

CS 490-004 Network Programming

Fall 2026

Quiz #3 on September 8, 2026 (SUGGESTED SOLUTIONS)

Your Last Three Digits: _____

(please do NOT write all of your student ID or your name)

Grade: _____

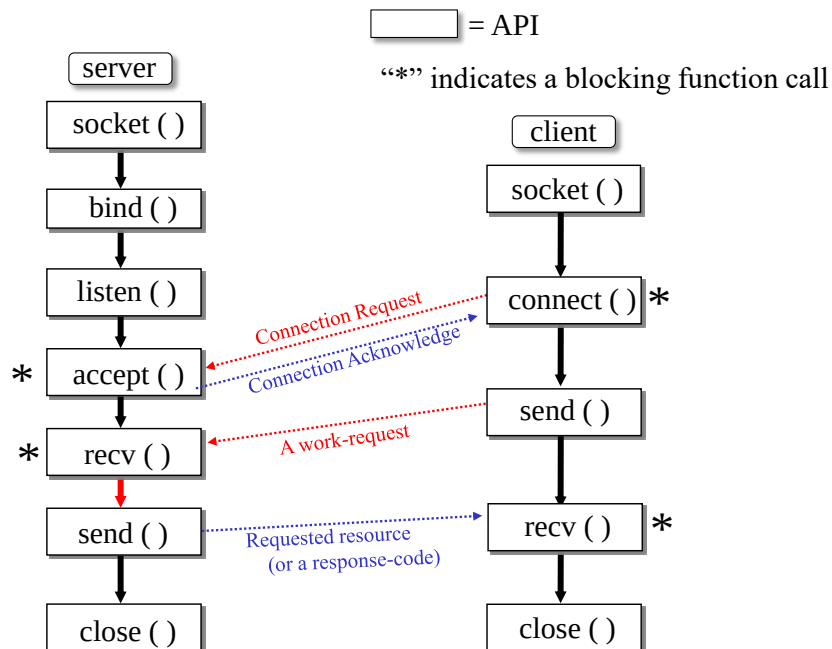
(1) What is “the client-server communication model”?

The client-server model is a model of network communication model (thus, it is a model for network applications) in the following way:

The one side of a communication is a server process, while the other side is a client process. A server process does not make any request to anyone but it waits for a request from a (remote) client process.

A client process sends a request to a (remote) server process. After a client sends a request to a server, it waits for a response from a server.

(2) Show how “the client-server communication model” is typically implemented using “socket APIs”.



(3) What is “multicast data transmissions”? Explain how “multicast data transmissions” solves the major weaknesses of “unicast data transmissions”.

Multicast data transmissions are a type of data transmissions that require a server transmits only one copy of data when multiple receivers share the same data (for IP-multicast, routers on the way to receivers duplicate data to each receivers).

The major advantages in multicast data transmissions (which are the weaknesses in the unicast transmissions) are followings:

- Reduce the workload at a server (especially when a large number of users request data from a server).
- Since a server does not have to repeat transmitting data possibly for a large number of times (when a large number of users request data from a server), serving a large number of receivers take less time (i.e., receivers can receive their request data sooner).
- Less network transmission to serve a large number of users.

(4) What is “tunneling” (as a technical definition)?

Transmitting payload data by intentionally deviating from the standard protocol-suite layer structure.

(5) What is “packet encapsulation”?

An entire packet at layer N becomes the payload at layer (N-1). Protocol layer (N-1) handles the entire packet at layer N just as payload – Protocol layer N and (N-1) never affects each other).