National Institute of Technology, Rourkela-8

Dept. of Comp. Sc. & Engg.,

End Sem Spring Exam June 2021

Course Name: DISTRIBUTED SYSTMS

Course Code: CS3006 Time: 2.0 Hours (9.30 to 11.30 AM) FM: 50

Date of Exam: June 2021

Instruction: (1) ANSWER ALL QUESTIONS
(2) Q1 through Q5 carries 10 marks each
(3) Answers should be brief and to the point

Q1. Answer the following briefly

(a) How many nodes are there in a hypercube network of dimension 4.
(a) What is the network connectivity of a distributed system following RING topology?
(b) Under what conditions, a distributed system can function as if a PC?
(d) Differentiate between Internet and www,
(e) Write the difference between crash and soft faults in a distributed system.
(f) Differentiate between direct and indirect communication using Send/Receive primitives.
(g) What is a system call? Can an ISR be called as a system call.
(h) Differentiate between Skew and Clock rate.
(i) What is the advantage of asynchronous communication?
(j) Differentiate between Automatic and Explicit buffering used for communication.

Q2. Select the correct answer with justification:

(i) The number of CPU registers depend on:

(a) OS (b) Computer Organization (c) Computer Architecture (d) None

(ii) Which of the following property is satisfied by a Distributed OS:

(a) SSI (b) MSI (c) Timesharing (d) Networking Image

(iii) Which of the following is not an advantage of Distributed System?
(a) Resource Sharing
(c) Reliability
(d) Scalability
(e) None

(iv) In a distributed system,

- **(a) Every node has its local clock**
- **(b) Every node has its local memory**
- **(c) Every node has both its local clock & memory**
- **(d) None**

(v) Which routing technique is used in a distributed system?

(a) Fixed Routing (b) Virtual Routing (c) Dynamic routing (d) All

(vi) In a distributed system, link and node failure are detected by

(a) Polling (b) Handshaking (c) Token passing (d) None

(vii) What is not true in a distributed system?

(a) It is a collection of computers (b) It is a collection of resources,
(c) All computers are synchronized (d) None

(viii) What are the characteristics of a distributed system?

(a) Users are aware of multiplicity of machines
(b) Access is done like local resources
(c) They can work without Internet
(d) None

(ix) What is the characteristic of atomicity?

- **(a) All operations are completed**
- **(b) None of the operations are completed**
- **(c) All or None of the operations are completed**
- **(d) None of the above**

(x) ------- of the distributed system are dispersed among various machines?

- **(a) Clients**
- **(b) Servers**
- **(c) Storage Devices**
- **(d) All**

Q3. Write brief answer for the following.

(i) What is the common problem found in a distributed system?

(ii) How many layers are there in TCP/IP protocol Suite? Write each of layers.

(iii) Which layer is responsible for process to process delivery?

(iv) What is the use of caching in a distributed system? Give an example.

(v) What are the RPC call semantics? Which one is better? Justify.

(vi) What features justify that an Air Line Reservation system is a distributed system

(vii) **How the clock synchronization can take place between two nodes in a distributed system? Write the name of algorithm.**

(viii) **What do you mean by local procedure call? How it is different from Remote Procedure Call?**

(ix) **Differentiate between shared memory and message passing?**

(x) **Which one in Q 3(ix) is followed in a distributed system?**

(x) **What do you mean by microkernel in a distributed system? Write its disadvantages.**

Q4. **(a) Write the full forms of following:**

SSI, XDR, RPC, RMI, NTP

(b) What is marshalling and unmarshalling in distributed systems?

(c) Show the marshalling processor for the following:

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(d) Differentiate between Availability and Reliability of a distributed system.

(e) State TRUE or FALSE whether "Every reliable system is available (OR) Every available system is reliable?

Q5. **Write the brief answer for the following.**

(a) What is an idempotent operation? Give an example.

(b) What do you mean by Zero Copy property in a distributed system? Give an example.

(c) What is the limitation of physical clock? How it can be overcome?

(d) What is lamport/s clock? Write its limitations. How it can be overcome?

(e) Differentiate between fault, error and failure in a distributed system?

(f) Write the rules for "happened before" relationship in a distributed system?

(g) What is the liveness and Safety condition in Leader Election Protocol?

(h) What is the message complexity of Bully's Leader Election Algorithm?

(i) Write the key difference between Ring and Bully's Algorithm.

(j) Draw the RPC information flow diagram depicting the client and server stubs.