

Homework Assignment 2

ECE 151 / CMPSC 171 - Spring 2014

Due Monday, April 14, 5pm

1. Compare the reading of a file using (a) a **single-threaded file server** and (b) a **multi-threaded file server**, given the following measurements. It takes 30 msec for the server to get a request from a client, dispatch it, and perform the rest of the processing. The data needed are in a cache in main memory. In two-thirds of the requests, a disk operation is needed, which requires an additional 90 msec, during which time the thread sleeps.

In case (a), how many requests/sec can the single-threaded server handle?

In case (b), how many requests/sec can the multi-threaded server handle?

2. Sketch a design of a multi-threaded server that supports multiple application-layer protocols using the **TCP socket API** as the transport-level interface between the application and the underlying operating system.

3. A process P that requires access to a file F , which is locally available on the machine where P is currently running. Consider **process migration**, where P is migrated to another machine but F is not, and where P still requires access to F . Suppose that the file-to-machine binding is fixed. Explain how would you implement a system-wide reference to F .

4. Explain the difference between (a) a **synchronous (two-way) RPC** and (b) two **asynchronous (one-way) RPCs**, considering the actions of the client and the server. Give an example application where (a) is appropriate, and an example application where (b) is appropriate.

5. Explain how **message oriented middleware (MOM)** supports the asynchronous model of communication. What is the role of a **message broker** in a message queueing system?

6. Consider a distributed system that provides **multimedia streaming** with audio and video streams coming from different sources. Explain how middleware can facilitate the synchronization of the incoming audio and video streams at the destination. What would you do to reduce the effects of jitter at the destination?