Network Structure

Exercises

19.9 What is the difference between computation migration and process migration? Which is easier to implement, and why?

19.10 Even though the OSI model of networking specifies seven layers of functionality, most computer systems use fewer layers to implement a network. Why do they use fewer layers? What problems could the use of fewer layers cause?

19.11 Explain why doubling the speed of the systems on an Ethernet segment may result in decreased network performance when the UDP transport protocol is used. What changes could help solve this problem?

19.12 What are the advantages of using dedicated hardware devices for routers? What are the disadvantages of using these devices compared with using general-purpose computers?

19.13 In what ways is using a name server better than using static host tables? What problems or complications are associated with name servers? What methods could you use to decrease the amount of traffic name servers generate to satisfy translation requests?

19.14 Name servers are organized in a hierarchical manner. What is the purpose of using a hierarchical organization?

19.15 The lower layers of the OSI network model provide datagram service, with no delivery guarantees for messages. A transport-layer protocol such as TCP is used to provide reliability. Discuss the advantages and disadvantages of supporting reliable message delivery at the lowest possible layer.

19.16 Run the program shown in Figure 19.4 and determine the IP addresses of the following host names:

- www.wiley.com
- www.cs.yale.edu

- www.apple.com
- www.westminstercollege.edu
- www.ietf.org

19.17   A DNS name can map to multiple servers, such as www.google.com. However, if we run the program shown in Figure 19.4, we get only one IP address. Modify the program to display all the server IP addresses instead of just one.

19.18   The original HTTP protocol used TCP/IP as the underlying network protocol. For each page, graphic, or applet, a separate TCP session was constructed, used, and torn down. Because of the overhead of building and destroying TCP/IP connections, performance problems resulted from this implementation method. Would using UDP rather than TCP be a good alternative? What other changes could you make to improve HTTP performance?

19.19   What are the advantages and the disadvantages of making the computer network transparent to the user?

19.20   What are the benefits of a DFS compared with a file system in a centralized system?

19.21   For each of the following workloads, identify whether a cluster-based or a client−server DFS model would handle the workload best. Explain your answers.

- Hosting student files in a university lab.
- Processing data sent by the Hubble telescope.
- Sharing data with multiple devices from a home server.

19.22   Discuss whether OpenAFS and NFS provide the following: (a) location transparency and (b) location independence.

19.23   Under what circumstances would a client prefer a location-transparent DFS? Under what circumstances would she prefer a location-independent DFS? Discuss the reasons for these preferences.

19.24   What aspects of a distributed system would you select for a system running on a totally reliable network?

19.25   Compare and contrast the techniques of caching disk blocks locally, on a client system, and remotely, on a server.

19.26   Which scheme would likely result in a greater space saving on a multiuser DFS: file-level deduplication or block-level deduplication? Explain your answer.

19.27   What types of extra metadata information would need to be stored in a DFS that uses deduplication?