
Question 1: In a Content Distribution Network (CDN), the best Cluster Selection strategy is:

- A to perform real-time measurements between clusters and clients.
- B always to select the geographically closest cluster, based on the client's local DNS server (LDNS) IP address.
- C to use DASH with different bitrate versions of the video file.
- D always to select the geographically closest cluster, based on the client's IP address.

Question 2: Socket programming:

- A allows implementing both client-server and P2P systems in the transport layer.
- B allows implementing both client-server and P2P systems.
- C only allows implementing client-server systems.
- D only allows implementing P2P systems.

Question 3: Creating a server application using UDP sockets requires:

- A a server socket bound to a given port.
- B a server socket bound to a given port for each received connection.
- C a connection socket for receiving data and a server socket for sending data.
- D a connection socket per used connection, for both sending and receiving data.

Question 4: In a server application using TCP sockets:

- A there is always only 1 socket, the server socket.
- B there are $n + 1$ sockets for n connected clients.
- C there are n sockets for n connected clients.
- D there are always 2 sockets, one for sending and another for receiving.

Question 5: In a client application using TCP sockets:

- A a client socket needs to first establish a TCP connection before contacting the server.
- B a single client socket is needed to connect to the server.
- C a client socket needs to be bound to a port before the TCP connection setup.
- D a single client socket is needed to connect to a local port.

Question 6: Assume a typical client-server application with a TCP socket bound to a server's IP address and port. What happens when a client connects?

- A The server rejects the connection unless the client creates a new connection socket for the connection.
- B The server accepts the connection and creates a new socket for each connection.
- C The server accepts the connection and maintains the existing server socket for all connections.
- D The server rejects the connection because the socket is already bound to the server's IP address and port.

Question 7: Assume a **pure** peer-to-peer application where TCP is being used. How many sockets will be used **in total** if there are 3 clients, each connected to one another (full mesh)?
Hint: each client will receive and create independent connections, no connection reuse should be considered

- A 3
- B 15
- C 6
- D 9

Question 8: When a client creates an SMTP connection to the server "mail.ntnu.no", what happens first on the client's side?

- A A DNS query to resolve "mail.ntnu.no".
- B The creation of a server socket.
- C A DNS query to resolve the root, top-level and authoritative servers for "mail.ntnu.no".
- D The creation of a client TCP socket.

Question 9: Assume a video player uses DASH over HTTP/TCP. The client is currently downloading a high-bitrate chunk, and suddenly the available bandwidth drops sharply. Which statement is correct?

- A The server pushes a lower bitrate chunk automatically without the client's involvement.
- B DASH requires switching from TCP to UDP to handle bitrate changes.
- C The client typically adapts by selecting a lower bitrate for the next chunk, since the current chunk download is already in progress.
- D The network immediately switches the current chunk to a lower bitrate version mid-download.

Question 10: A single client machine opens two separate TCP connections to the same server IP and the same server port (e.g., two browser tabs to the same site). How can the server distinguish these two connections?

- A** By the TCP connection's 4-tuple: (client IP, client port, server IP, server port) — the client ports differ.
- B** It cannot; TCP allows only one connection per (server IP, server port).
- C** The server distinguishes them by creating different server ports for each connection.
- D** The server distinguishes them because each connection must use a different server socket bound to a different port.