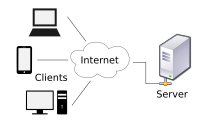
Server (computing)

From Wikipedia, the free encyclopedia

[Jump to navigation](https://en.wikipedia.org/wiki/Server_(computing)#mw-head)[Jump to search](https://en.wikipedia.org/wiki/Server_(computing)#searchInput)

[](https://en.wikipedia.org/wiki/File:Client-server-model.svg)

A computer network diagram of [client](https://en.wikipedia.org/wiki/Client_(computing)) computers communicating with a server computer via the [Internet](https://en.wikipedia.org/wiki/Internet)

[](https://en.wikipedia.org/wiki/File:Wikimedia_Foundation_Servers-8055_35.jpg)

[Wikimedia Foundation](https://en.wikipedia.org/wiki/Wikimedia_Foundation) servers

[](https://en.wikipedia.org/wiki/File:First-server-cern-computer-center.jpg)

First [WWW](https://en.wikipedia.org/wiki/World_Wide_Web) server located at [CERN](https://en.wikipedia.org/wiki/CERN) with its original sticker that says: "This machine is a server. DO NOT POWER IT DOWN!!"

In [computing](https://en.wikipedia.org/wiki/Computing), a **server** is a piece of [computer](https://en.wikipedia.org/wiki/Computer) hardware or software ([computer program](https://en.wikipedia.org/wiki/Computer_program)) that provides functionality for other programs or devices, called "[clients](https://en.wikipedia.org/wiki/Client_(computing))". This [architecture](https://en.wikipedia.org/wiki/Systems_architecture) is called the [client–server model](https://en.wikipedia.org/wiki/Client%E2%80%93server_model). Servers can provide various functionalities, often called "services", such as sharing data or [resources](https://en.wikipedia.org/wiki/System_resource) among multiple clients, or performing [computation](https://en.wikipedia.org/wiki/Computation) for a client. A single server can serve multiple clients, and a single client can use multiple servers. A client process may run on the same device or may connect over a network to a server on a different device.[[1]](https://en.wikipedia.org/wiki/Server_(computing)#cite_note-1) Typical servers are [database servers](https://en.wikipedia.org/wiki/Database_server), [file servers](https://en.wikipedia.org/wiki/File_server), [mail servers](https://en.wikipedia.org/wiki/Mail_server), [print servers](https://en.wikipedia.org/wiki/Print_server), [web servers](https://en.wikipedia.org/wiki/Web_server), [game servers](https://en.wikipedia.org/wiki/Game_server), and [application servers](https://en.wikipedia.org/wiki/Application_server).[[2]](https://en.wikipedia.org/wiki/Server_(computing)#cite_note-2)

Client–server systems are today most frequently implemented by (and often identified with) the [request–response](https://en.wikipedia.org/wiki/Request%E2%80%93response) model: a client sends a request to the server, which performs some action and sends a response back to the client, typically with a result or acknowledgment. Designating a computer as "server-class hardware" implies that it is specialized for running servers on it. This often implies that it is more powerful and reliable than standard [personal computers](https://en.wikipedia.org/wiki/Personal_computer), but alternatively, large [computing clusters](https://en.wikipedia.org/wiki/Computing_cluster) may be composed of many relatively simple, replaceable server components.



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History[[edit](https://en.wikipedia.org/w/index.php?title=Server_(computing)&action=edit&section=1)]

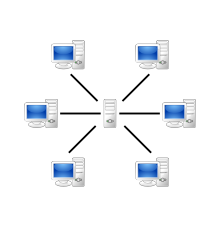
The use of the word *server* in computing comes from [queueing theory](https://en.wikipedia.org/wiki/Queueing_theory),[[3]](https://en.wikipedia.org/wiki/Server_(computing)#cite_note-3) where it dates to the mid 20th century, being notably used in [Kendall (1953)](https://en.wikipedia.org/wiki/Server_(computing)#CITEREFKendall1953) (along with "service"), the paper that introduced [Kendall's notation](https://en.wikipedia.org/wiki/Kendall%27s_notation). In earlier papers, such as the [Erlang (1909)](https://en.wikipedia.org/wiki/Server_(computing)#CITEREFErlang1909), more concrete terms such as "[telephone] operators" are used.

In computing, "server" dates at least to [RFC 5](https://tools.ietf.org/html/rfc5) (1969),[[4]](https://en.wikipedia.org/wiki/Server_(computing)#cite_note-rulifson-4) one of the earliest documents describing [ARPANET](https://en.wikipedia.org/wiki/ARPANET) (the predecessor of [Internet](https://en.wikipedia.org/wiki/Internet)), and is contrasted with "user", distinguishing two types of [host](https://en.wikipedia.org/wiki/Host_(network)): "server-host" and "user-host". The use of "serving" also dates to early documents, such as [RFC 4](https://tools.ietf.org/html/rfc4),[[5]](https://en.wikipedia.org/wiki/Server_(computing)#cite_note-5) contrasting "serving-host" with "using-host".

The [Jargon File](https://en.wikipedia.org/wiki/Jargon_File) defines "[server](http://www.catb.org/jargon/html/S/server.html)" in the common sense of a process performing service for requests, usually remote, with the 1981 ([1.1.0](http://www.catb.org/jargon/oldversions/jarg110.txt)) version reading:

SERVER n. A kind of [DAEMON](https://en.wikipedia.org/wiki/Daemon_(computing)) which performs a service for the requester, which often runs on a computer other than the one on which the server runs.

Operation[[edit](https://en.wikipedia.org/w/index.php?title=Server_(computing)&action=edit&section=2)]

[](https://en.wikipedia.org/wiki/File:Server-based-network.svg)

A network based on the [**client–server model**](https://en.wikipedia.org/wiki/Client%E2%80%93server_model) where multiple individual *clients* request services and resources from centralized servers

Strictly speaking, the term *server* refers to a [computer program](https://en.wikipedia.org/wiki/Computer_program) or [process](https://en.wikipedia.org/wiki/Process_(computing)) (running program). Through [metonymy](https://en.wikipedia.org/wiki/Metonymy), it refers to a device used for (or a device dedicated to) running one or several server programs. On a network, such a device is called a [*host*](https://en.wikipedia.org/wiki/Host_(network)). In addition to *server*, the words *serve* and *service* (as noun and as verb) are frequently used, though *servicer* and *servant* are not.[[a]](https://en.wikipedia.org/wiki/Server_(computing)#cite_note-6) The word *service* (noun) may refer to either the abstract form of functionality, e.g. [Web service](https://en.wikipedia.org/wiki/Web_service). Alternatively, it may refer to a computer program that turns a computer into a server, e.g. [Windows service](https://en.wikipedia.org/wiki/Windows_service). Originally used as "servers serve users" (and "users use servers"), in the sense of "obey", today one often says that "servers serve data", in the same sense as "give". For instance, [web servers](https://en.wikipedia.org/wiki/Web_server) "serve [up] web pages to users" or "service their requests".

The server is part of the [client–server model](https://en.wikipedia.org/wiki/Client%E2%80%93server_model); in this model, a server serves data for [clients](https://en.wikipedia.org/wiki/Client_(computing)). The nature of communication between a client and server is [request and response](https://en.wikipedia.org/wiki/Request%E2%80%93response). This is in contrast with [peer-to-peer](https://en.wikipedia.org/wiki/Peer-to-peer) model in which the relationship is on-demand reciprocation. In principle, any computerized process that can be used or called by another process (particularly remotely, particularly to share a resource) is a server, and the calling process or processes is a client. Thus any general-purpose computer connected to a network can host servers. For example, if files on a device are shared by some process, that process is a [file server](https://en.wikipedia.org/wiki/File_server). Similarly, [web server](https://en.wikipedia.org/wiki/Web_server) software can *run* on any capable computer, and so a [laptop](https://en.wikipedia.org/wiki/Laptop) or a personal computer can host a web server.

While request–response is the most common client-server design, there are others, such as the [publish–subscribe pattern](https://en.wikipedia.org/wiki/Publish%E2%80%93subscribe_pattern). In the publish-subscribe pattern, clients register with a pub-sub server, subscribing to specified types of messages; this initial registration may be done by request-response. Thereafter, the pub-sub server forwards matching messages to the clients *without* any further requests: the server [*pushes*](https://en.wikipedia.org/wiki/Push_technology) messages to the client, rather than the client [*pulling*](https://en.wikipedia.org/wiki/Pull_technology) messages from the server as in request-response.[[6]](https://en.wikipedia.org/wiki/Server_(computing)#cite_note-7)

Purpose[[edit](https://en.wikipedia.org/w/index.php?title=Server_(computing)&action=edit&section=3)]

*Main category:*[*Servers (computing)*](https://en.wikipedia.org/wiki/Category:Servers_(computing))

The role of a server is to share data as well as to share [resources](https://en.wikipedia.org/wiki/System_resource) and distribute work. A server computer can serve its own computer programs as well; depending on the scenario, this could be part of a [*quid pro quo*](https://en.wikipedia.org/wiki/Quid_pro_quo) transaction, or simply a technical possibility. The following table shows several scenarios in which a server is used.

|  |  |  |
| --- | --- | --- |
| **Server type** | **Purpose** | **Clients** |
| [Application server](https://en.wikipedia.org/wiki/Application_server) | Hosts [web apps](https://en.wikipedia.org/wiki/Web_app) (computer programs that run inside a [web browser](https://en.wikipedia.org/wiki/Web_browser)) allowing users in the network to run and use them, without having to install a copy on their own computers. Unlike what the name might imply, these servers need not be part of the [World Wide Web](https://en.wikipedia.org/wiki/World_Wide_Web); any [local network](https://en.wikipedia.org/wiki/Local_network) would do. | Computers with a web browser |
| [Catalog server](https://en.wikipedia.org/wiki/Catalog_server) | Maintains an index or table of contents of information that can be found across a large distributed network, such as computers, users, files shared on file servers, and web apps. [Directory servers](https://en.wikipedia.org/wiki/Directory_server) and [name servers](https://en.wikipedia.org/wiki/Name_server) are examples of catalog servers. | Any computer program that needs to find something on the network, such a [Domain member](https://en.wikipedia.org/wiki/Windows_domain) attempting to log in, an [email client](https://en.wikipedia.org/wiki/Email_client) looking for an email address, or a user looking for a file |
| [Communications server](https://en.wikipedia.org/wiki/Communications_server) | Maintains an environment needed for one communication endpoint (user or devices) to find other endpoints and communicate with them. It may or may not include a directory of communication endpoints and a presence detection service, depending on the openness and security parameters of the network | Communication endpoints (users or devices) |
| [Computing server](https://en.wikipedia.org/wiki/Supercomputer) | Shares vast amounts of computing resources, especially [CPU](https://en.wikipedia.org/wiki/Central_processing_unit) and [random-access memory](https://en.wikipedia.org/wiki/Random-access_memory), over a network. | Any computer program that needs more CPU power and RAM than a personal computer can probably afford. The client must be a networked computer; otherwise, there would be no client-server model. |
| [Database server](https://en.wikipedia.org/wiki/Database_server) | Maintains and shares any form of [database](https://en.wikipedia.org/wiki/Database) (organized collections of data with predefined properties that may be displayed in a table) over a network. | [Spreadsheets](https://en.wikipedia.org/wiki/Spreadsheet), [accounting software](https://en.wikipedia.org/wiki/Accounting_software), [asset management software](https://en.wikipedia.org/wiki/Digital_asset_management) or virtually any computer program that consumes well-organized data, especially in large volumes |
| [Fax server](https://en.wikipedia.org/wiki/Fax_server) | Shares one or more [fax machines](https://en.wikipedia.org/wiki/Fax_machine) over a network, thus eliminating the hassle of physical access | Any fax sender or recipient |
| [File server](https://en.wikipedia.org/wiki/File_server) | Shares [files](https://en.wikipedia.org/wiki/Computer_file) and [folders](https://en.wikipedia.org/wiki/Computer_folder), storage space to hold files and folders, or both, over a network | Networked computers are the intended clients, even though local programs can be clients |
| [Game server](https://en.wikipedia.org/wiki/Game_server) | Enables several computers or gaming devices to play [multiplayer video games](https://en.wikipedia.org/wiki/Multiplayer_video_game) | Personal computers or [gaming consoles](https://en.wikipedia.org/wiki/Video_game_console) |
| [Mail server](https://en.wikipedia.org/wiki/Mail_server) | Makes [email](https://en.wikipedia.org/wiki/Email) communication possible in the same way that a [post office](https://en.wikipedia.org/wiki/Post_office) makes [snail mail](https://en.wikipedia.org/wiki/Snail_mail) communication possible | Senders and recipients of email |
| [Media server](https://en.wikipedia.org/wiki/Media_server) | Shares [digital video](https://en.wikipedia.org/wiki/Digital_video) or [digital audio](https://en.wikipedia.org/wiki/Digital_audio) over a network through [media streaming](https://en.wikipedia.org/wiki/Streaming_media) (transmitting content in a way that portions received can be watched or listened to as they arrive, as opposed to downloading an entire file and then using it) | User-attended personal computers equipped with a monitor and a speaker |
| [Print server](https://en.wikipedia.org/wiki/Print_server) | Shares one or more [printers](https://en.wikipedia.org/wiki/Printer_(computing)) over a network, thus eliminating the hassle of physical access | Computers in need of printing something |
| [Sound server](https://en.wikipedia.org/wiki/Sound_server) | Enables computer programs to play and record sound, individually or cooperatively | Computer programs of the same computer and network clients. |
| [Proxy server](https://en.wikipedia.org/wiki/Proxy_server) | Acts as an [intermediary](https://en.wikipedia.org/wiki/Intermediary) between a client and a server, accepting incoming traffic from the client and sending it to the server. Reasons for doing so include content control and filtering, improving traffic performance, preventing unauthorized network access or simply routing the traffic over a large and complex network. | Any networked computer |
| Virtual server | Shares hardware and software resources with other virtual servers. It exists only as defined within specialized software called [hypervisor](https://en.wikipedia.org/wiki/Hypervisor). The [hypervisor](https://en.wikipedia.org/wiki/Hypervisor) presents virtual hardware to the server as if it were real physical hardware.[[7]](https://en.wikipedia.org/wiki/Server_(computing)#cite_note-8) Server virtualization allows for a more efficient infrastructure. [[8]](https://en.wikipedia.org/wiki/Server_(computing)#cite_note-9) | Any networked computer |
| [Web server](https://en.wikipedia.org/wiki/Web_server) | Hosts [web pages](https://en.wikipedia.org/wiki/Web_page). A web server is what makes the [World Wide Web](https://en.wikipedia.org/wiki/World_Wide_Web) possible. Each [website](https://en.wikipedia.org/wiki/Website) has one or more web servers. | Computers with a web browser |

Almost the entire structure of the [Internet](https://en.wikipedia.org/wiki/Internet) is based upon a [client–server](https://en.wikipedia.org/wiki/Client%E2%80%93server) model. High-level [root nameservers](https://en.wikipedia.org/wiki/Root_nameserver), [DNS](https://en.wikipedia.org/wiki/Domain_Name_System), and routers direct the traffic on the internet. There are millions of servers connected to the Internet, running continuously throughout the world[[9]](https://en.wikipedia.org/wiki/Server_(computing)#cite_note-10) and virtually every action taken by an ordinary [Internet](https://en.wikipedia.org/wiki/Internet) user requires one or more interactions with one or more servers. There are exceptions that do not use dedicated servers; for example, [peer-to-peer file sharing](https://en.wikipedia.org/wiki/File_sharing) and some implementations of [telephony](https://en.wikipedia.org/wiki/Telephony) (e.g. pre-Microsoft [Skype](https://en.wikipedia.org/wiki/Skype)).

Hardware[[edit](https://en.wikipedia.org/w/index.php?title=Server_(computing)&action=edit&section=4)]

[](https://en.wikipedia.org/wiki/File:Inside_and_Rear_of_Webserver.jpg)

A rack-mountable server with the top cover removed to reveal internal components

[Hardware](https://en.wikipedia.org/wiki/Computer_hardware) requirement for servers vary widely, depending on the server's purpose and its software. Servers are more often than not, more powerful and expensive than the clients that connect to them.

Since servers are usually accessed over a network, many run unattended without a [computer monitor](https://en.wikipedia.org/wiki/Computer_monitor) or input device, audio hardware and [USB](https://en.wikipedia.org/wiki/Universal_Serial_Bus) interfaces. Many servers do not have a [graphical user interface](https://en.wikipedia.org/wiki/Graphical_user_interface) (GUI). They are configured and managed remotely. Remote management can be conducted via various methods including [Microsoft Management Console](https://en.wikipedia.org/wiki/Microsoft_Management_Console) (MMC), [PowerShell](https://en.wikipedia.org/wiki/PowerShell), [SSH](https://en.wikipedia.org/wiki/Secure_Shell) and [browser-based](https://en.wikipedia.org/wiki/Web_browser) [out-of-band management](https://en.wikipedia.org/wiki/Out-of-band_management) systems such as Dell's [iDRAC](https://en.wikipedia.org/wiki/Dell_DRAC) or HP's [iLo](https://en.wikipedia.org/wiki/HP_Integrated_Lights-Out" \o "HP Integrated Lights-Out).

**Large servers**[[edit](https://en.wikipedia.org/w/index.php?title=Server_(computing)&action=edit&section=5)]

Large traditional single servers would need to be run for long periods without interruption. [Availability](https://en.wikipedia.org/wiki/Availability) would have to be very high, making hardware reliability and durability extremely important. [Mission-critical](https://en.wikipedia.org/wiki/Mission-critical) enterprise servers would be very [fault tolerant](https://en.wikipedia.org/wiki/Fault_tolerance) and use specialized hardware with low [failure rates](https://en.wikipedia.org/wiki/Failure_rate) in order to maximize [uptime](https://en.wikipedia.org/wiki/Uptime). [Uninterruptible power supplies](https://en.wikipedia.org/wiki/Uninterruptible_power_supply) might be incorporated to guard against power failure. Servers typically include hardware [redundancy](https://en.wikipedia.org/wiki/Redundancy_(engineering)) such as dual [power supplies](https://en.wikipedia.org/wiki/Power_supply), [RAID](https://en.wikipedia.org/wiki/RAID) [disk](https://en.wikipedia.org/wiki/Hard_disk) systems, and [ECC memory](https://en.wikipedia.org/wiki/ECC_memory),[[10]](https://en.wikipedia.org/wiki/Server_(computing)#cite_note-11) along with extensive [pre-boot](https://en.wikipedia.org/wiki/Preboot_Execution_Environment) memory testing and verification. Critical components might be [hot swappable](https://en.wikipedia.org/wiki/Hot_swappable), allowing technicians to replace them on the running server without shutting it down, and to guard against overheating, servers might have more powerful fans or use [water cooling](https://en.wikipedia.org/wiki/Water_cooling). They will often be able to be configured, powered up and down or rebooted remotely, using [out-of-band management](https://en.wikipedia.org/wiki/Out-of-band_management), typically based on [IPMI](https://en.wikipedia.org/wiki/Intelligent_Platform_Management_Interface). Server casings are usually [flat and wide](https://en.wikipedia.org/wiki/Rack_unit), and designed to be rack-mounted, either on [19-inch racks](https://en.wikipedia.org/wiki/19-inch_rack) or on [Open Racks](https://en.wikipedia.org/wiki/Open_Rack).

These types of servers are often housed in dedicated [data centers](https://en.wikipedia.org/wiki/Data_centers). These will normally have very stable power and Internet and increased security. Noise is also less of a concern, but power consumption and heat output can be a serious issue. Server rooms are equipped with air conditioning devices.

* [](https://en.wikipedia.org/wiki/File:DL380sREAR.jpg)

A [server rack](https://en.wikipedia.org/wiki/Server_rack) seen from the rear

* [](https://en.wikipedia.org/wiki/File:Wikimedia_Foundation_Servers-8055_08.jpg)

[Wikimedia Foundation](https://en.wikipedia.org/wiki/Wikimedia_Foundation) servers as seen from the front

* [](https://en.wikipedia.org/wiki/File:Wikimedia_Foundation_Servers-8055_23.jpg)

[Wikimedia Foundation](https://en.wikipedia.org/wiki/Wikimedia_Foundation) servers as seen from the rear

* [](https://en.wikipedia.org/wiki/File:Wikimedia_Foundation_Servers-8055_02.jpg)

[Wikimedia Foundation](https://en.wikipedia.org/wiki/Wikimedia_Foundation) servers as seen from the rear

**Clusters**[[edit](https://en.wikipedia.org/w/index.php?title=Server_(computing)&action=edit&section=6)]

*Main article:*[*Server farm*](https://en.wikipedia.org/wiki/Server_farm)

A *server farm* or *server cluster* is a collection of computer servers maintained by an organization to supply server functionality far beyond the capability of a single device. Modern [data centers](https://en.wikipedia.org/wiki/Data_center) are now often built of very large clusters of much simpler servers,[[11]](https://en.wikipedia.org/wiki/Server_(computing)#cite_note-12) and there is a collaborative effort, [Open Compute Project](https://en.wikipedia.org/wiki/Open_Compute_Project) around this concept.

**Appliances**[[edit](https://en.wikipedia.org/w/index.php?title=Server_(computing)&action=edit&section=7)]

A class of small specialist servers called [network appliances](https://en.wikipedia.org/wiki/Network_appliance) are generally at the low end of the scale, often being smaller than common desktop computers.

**Mobile**[[edit](https://en.wikipedia.org/w/index.php?title=Server_(computing)&action=edit&section=8)]

A mobile server has a portable form factor, e.g. a [laptop](https://en.wikipedia.org/wiki/Laptop).[[12]](https://en.wikipedia.org/wiki/Server_(computing)#cite_note-13) In contrast to large [data centers](https://en.wikipedia.org/wiki/Data_center) or rack servers, the mobile server is designed for on-the-road or *ad hoc* deployment into emergency, disaster or temporary environments where traditional servers are not feasible due to their power requirements, size, and deployment time.[[13]](https://en.wikipedia.org/wiki/Server_(computing)#cite_note-14) The main beneficiaries of so-called "server on the go" technology include network managers, software or database developers, training centers, military personnel, law enforcement, forensics, emergency relief groups, and service organizations.[[14]](https://en.wikipedia.org/wiki/Server_(computing)#cite_note-deskeng1-15) To facilitate portability, features such as the [keyboard](https://en.wikipedia.org/wiki/Computer_keyboard), [display](https://en.wikipedia.org/wiki/Display_device), [battery](https://en.wikipedia.org/wiki/Battery_(electricity)) ([uninterruptible power supply](https://en.wikipedia.org/wiki/Uninterruptible_power_supply), to provide power redundancy in case of failure), and mouse are all integrated into the chassis.

Operating systems[[edit](https://en.wikipedia.org/w/index.php?title=Server_(computing)&action=edit&section=9)]

[](https://en.wikipedia.org/wiki/File:Cobalt_Qube_3_Front.jpg)

Sun's [Cobalt Qube](https://en.wikipedia.org/wiki/Cobalt_Qube) 3; a computer [server appliance](https://en.wikipedia.org/wiki/Server_appliance) (2002); running Cobalt Linux (a customized version of Red Hat Linux, using the 2.2 Linux kernel), complete with the Apache web server.

On the Internet the dominant operating systems among servers are UNIX-like [open-source](https://en.wikipedia.org/wiki/Open_source_software) [distributions](https://en.wikipedia.org/wiki/Software_distribution), such as those based on [Linux](https://en.wikipedia.org/wiki/Linux) and [FreeBSD](https://en.wikipedia.org/wiki/FreeBSD),[[15]](https://en.wikipedia.org/wiki/Server_(computing)#cite_note-linuxusage-16) with [Windows Server](https://en.wikipedia.org/wiki/Windows_Server) also having a significant share. Proprietary operating systems such as [z/OS](https://en.wikipedia.org/wiki/Z/OS) and [macOS Server](https://en.wikipedia.org/wiki/MacOS_Server) are also deployed, but in much smaller numbers.

Specialist server-oriented operating systems have traditionally had features such as:

* [GUI](https://en.wikipedia.org/wiki/GUI) not available or optional
* Ability to [reconfigure](https://en.wikipedia.org/wiki/Reconfigurable_computing) and update both hardware and software to some extent without restart
* Advanced [backup](https://en.wikipedia.org/wiki/Backup) facilities to permit regular and frequent online backups of critical [data](https://en.wikipedia.org/wiki/Data),
* [Transparent](https://en.wikipedia.org/wiki/Network_transparency) data transfer between different [volumes](https://en.wikipedia.org/wiki/Volume_(computing)) or devices
* Flexible and advanced networking capabilities
* Automation capabilities such as [daemons](https://en.wikipedia.org/wiki/Daemon_(computer_software)) in UNIX and [services](https://en.wikipedia.org/wiki/Windows_service) in Windows
* Tight system security, with advanced user, resource, data, and memory protection.
* Advanced detection and alerting on conditions such as overheating, processor and disk failure.[[16]](https://en.wikipedia.org/wiki/Server_(computing)#cite_note-17)

In practice, today many desktop and server operating systems share similar [code bases](https://en.wikipedia.org/wiki/Code_base), differing mostly in configuration.

Energy consumption[[edit](https://en.wikipedia.org/w/index.php?title=Server_(computing)&action=edit&section=10)]

In 2010, data centers (servers, cooling, and other electrical infrastructure) were responsible for 1.1-1.5% of electrical energy consumption worldwide and 1.7-2.2% in the United States.[[17]](https://en.wikipedia.org/wiki/Server_(computing)#cite_note-18) One estimate is that total energy consumption for information and communications technology saves more than 5 times its [carbon footprint](https://en.wikipedia.org/wiki/Carbon_footprint)[[18]](https://en.wikipedia.org/wiki/Server_(computing)#cite_note-19) in the rest of the economy by increasing efficiency.

Global energy consumption is increasing due to the increasing demand of data and bandwidth. [Natural Resources Defense Council](https://en.wikipedia.org/wiki/Natural_Resources_Defense_Council) (NRDC) states that data centers used [91 billion kilowatt hours (kWh) electrical energy in 2013 which accounts to 3% of global electricity usage.](https://lifelinedatacenters.com/data-center/reduce-data-center-carbon-footprints/)

[Environmental groups](https://en.wikipedia.org/wiki/Environmental_groups) have placed focus on the carbon emissions of data centers as it accounts to 200 million metric tons of [carbon dioxide](https://en.wikipedia.org/wiki/Carbon_dioxide) in a year.

Various hosting providers have introduced [eco-friendly](https://en.wikipedia.org/wiki/Eco-friendly) servers that reduced [carbon emissions](https://en.wikipedia.org/wiki/Carbon_emissions) by 80% through off-shelf equipment and energy management.

See also[[edit](https://en.wikipedia.org/w/index.php?title=Server_(computing)&action=edit&section=11)]

* [Mobile server](https://en.wikipedia.org/wiki/Mobile_server)
* [Peer-to-peer](https://en.wikipedia.org/wiki/Peer-to-peer#Distributed_storage_and_search)

Notes[[edit](https://en.wikipedia.org/w/index.php?title=Server_(computing)&action=edit&section=12)]

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Further reading[[edit](https://en.wikipedia.org/w/index.php?title=Server_(computing)&action=edit&section=14)]

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|  | Wikimedia Commons has media related to [***Servers***](https://commons.wikimedia.org/wiki/Category:Servers). |

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