Purchase 200 items Sell 50 items	Read item count in Stock

8 Explain two version locking. (4)

9 Define mutual exclusion and summarize its three essential requirements. (4)

10 Evaluate the performance of Maekawa's voting algorithm. (4)

PART B

Answer any two full questions, each carries 9 marks.

11 a) "The absence of these two transparencies most strongly affects the utilization of distributed resources". Identify and explain the above two types of transparencies with examples. (4)

b) Compare workstation model with workstation-server model. (5)

12 a) Distinguish between mobile computing and ubiquitous computing. (4)

b) Compare client-server architecture with peer to peer architecture. (5)

13 a) Distinguish between Omission Failures and Arbitrary failures. (4)

b) Identify the failure category in the following events and define it: (3)
   i. Dropped messages
   ii. Corrupt/duplicate data
   iii. Delayed transmission

c) Explain the significance of middleware in distributed systems (2)

PART C

Answer any two full questions, each carries 9 marks.

14 a) With a neat architecture, explain the steps in establishing a Skype connection. (6)

b) Describe the features of group communication. (3)

15 a) Explain IP multicast (4)

b) Illustrate the architecture and implementation details of Andrew File System. (5)

16 a) Explain the role of virtual file system module (VFS) in Sun NFS. (4)

b) Sketch the distributed file service architecture and explain its components. (5)

PART D

Answer any two full questions, each carries 12 marks.

17 a) Explain how the time-stamp approach helps in overcoming the lost-update problem. Discuss how the inconsistencies are removed. (6)

b) Define deadlock and explain how deadlocks can be detected and prevented. (6)

18 a) Explain the use of locks in two phase locking and strict two phase locking. (6)

b) Evaluate the performance of ring based algorithm for mutual exclusion. (6)
Give an example for the execution of the algorithm to show that processes are not necessarily granted entry to the critical section in happened-before order.

19 a) Illustrate bully algorithm for election with an example. (8)

b) Outline two scenarios where the election condition E1 is broken in case of Bully algorithm. (4)

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Reg No.:_____ **00000CS407121901** Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh semester B.Tech examinations (S), September 2020

Course Code: CS407

Course Name: DISTRIBUTED COMPUTING

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 4 marks. Marks

1		In what all aspects distributed systems are better than centralized systems? Give examples of two applications for which distributed systems will be more suitable.	(4)
2		What are the different communicating entities in a distributed system?	(4)
3		Distinguish between synchronous and asynchronous distributed systems.	(4)
4		Describe the architecture of Skype overlay network.	(4)
5		Explain the characteristics of multicasting.	(4)
6		What is the role of Vice and Venus in AFS?	(4)
7		Does ring based mutual exclusion algorithm satisfy the happened before ordering criteria? Illustrate with an example.	(4)
8		What are the criteria for evaluating the performance of a mutual exclusion algorithm?	(4)
9		Explain the basic time stamp ordering rule.	(4)
10		Distinguish between forward and backward validation.	(4)

PART B

Answer any two full questions, each carries 9 marks.

11	a)	Explain processor pool model with diagram.	(3)
	b)	Discuss the challenges in designing a distributed system.	(6)
12	a)	Illustrate the security model for distributed systems.	(6)
	b)	Identify the failure category in the following events and define it: i.Dropped messages ii.Corrupt/duplicate data iii.Delayed transmission	(3)
13	a)	Explain with an example the distributed service as a utility.	(4)
	b)	How can processes and their interactions be secured in a distributed system?	(5)

PART C

Answer any two full questions, each carries 9 marks.

14 a) Explain the request –reply protocol used in client server communication (5)

b) Discuss IP multicast communication. (4)

15 a) What are the different call semantics in RPC? (4)

b) Differentiate between NFS and AFS. (5)

16 a) Discuss the caching mechanisms in NFS. (4)

b) Differentiate non- recursive and recursive navigation used in name service. (5)

PART D

Answer any two full questions, each carries 12 marks.

17 a) How the optimistic concurrency control to the serialization of transactions avoids drawbacks of locking. (6)

b) Explain the use of locks in two phase locking and strict two phase locking. (6)

18 a) Describe the working of bully algorithm with an example. (6)

b) What is a nested transaction? (6)

Consider the following 'transfer' transactions T and U

T: a.withdraw(100); b.deposit(100);

U: c.withdraw(200); b.deposit(200);

Suppose that they are structured as pairs of nested transactions:

*T*1: a.withdraw(4); *T*2: b.deposit(4);

*U*1: c.withdraw(3); *U*2: b.deposit(3);

Compare the number of serially equivalent interleavings of *T*1, *T*2, *U*1 and *U*2 with the number of serially equivalent interleavings of *T* and *U*.

19 Explain Ricart and Agrawala's algorithm for mutual exclusion. Discuss the performance of the algorithm. Explain the working of the algorithm in a scenario of 4 processes P1, P2, P3 and P4 with P2 and P3 requesting to enter into critical section with timestamps 28 and 36 respectively. (12)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh Semester B.Tech Degree Examination (Regular and Supplementary), December 2020

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 four challenges in the design of a distributed system.	(4)
2		Discuss the techniques used in distributed systems for failure handling.	(4)
3		Distinguish between the two variants of the interaction model in distributed systems.	(4)
4		What is file group? How will you generate a unique identifier for a file group?	(4)
5		Write notes on the three RPC call semantics.	(4)
6		List and explain the characteristics of multicasting.	(4)
7		What is the purpose of using Locks in transactions? Describe two-phase locking.	(4)
8		Explain the basic time stamp ordering rule.	(4)
9		What are the criteria for evaluating the performance of a mutual exclusion algorithm?	(4)
10		Explain the Ricart and Agarwal algorithm.	(4)

PART B

Answer any two full questions, each carries 9 marks.

11	a)	Compare workstation model with workstation-server model.	(4)
	b)	Illustrate the processor-pool model with a neat diagram. Discuss the features.	(5)
12	a)	Describe architectural patterns used in distributed systems.	(5)
	b)	What are the different placement strategies followed in a distributed system?	(4)
13	a)	Explain interaction model of distributed systems.	(5)
	b)	Explain how multimedia services are supported in distributed systems.	(4)

PART C

Answer any two full questions, each carries 9 marks.

14	a)	With a neat diagram, explain the tasks in group membership management.	(5)
	b)	Explain the request –reply protocol used in client server communication. Give an example.	(4)
15	a)	Summarize any five Distributed File System requirements.	(5)
	b)	Explain the role of virtual file system module (VFS) in Sun NFS.	(4)
16	a)	What are the different failures mentioned in the failure model for UDP datagrams?	(4)
	b)	With appropriate diagram explain the distribution of processes in the Andrew File System.	(5)

PART D

Answer any two full questions, each carries 12 marks.

17	a)	Explain the lost update and inconsistent retrievals problems in concurrent transactions with the help of examples.	(6)
	b)	What are the disadvantages of Lock based concurrency control? Name and explain any alternative approach for achieving concurrency	(6)
18	a)	Describe the working of bully algorithm with an example.	(6)
	b)	Compare the central server algorithm and ring based algorithm. Which is better and why?	(6)
19	a)	What are nested transactions? Summarize the rules for committing of nested transactions	(6)
	b)	In a ring topology 7 processes are connected with different ID's as shown: P20->P5->P10->P18->P3->P4->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?	(6)

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