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B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Sixth Semester

Computer Science and Engineering

CS 6601 — DISTRIBUTED SYSTEMS

(Common to Information Technology)

(Regulations 2013)

Time : 3 hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is location aware computing?
2. State any four factors to be considered for variations in client server model.
3. Compare the communicating entities : Object, components and web services.
4. "Tiered architectures are complementary to layering" — Comment.
5. What is Napster?
6. Define Gnutella.
7. List the methods to ensure serializability.
8. State the issues in Clocks.
9. Draw the pictorial representation of lifecycle of Java Thread.
10. What is User-Mode Scheduling (UMS)?

PART B — (5 × 13 = 65 marks)

11. (a) (i) What is the need for distributed system? List the distributed systems challenges. (5)

(ii) Identify the five types of hardware resource and five types of data or software resource that can be shared efficiently. Give examples. (8)

Or

(b) (i) Elaborate the design issues to be considered for spontaneous networking. (5)

(ii) A user arrives at a railway station for the first time, carrying a PDA that is capable of wireless networking. Suggest how the user could be provided with information about the local services and amenities at that station, without entering the station's name or attributes. What are the technical challenges to be addressed? (8)

12. (a) (i) Discuss on Distributed Shared Memory (DSM) with suitable illustrations. (8)

(ii) Consider a simple server that carries out client requests without accessing other servers. Explain why it is generally not possible to set a limit on the time taken by a server to respond to a client request. What should the server do, to execute requests within a bounded time? (5)

Or

(b) (i) What is Publish-Subscriber Systems? Explain its characteristic features with neat sketch. (8)

(ii) Classify and tabulate the arbitrary failures with respect to class, affects and comments. (5)

13. (a) What is Pastry? Explain the Pastry's Routing Algorithm with pseudo-code. (13)

Or

(b) (i) Explain File Service Architecture and Andrew File System with suitable sketch. (10)

(ii) State the differences between Overlay networks and IP routing. (3)

14. (a) (i) State the problems in Cristian's algorithm. Explain how Berkeley algorithm overcomes the problems of Cristian's algorithm with neat sketch. (8)

(ii) Describe the Central Sever Algorithm with neat sketch. State its performance measures. (5)

Or

(b) Elucidate Coda architecture with respect to file systems, communication coda and processes in coda with necessary block diagrams. (13)

15. (a) (i) State the issues in load balancing algorithms. (5)

(ii) What is Process Migration? State the issues in migration. Describe Negotiation in Migration process with neat sketch. (8)

Or

(b) (i) Give a brief account on desired features of scheduling algorithms. (5)

(ii) Define Thread. Elucidate the actions involved in multithreaded architecture and multithreaded models with appropriate sketch. (8)

PART C — (1 × 15 = 15 marks)

16. (a) A client makes remote procedure calls to a server. The client takes 5 milliseconds to compute the arguments for each request, and the server takes 10 milliseconds to process each request. The local operating system processing time for each send or receive operation is 0.5 milliseconds, and the network time to transmit each request or reply message is 3 milliseconds. Marshalling or unmarshalling takes 0.5 milliseconds per message.

(i) Calculate the time taken by the client to generate and return from two requests :

(1) if it is single-threaded, and (4)

(2) if it has two threads that can make requests concurrently on a single processor. Context-switching time can be ignored. (8)

(ii) Is there a need for asynchronous RPC if client and server processes are threaded? (3)

Or

(b) (i) A client attempts to synchronize with a time server. It records the round-trip times and timestamps returned by the server is given in the table below. Which of these times should it use to set its clock? To what time should it set it? Estimate the accuracy of the setting with respect to the server's clock.

Round-trip (ms)	Time (hr:min:sec)
22	10:54:23.674
25	10:54:25.450
20	10:54:28.342

If the minimum time between sending and receiving a message in the system is 8 ms, is there any change in the derived solution? (7)

(ii) Two processes P and Q are connected in a ring using two channels and they constantly rotate a message m. At any one time, there is only one copy of m in the system. Each process's state consists of the number of times it has received m and P sends m first. At a certain point P, has the message and its state is 101. Immediately after sending m, P initiates the snapshot algorithm. Explain the operation of the algorithm in this case, giving the possible global state(s) reported by the algorithm. (8)