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SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

Continuous Assessment Test - II, September 2018

B.Tech(Common to all Faculty), Fall Semester -2018-19

Course Code	:	CSE4001	Duration	:	90 Minutes.
Course Name	:	Parallel and Distributed Computing	Max. Marks	:	50
School	:	SCOPE	Slot	:	B1

Answer All the Questions **(5*10=50 Marks)**

1. (a) Below is a list of three fundamental parallel algorithm models. Explain each of the models and describe how locality is preserved in the models. (6)

(i) The data-parallel model; (ii) The task graph model; and (iii) The work pool model.

(b) Consider the execution of the query:

MODEL = "Tata Elxsi" AND CMP =1633.2 AND (1-Year Return = -22.2 OR Total Price =1965.0) on the following table:

Company	Sales for Jun '16 (₹ Cr)	YoY Chg (%)	NP for Jun '16 (₹ Cr)	YoY Chg (%)	CMP (₹)	1-Year Return (%)	Target Price (₹)*
Bharat Financials	334.1	53.8	235.9	481.9	795.9	54.3	752.4
Manappuram Finance	743.3	38.3	160.3	128.9	87.8	257.4	112.2
Motilal Oswal Financials	308.3	62.5	79.2	84.3	480.4	52.6	475.0
Capital First	616.1	56.0	49.2	34.8	718.6	81.8	715.3
JK Lakshmi Cement	777.2	31.6	28.6	373.4	443.9	25.3	467.9
Repco Home Finance	238.9	23.5	39.5	13.6	831.0	10.4	880.9
Tata Elxsi	294.3	20.9	41.9	40.6	1,633.2	-22.2	1,965.0
Can Fin Homes	309.5	27.6	49.7	117.3	1,437.5	84.0	1,443.3
Gulf Oil Lubricants	283.0	23.2	31.2	43.3	689.7	43.9	746.3
Delta Corp	108.7	34.6	20.1	2,474.4	142.1	88.7	NA
Firstsoure Solutions	875.3	19.4	73.4	17.7	44.7	48.3	54.3
Take Solutions	317.7	39.0	31.4	16.0	173.0	21.8	202.5
8K Miles	103.9	105.4	19.3	208.3	2,006.5	105.0	NA
GIC Housing Fin	234.4	14.9	32.3	21.2	293.5	47.3	325.0
Orient Refractories	130.4	19.0	17.4	34.7	97.5	8.9	121.5

Generate the different tables to process the execution query and illustrate its structural description in the form of Task Dependency Graph Model (4)

2. (a). Give a pseudo code for unidirectional communication using MPI. (5)

(b) The following is an OpenMP parallization algorithm for a shared memory machine.

```
do k=1,n-1
a(k+1:n,k) = a(k+1:n,k)/a(k,k)
!$omp parallel do schedule (static)
do j=k+1,n
```

```
a(k+1:n,j) = a(k+1:n,j)-a(k,j)*a(k+1:n,k)
end do
!$omp end parallel do
end do
```

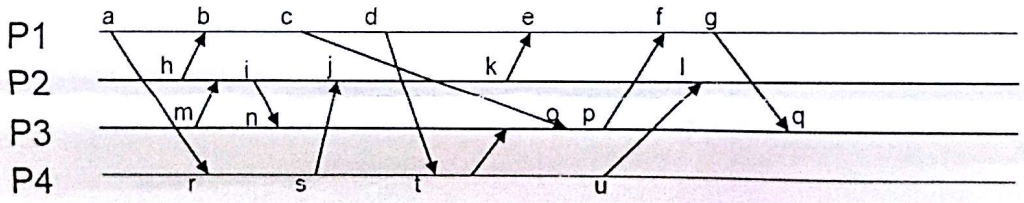
Explain the algorithm, including the partitioning of data. (5)

3. (a) For which of the following applications would UDP be preferable over TCP, ignoring / annoying concerns such as firewalls that might block some protocols? (5)

i) Streaming a live video over the internet	TCP / UDP
ii) Instant messaging/email	TCP / UDP
iii) Logging in to your bank website	TCP / UDP
iv) Voice over IP	TCP / UDP
v) Large file transfers	TCP / UDP

(b) Illustrate the client and server routines that uses stub programs to establish the network communication. Explain with its related concepts (5)

4. Consider figure below that shows four processes (P1, P2, P3, P4) with events a, b, c, ... and messages communicating between them. Assume that initial logical clock values are all initialized to 0.List the Lamport timestamps for each event shown in Figure. Assume that each process maintains a logical clock as a single integer value as a Lamport clock.



(i) Provide timestamps for each labeled event (6)
(ii) Identify the concurrent events. (2)
(iii) Discuss on the disadvantages of Lamport algorithm. (2)

5. (a) A client's clock reads 9:20:00. The server's clock reads 9:10:00 when they synchronize using the Berkeley algorithm. Assume message delays are negligible. What is the time at the client after synchronization? (3)

(b)Your Bank maintains multiple servers in their cloud, but for each customer, one of the servers is responsible, i.e., is the leader. (3)

(i) What if there are two leaders per customer?
(ii) What if servers disagree about who the leader is?
(iii) What if the leader crashes?

(c) Is leader election possible in a synchronous ring in which all but one processor have the same identifier? Prove its impossibility result using algorithmic approach. (4)