COLLEGE OF ENGINEERING, PUNE

(An Autonomous Institute of Government of Maharashtra)

End Semester Examination

Subject :- (CT 412) Distributed Systems   Max. Time :- 3 Hrs

Class:- B.Tech (Information Technology)   ACY:- 2012-13   Max. Marks:- 100

Instructions :

    1. Attempt all questions

    2. Figures to the right indicate full marks

    3. Draw neat and labeled diagram wherever necessary

    4. Assume suitable data, if necessary

Q 1   **a**   **i**   In all how many NFS lookup calls are needed to access directory   **2** "Desktop/finalyear/btech/it/distributed-systems/assignments/1" ?

      ii   Why does the client kernel do path traversal by breaking the path into directory   **2** components ?

      iii   What is the reason for not passing the whole path name to the server?   **2**

      iv   Write correct arguments for the following NFS filesystem interface operations :   **4**

        1. umount(_____)

2. open(_____)

3. getattr(_____)

4. brelse(_____)

b The directory "distributed-systems" is located on server 1. It is accessed using path "/server1/btech/it/distributed-systems/". The directory is moved automatically to server 2. Now "distributed-systems" directory will be accessed from server 2 with the path name as "/server2/coep/btech/it/distributed-systems".

i Are both the paths location transparent ? **2**

ii Can we say our system location independent? **2**

iii What does location transparency and location independence mean ? **4**

Q 2 a A simplified version of cache ownership protocol is summarized as follows : **8**

The protocol manages cache blocks, each of which can be in one of the following three states :

1. INVALID – This cache block does not contain valid data.

2. CLEAN – Memory is up-to-date; the block may be in other caches.

3. DIRTY – Memory is incorrect; no other cache holds the block.

With a suitable example and diagram, explain working of this simplified cache ownership protocol.

b   Is printer shared over LAN loosely-coupled software? Justify your answer.   **6**

Q 3   **a**

    i   Computer systems can fail due to a fault in some component, such as   **8** processor, memory, I/O device, cable or software. If some component has probability p of malfunctioning in a given second of time, then derive the equation for mean time to failure. If the probability of crash for a system is 10^{-6} per second, then what is its mean time to failure ?

OR

    ii   Consider a design of an elevator controller in a 100-story building. Suppose that   **8** the elevator is sitting peacefully on the 60th floor waiting for customers. Then someone pushes the the call button on the first floor. Just 100 msec later, someone else pushes the call button on 100th floor.

How the elevator will work in the above scenario, if the controller system is :

    1.   Event-triggered real-time system.

    2.   Time-triggered real-time system with sensors sampled at every 500 msec.

b   Enlist design goals, object model, interfaces, replication & recovery support of   **10** CORBA and DCOM.

Q 4 **a** Compare mutual exclusion algorithms, with respect to messages per entry/exit and   **10**
delay before entry. Do all of them suffer badly in event crashes?

b Illustrate the use of vector in CBCAST communication primitive in ISIS. Does it   **8**
guarantees ordered delivery of messages for causally related messages ? Explain.

Q 5 **a** How does Grid computing differ from Cluster computing ?   **8**

b Describe in detail, the taxonomy of coordination models in distributed systems.   **8**

Q 6 **a**

i Explain the difference between a plug-in, an applet, a servlet, and a CGI program.   **8**

OR

ii Which are the server side and client side softwares in Lotus Notes?   **8**

b Two machines in a distributed system have their local clocks which are supposed   **8**
to tick 100 times per millisecond. One of them ticks 99 times per millisecond. The
UTC update comes once after one minute. What is the maximum clock skew which
occurs ? How change can be introduced for synchronizing the two clocks ?