

LECTURE NOTE ON CLIENT – SERVER

(COM 411 – Lecture One)

As workplaces continue to use interconnected data to perform daily tasks, IT professionals have increasingly moved to a method known as the client-server model to manage information. Using a client-server model, you can access, share and secure data efficiently across devices. Understanding how this system functions in the workplace can provide important foundational knowledge for IT professionals and prove helpful for users accessing information from a server. In this article, we explain the functions and features of the client-server model and address FAQs related to this topic.

What is a client-server model?

A client-server model is the name of the process used to deliver information from a server to a digital device. The client-server model describes a specific way devices access information stored in servers. It allows multiple clients to open applications or retrieve files from an individual server, which helps maintain consistency across all devices. Client-server models are widely used across all industries that use servers to store and access information.

Types of Computer Servers and How They Function

Types of clients include:

- a. Laptops
- b. Smartphones
- c. Tablets
- d. Desktop computers
- e. Chat applications
- f. Types of servers include:
 - g. File servers
 - h. Mail servers
 - i. Web servers

j. Cloud servers

How does the client-server model work?

The client-server model functions as a storage system for data. In the client-server model, much of the information and applications on a device are actually stored or installed on a remote server. When a client needs to access a particular file or application, it requests the data from a server. The server will then verify the request to ensure it came from a recognized device. Once the server verifies clients' credentials, it will download the requested information to the device.

Client devices may share a network with their host server or connect through the internet. The client-server model typically follows a request/response pattern, using a message system to make requests to a server. Communications between a client and a server function through specific protocols like TCP/IP.

Examples of client-server models used daily by businesses and individuals include:

- a. Email
- b. Network printers
- c. The internet
- d. LAN networks

What are the benefits of client-server models?

In a client-server model, IT professionals benefit from centralized management of server systems. This approach makes it easier to update information, forms and files accessible to all employees by changing the data in a central location. Instead of accessing individual devices to test or fix a problem within an application or data file, IT professionals can freely assess systems stored in a company-wide server, without needing to contact or interact with the user. IT professionals can monitor data from a single server to anticipate errors.

Another main benefit of using the client-server model is the increased security of critical information. When stored in a single server instead of across multiple devices, data can be better protected from external threats.

Here are the additional benefits of using a client-server model:

- i. The client-server model helps servers handle many requests at once using a scheduling system to prioritize messages from clients.
- ii. Client-server models improve the functionality of any computer by using resources from other devices through a server.
- iii. Data shared through a client-server network can be used on different devices since it isn't platform-specific.
- iv. Client-server networks make it easier to add features to a server without interrupting other processes.
- v. In a client-server model, data can be recovered more easily than through decentralized server models.
- vi. Client-server models may help an organization save money because they typically require less maintenance.
- vii. Client-server computing uses different architecture to maintain server networks.

Here are the four architecture types IT professionals use:

- a) **One-tier:** A one-tier server uses a single device to run a program. Because a one-tier server doesn't require access to a network, it can help eliminate network traffic.
- b) **Two-tier:** These server systems include a client, server and program, and they also store the graphical user interface (GUI) on the client's device, while keeping the domain logic on a server. This type of server uses complex coding languages like Java or C++ to display the GUI.
- c) **Three-tier:** Three-tier servers combine a presentation tier or user interface layer, an application tier that acts as a service layer performing detailed processing and a data tier made up of a database server storing information.

- d) **N-tier:** An N-tier server comprises different layers that separate responsibilities and manage dependencies or physical tiers running on different machines that enhance the scalability of a system. N-tier servers can be open-layer programming, where layers can communicate freely, or closed-layer when one layer communicates only with the layer below.

How is the peer-to-peer model different from a client-server approach?

Instead of using a centralized module, peer-to-peer (P2P) models use multiple units. In P2P models, all units have the ability to act as a server or a client. Unlike the single server control of a client-server model, P2P units collectively communicate and share resources as needed. These units can also help to balance the server load capacity as client requests increase.

Are there different types of servers used in a client-server model?

There are four different servers that IT professionals use to create a client-server connection.

Client-server models can include:

- i. **Database servers:** A database server is typically used for programs containing highly structured data, like marketing spreadsheets or accounting files.
- ii. **Application servers:** These servers help users access internet applications without downloading a copy to their device.
- iii. **Web servers:** These servers exist to facilitate client access to the internet.
- iv. **Computing servers:** A computing server provides additional space and power beyond the capabilities of a typical device.

How are TCP and IP protocols used in client-server models?

A TCP protocol keeps a connection between the client and server until a request is completed or as long as a device and a server send messages to each other. TCP protocols help organize information into units so networks can receive, deliver and transfer data efficiently. They also help manage information that must be retransmitted if it becomes distorted or dropped.

IP protocols don't require a connection. In an IP protocol, independent data units travel through the internet.

How are LANs and WANs used in client-server networks?

A local area network (LAN) connects a device to a server using a localized path. Organizations typically set up LAN networks within an office. These connections can be more secure but lack external capabilities, such as connecting to a cloud. A wide area network (WAN) uses the internet to connect devices and servers. WAN networks allow for broader applications and access to larger collections of data, although these connections may need heightened security measures.

What are the three classifications of clients?

IT professionals refer to clients in three distinct types. They're also called server requesters. These include:

- i. **Thin clients:** A thin client needs the resources and processing power from a server to perform many of a device's main functions.
- ii. **Thick clients:** Devices that can process large amounts of data and handle multiple functions without the help of a server are considered thick clients.
- iii. **Hybrid clients:** These devices can process data within their systems but rely on a server to store data used for larger or repeated processing tasks.

What web technologies are built to use client-server models?

Client-server models are the foundation for the following technologies:

- i. Domain name systems
- ii. Telnet
- iii. Hypertext transfer protocol
- iv. Simple mail transfer protocol

What are some functions of client-side and server-side programming?

- i. Client-side programming in a device includes:
- ii. Creating interactive web pages
- iii. Interacting with temporary and local storage
- iv. Sending data requests to a server
- v. Interfacing between servers and users
- vi. Server-side programming includes:
- vii. Completing database operations
- viii. Connecting with other servers
- ix. Processing user requests
- x. Writing files on servers
- xi. Accessing server files
- xii. Querying a database
- xiii. Creating structured web applications