Introduction to Computer Science-101
Quiz_3_solution

1. Explain the difference between FTP and TELNET. When would you use FTP and when would you use TELNET? (10%)
   FTP is used to transfer files over a network. TELNET is used to establish a login session on a remote machine. After establishing a session, we can also use TELNET commands to copy files.

2. Change the following IP addresses from dotted-decimal notation to binary notation. (10%)
   a.   112.32.7.28
   b.   129.4.6.8
   a. 01110000   00100000   00000111   00011100
   b. 10000001   00000100   00000110   00001000

3. Explain the client-server model on the Internet. In which layer of the TCP/IP protocol suite is the model implemented? (10%)
   In the client-server architecture, each application is made of two separate but related programs: a client program and a server program. The server program must be running all the time; the client program can be running only when needed. This model is implemented at the application layer.

4. What is the main function of the transport layer in the TCP/IP protocol suite? What type of addresses is used in this layer? (e.g. IP address used at network layer) (10%)
   The transport layer is responsible for process-to-process delivery of the entire message. The transport layer address is the process identification, called a port number.

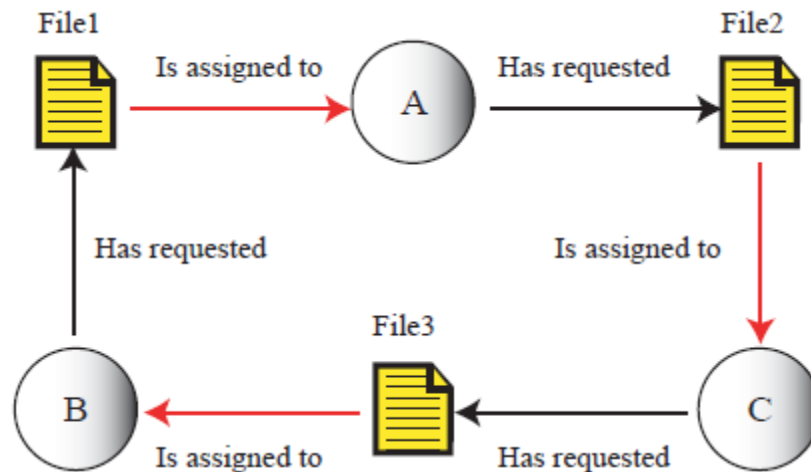5. What are the components of an operating system? (10%)
   Components of an operating systems are user interface, memory manager, process manager, device manager, and file manager.

6. How is demand paging more efficient than regular paging?(10%)
   In regular paging the entire program must be in memory at the same time in order for the program to execute. With demand paging, only some pages of a program can be in memory. This means that, in demand paging, more programs can use the computer's resources at any given time.

7. Three processes (A, B, and C) are running concurrently. Process A has acquired File1, but needs File 2. Process B has acquired File3, but needs File 1. Process C has acquired File2, but needs File3. Draw a diagram for these processes. Is this a deadlock situation? (10%)
   This is a deadlock situation (see following figure) because all four conditions of deadlock (mutual exclusion, resource holding, no preemption, and circular waiting) are all present.

File1 — Is assigned to → A — Has requested → File2
File2 — Is assigned to → C — Has requested → File3 — Is assigned to → B — Has requested → File1

8. What is the status (show as following figure) of a process in each of the following situations? (10%)
    a. The process is using the CPU.
    b. The process has been stopped because its time slot is over.
    c. The process is reading data from the keyboard.
    d. The process is printing data.

    a. running
    b. ready
    c. waiting
    d. waiting
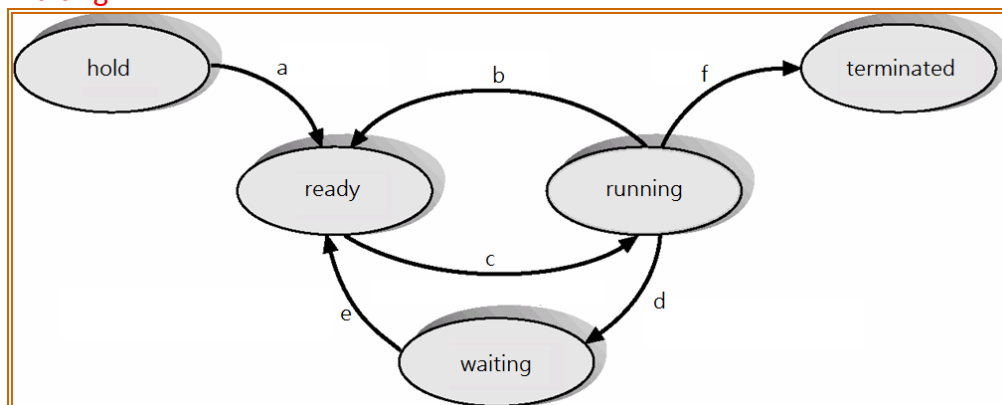
9. A multiprogramming operating system uses paging. The available memory is 60 MB divided into 15 frames, each of 4 MB. The first program needs 13 MB. The second program needs 35 MB.(10%)
    a. How many frames are used by the first program?
        13 / 4 = 3.25 → 4 pages.
    b. How many frames are used by the second program?
        35 / 4 = 8.75 → 9 pages.
    c. What is the total memory wasted (considering memory lost inside each frame)?
        60-(35+13)=12 MB.
    d. What percentage of memory wasted (considering memory lost inside each frame)?
        12/60=20%.

10. List four necessary conditions for deadlock. (10%)
   Mutual exclusion, resource holding, no preemption and circular waiting.